

G0.0+0.0

Sgr A East

RA: 17^h45^m44^s**1-GHz flux/Jy:** 100?**Size/arcmin:** 3.5×2.5**Dec:** −29°00′**Spectral index:** 0.8?**Type:** S**Radio:** Non-thermal shell, in complex region, interacting with molecular material to the W.**X-ray:** Diffuse emission, centrally peaked.**Point sources:** Compact X-ray/radio source.**References:**

Ekers et al. 1983, A&A, 122, 143. VLA at 1.4 GHz and 5 GHz (both 5″×8″), $S_{1.4\text{ GHz}}=77\text{ Jy}$, $S_{5.0\text{ GHz}}=31\text{ Jy}$.
 Pedlar et al. 1989, ApJ, 342, 769. VLA at 332 MHz (12″), 1.4 GHz (1″3×2″5) and 5 GHz (1″3×2″5).
 Mezger et al. 1989, A&A, 209, 337. Nearby molecular material.
 Ho et al. 1991, Nature, 350, 309. VLA of NH₃ emission from surroundings.
 Anantharamaiah et al. 1991, MNRAS, 249, 262. VLA at 330 MHz (17″×33″).
 Serabyn et al. 1992, ApJ, 395, 166. Nearby molecular material.
 Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×88″).
 Yusef-Zadeh & Mehringer 1995, ApJ, 452, L37. VLA of nearby H₂O masers.
 Yusef-Zadeh et al. 1999, ApJ, 512, 230. OH maser observations.
 Coil & Ho 2000, ApJ, 533, 245. NH₃ observations of surroundings.
 LaRosa et al. 2000, AJ, 119, 207. VLA at 333 MHz (24″×43″). *see also:* LaRosa et al. 2000, AJ, 119, 3145. Erratum.
 Fatuzzo et al. 2001, ApJ, 549, 293. Electron–positron lines from the vicinity.
 Yusef-Zadeh et al. 2001, ApJ, 560, 749. Observations of nearby molecular hydrogen.
 Maeda et al. 2002, ApJ, 570, 671. Chandra observations.
 Sakano et al. 2003, AN, 324 (No S1), 197. XMM-Newton observations.
 Roy & Pramesh Rao 2004, MNRAS, 349, L25. GMRT at 620 MHz (6′6×11′4).
 Sakano et al. 2004, MNRAS, 350, 129. XMM-Newton observations.
 Yusef-Zadeh et al. 2004, ApJS, 155, 421. VLA at 1.4 GHz (1″×2″2).
 Park et al. 2005, ApJ, 631, 964. Chandra observations.
 Aharonian et al. 2006, ApJ, 636, 777. H.E.S.S. detection.
 Koyama et al. 2007, PASJ, 59, S237. Suzaku observations.

Lee et al. 2008, ApJ, 674, 247. Molecular H₂ observations of surroundings.
 Sjouwerman & Pihlström 2008, ApJ, 681, 1287. VLA at 1.7 GHz of OH masers.
 Hewitt et al. 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
 Tsuboi & Miyazaki 2012, PASJ, 64, 111. CO observations of SW.
 Minh et al. 2013, ApJ, 773, 31. NH₃ observations of region.
 Zhao et al. 2013, ApJ, 777, 146. VLA at 4.8 GHz (0″5×0″7), 5.5 GHz (0″6×1″6), and 8.3 GHz (1″0×2″0).
 Nynka et al. 2013, ApJ, 778, L31. NuSTAR of compact X-ray source.
 Pihlström et al. 2014, AJ, 147, 73. VLA observations of methanol masers.
 Ponti et al. 2015, MNRAS, 453, 172. XMM-Newton observations.
 Tsuboi et al. 2015, PASJ, 67, 109. CO observations of region.
 Lau et al. 2015, Science, 348, 413. IR observations.
 Ajello et al. 2016, ApJ, 819, 44. Fermi observations.
 Yusef-Zadeh et al. 2016, ApJ, 819, 60. VLA at 1.5 GHz (0″5×1″4) and other frequencies.
 McEwen et al. 2016, ApJ, 832, 129. CH₃OH maser observations in region.
 Qiao et al. 2018, ApJS, 239, 15. OH maser observations.
 Ono et al. 2019, PASJ, 71, 52. Suzaku X-ray spectroscopy.
 Ogbodo et al. 2020, MNRAS, 493, 199. OH maser observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.
 Zhou et al. 2021, ApJ, 908, 31. Chandra observations.
 Tanaka et al. 2021, ApJ, 915, 79. [C I] sub-mm observations of surroundings.

G0.3+0.0**RA:** 17^h46^m15^s**1-GHz flux/Jy:** 22**Size/arcmin:** 15×8**Dec:** −28°38′**Spectral index:** 0.6**Type:** S

Has been called G0.33+0.04, G0.30+0.04 and G0.4+0.1.

Radio: Bilateral shell, near Galactic Centre.**X-ray:** Diffuse emission.**References:**

Kassim & Frail 1996, MNRAS, 283, L51. VLA at 333 MHz (23″×42″), plus review of flux densities and other observations.
 LaRosa et al. 2000, AJ, 119, 207. VLA at 333 MHz (30″). *see also:* LaRosa et al. 2000, AJ, 119, 3145. Erratum.
 Yusef-Zadeh et al. 2004, ApJS, 155, 421. VLA at 1.4 GHz (30″).

Ponti et al. 2015, MNRAS, 453, 172. XMM-Newton observations.
 Ajello et al. 2016, ApJ, 819, 44. Fermi observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.
 Heywood et al. 2022, ApJ, 925, 165. MeerKAT at 1.28 GHz.

G0.9+0.1

RA: 17^h47^m21^s
Dec: –28°09′

1-GHz flux/Jy: 18?
Spectral index: varies

Size/arcmin: 8
Type: C

Radio: Flat spectrum core within steep spectrum shell.

X-ray: Central core, with non-thermal spectrum.

Point sources: Central pulsar.

References:

Helfand & Becker 1987, ApJ, 314, 203. VLA at 1.4 and 5 GHz, and Einstein observations.
Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×91″).
Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Mereghetti et al. 1998, A&A, 331, L77. X-ray detection.
LaRosa et al. 2000, AJ, 119, 207. VLA at 333 MHz (24″×43″).
see also: LaRosa et al. 2000, AJ, 119, 3145. Erratum.
Sidoli et al. 2000, A&A, 361, 719. BeppoSAX observations.
Gaensler et al. 2001, ApJ, 556, L107. Chandra observations.
Porquet et al. 2003, A&A, 401, 197. XMM-Newton observations.
Yusef-Zadeh et al. 2004, ApJS, 155, 421. VLA at 1.4 GHz (8″6×11″3).
Aharonian et al. 2005, A&A, 432, L25. H.E.S.S. detection.
Dubner et al. 2008, A&A, 487, 1033. ATCA and VLA at 1.4 GHz (1″2×2″5 : $S = 8.3 \pm 0.7$ Jy), 5 GHz (1″6×2″5) and 8.3 GHz (0″8×1″5).

Camilo et al. 2009, ApJ, 700, L34. Pulsar detection.
Holler et al. 2012, A&A, 539, A24. Chandra and XMM-Newton observations.
Ponti et al. 2015, MNRAS, 453, 172. XMM-Newton observations.
Archer et al. 2016, ApJ, 821, 129. γ -ray observations.
H.E.S.S. Collaboration: Abdalla et al. 2018, A&A, 612, A1. H.E.S.S. observations.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S = 2.3$ Jy) including polarisation, and Spitzer observations.
Adams et al. 2021, ApJ, 913, 115. High energy γ -ray observations.
Heywood et al. 2022, ApJ, 925, 165. MeerKAT at 1.28 GHz (4″).

G1.0–0.1

RA: 17^h48^m30^s
Dec: –28°09′

1-GHz flux/Jy: 15
Spectral index: 0.6?

Size/arcmin: 8
Type: S

Has been called G1.05–0.1 and G1.05–0.15.

Radio: Incomplete shell, to the S of Sgr D.

X-ray: Possibly detected.

References:

Downes et al. 1979, A&AS, 35, 1. Review of flux densities.
Anantharamaiah et al. 1991, MNRAS, 249, 262. VLA at 330 MHz (64″×100″ : $S = 12.3$ Jy).
Liszt 1992, ApJS, 82, 495. VLA at 1.6 GHz (13″×23″).
Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×91″).
Mehringer et al. 1998, ApJ, 493, 274. VLA at 1.6 GHz (15″×28″) and 5 GHz, including masers observations.
Yusef-Zadeh et al. 1999, ApJ, 527, 172. VLA of nearby OH masers.
LaRosa et al. 2000, AJ, 119, 207. VLA at 333 MHz (24″×43″).
see also: LaRosa et al. 2000, AJ, 119, 3145. Erratum.
Sidoli et al. 2001, A&A, 372, 651. BeppoSAX possible detection.
Yusef-Zadeh et al. 2004, ApJS, 155, 421. VLA at 1.4 GHz (30″).

Hewitt et al. 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Nobukawa et al. 2009, AdSpR, 43, 1045. Suzaku observations.
Marquez-Lugo & Phillips 2010, MNRAS, 407, 94. Mid-IR observations.
Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.
Ponti et al. 2015, MNRAS, 453, 172. XMM-Newton observations.
Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
Ogbodo et al. 2020, MNRAS, 493, 199. OH maser observations.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.

G1.4–0.1

RA: 17^h49^m39^s
Dec: –27°46′

1-GHz flux/Jy: 2?
Spectral index: ?

Size/arcmin: 10
Type: S

Radio: Shell, brightest in E.

X-ray: Diffuse emission.

References:

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz (43″×92″ : S=2 Jy).
 Yusef-Zadeh et al. 1999, ApJ, 527, 172. VLA of nearby OH masers.
 Bhatnagar 2002, MNRAS, 332, 1. GMRT at 327 MHz (2′.4×2′.7 : S=4.2±0.5).
 Yusef-Zadeh et al. 2004, ApJS, 155, 421. VLA at 1.4 GHz (8″.2×12″.2).
 Hewitt et al. 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.

Pihlström et al. 2014, AJ, 147, 73. VLA observations of methanol masers.
 Ponti et al. 2015, MNRAS, 453, 172. XMM-Newton observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 McEwen et al. 2016, ApJ, 826, 189. NH₃ and CH₃OH observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : S=0.1 Jy) including polarisation, and Spitzer observations.

G1.9+0.3

RA: 17^h48^m45^s
Dec: –27°10′

1-GHz flux/Jy: 0.6
Spectral index: 0.6

Size/arcmin: 1.5
Type: S

Radio: Shell, brighter to the N, brightening; shows secular increase.

X-ray: Shell, with bright limbs to E and W.

Distance: H_I absorption gives < 10 kpc.

References:

Green & Gull 1984, Nature, 312, 527. VLA at 5 GHz (2″×4″.4).
 Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×94″).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Yusef-Zadeh et al. 2004, ApJS, 155, 421. VLA at 1.4 GHz (8″.3×12″).
 Nord et al. 2004, AJ, 128, 1646. VLA at 330 MHz (7″×12″).
 Green 2004, BASI, 32, 335. VLA at 1.5 GHz (7″.2×9″.4).
 Reynolds et al. 2008, ApJ, 680, L41. Chandra observations.
 Green et al. 2008, MNRAS, 387, L54. VLA at 4.86 GHz (4″×10″), for expansion studies.
 Murphy et al. 2008, MNRAS, 389, L23. MOST at 843 MHz for flux increase.
 Gómez & Rodríguez 2009, RMxAA, 45, 91. VLA at 1.5 GHz (5″.1×10″.6).
 Reynolds et al. 2009, ApJ, 695, L149. Chandra spectroscopy.
 Borkowski et al. 2010, ApJ, 724, L161. Chandra observations.
 Carlton et al. 2011, ApJ, 737, L22. Chandra expansion studies.
 Borkowski et al. 2013, ApJ, 771, L9. Chandra observations.
 H.E.S.S. Collaboration: Abramowski et al. 2014, MNRAS, 441, 790. H.E.S.S. observations.

Borkowski et al. 2014, ApJ, 790, L18. Chandra expansion studies.
 Roy & Pal 2014, IAUS, 296, 197. GMRT H_I observations.
 De Horta et al. 2014, SerAJ, 189, 41. ATCA at 1.4 (5″.4×10″.4), 2.4 (2″.9×6″.1) and 5 GHz (1″.2×2″.8).
 Gök & Ergin 2015, AdSpR, 56, 1793. Suzaku and Fermi observations.
 Zoglauer et al. 2015, ApJ, 798, 98. NuSTAR observations.
 Borkowski et al. 2017, ApJ, 837, L7. Chandra expansion studies.
 Luken et al. 2020, MNRAS, 492, 2606. ATCA at various frequencies and epochs, including polarisation, for expansion study.
 Weinberger et al. 2020, A&A, 638, A83. INTEGRAL observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : S=0.3 Jy) including polarisation, and Spitzer observations.
 Enokiya et al. 2023, PASJ, 75, 970. CO observations of vicinity.

G3.1–0.6

RA: 17^h55^m30^s
Dec: –26°35′

1-GHz flux/Jy: 5
Spectral index: 0.9?

Size/arcmin: 52×28
Type: S

Radio: Elongated shell.

References:

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz (43″×96″ : S=6.5 Jy).
 Roy & Pramesh Rao 2002, MNRAS, 329, 775. GMRT at 330 MHz (25″×37″).
 Hurley-Walker et al. 2019, PASA, 36, e048. MWA at 72 to 231 MHz (~2′).

G3.7–0.2

RA: 17^h55^m26^s
Dec: –25°50′

1-GHz flux/Jy: 2.3
Spectral index: 0.65

Size/arcmin: 14×11
Type: S

Has been called G003.8–00.3.

Radio: Double arc.

References:

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz (43″×99″ :
 $S=2.4$ Jy).
 Gaensler 1998, ApJ, 493, 781. VLA at 1.4 GHz (9″×15″ : $S=$
 1.7 ± 0.1 Jy).

Yusef-Zadeh et al. 2004, ApJS, 155, 421. VLA at 1.4 GHz
 (8″4×11″4).
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ :
 $S=0.1$ Jy) including polarisation, and Spitzer observations.

G3.8+0.3

RA: 17^h52^m55^s
Dec: –25°28′

1-GHz flux/Jy: 3?
Spectral index: 0.6

Size/arcmin: 18
Type: S?

Radio: Incomplete shell.

Distance: Optical extinction suggests 4.1 kpc.

References:

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz (43″×100″ :
 $S=3.5$ Jy).
 Bhatnagar 2002, MNRAS, 332, 1. GMRT at 327 MHz
 (17″×27″ : $S=6.0\pm0.4$).

Wang et al. 2020, A&A, 639, A72. Optical extinction for dis-
 tance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ :
 $S=0.1$ Jy) including polarisation, and Spitzer observations.

G4.2–3.5

RA: 18^h08^m55^s
Dec: –27°03′

1-GHz flux/Jy: 3.2?
Spectral index: 0.6?

Size/arcmin: 28
Type: S

Radio: Elongated shell.

Optical: Detected.

References:

Reich et al. 1988, IAUCo, 101, 293. Summary of parameters.
 Reich et al. 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz
 (4′3).
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.

G4.5+6.8**RA:** 17^h30^m42^s**Dec:** –21°29′**1-GHz flux/Jy:** 19
Spectral index: 0.64

Kepler, SN1604, 3C358

Size/arcmin: 3**Type:** S

This is the remnant of Kepler’s SN of AD1604.

Radio: Incomplete shell, brighter to the N.

Optical: Faint filaments.

X-ray: Shell, brighter to the N.

Distance: Optical expansion and proper motion indicates about 2.9 kpc, H_I observations suggest 3.4 to 6.4 kpc.

References:

van den Bergh & Kamper 1977, ApJ, 218, 617. Optical proper motions.
Leibowitz & Danziger 1983, MNRAS, 204, 273. Optical spectra.
White & Long 1983, ApJ, 264, 196. Einstein observations.
Matsui et al. 1984, ApJ, 287, 295. VLA at 1.4 (2″5×3″2) and 5 GHz (3″2×4″8) and Einstein image (5″).
Dickel et al. 1988, ApJ, 330, 254. VLA at 1.4 (1″2×2″3) and 5 GHz (0″6×1″0) at two epochs.
Smith et al. 1989, ApJ, 347, 925. EXOSAT observations.
Hatsukade et al. 1990, PASJ, 42, 279. X-ray spectrum.
Blair et al. 1991, ApJ, 366, 484. Optical imaging and spectroscopy.
Bandiera & van den Bergh 1991, ApJ, 374, 186. Optical changes.
van den Bergh & Pritchett 1991, PASP, 103, 194. Optical imaging.
Predehl & Schmitt 1995, A&A, 293, 889. ROSAT of dust scattered halo.
Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Hughes 1999, ApJ, 527, 298. ROSAT and Einstein image comparison for expansion studies.
Reynoso & Goss 1999, AJ, 118, 926. VLA at 1.4 GHz (13″×23″) for H_I studies.
Kinugasa & Tsunemi 1999, PASJ, 51, 239. ASCA observations.
Gerardy & Fesen 2001, AJ, 121, 2781. IR spectroscopy and imaging.
DeLaney et al. 2002, ApJ, 580, 914. VLA at 1.3 to 1.5 GHz and 5 GHz (7″2) for spectral index studies.
Morgan et al. 2003, ApJ, 597, L33. Sub-mm dust observations.
Sollerman et al. 2003, A&A, 407, 249. Optical spectroscopy.
Cassam-Chenaï et al. 2004, A&A, 414, 545. XMM-Newton observations.
Bamba et al. 2005, ApJ, 621, 793. Chandra observations of rim.
Riesgo & López 2005, RMxAA, 41, 57. Optical observations of filament (previously classified as PN, H 2-12).
Blair et al. 2007, ApJ, 662, 998. Spitzer observations.
Reynolds et al. 2007, ApJ, 668, L135. Chandra observations.

Sankrit et al. 2008, AJ, 135, 538. HST observations.
Aharonian et al. 2008, A&A, 488, 219. H.E.S.S. upper limit.
Enomoto et al. 2008, ApJ, 683, 383. γ -ray upper limit.
Katsuda et al. 2008, ApJ, 689, 225. Chandra proper motion studies.
Vink et al. 2008, ApJ, 689, 231. Chandra proper motion studies.
Gomez et al. 2012, MNRAS, 420, 3557. Herschel IR dust observations.
Williams et al. 2012, ApJ, 755, 3. Spitzer spectroscopy.
Burkey et al. 2013, ApJ, 764, 63. Chandra observations.
Yang et al. 2013, ApJ, 766, 44. Suzaku spectroscopy.
Park et al. 2013, ApJ, 767, L10. Suzaku observations.
Katsuda et al. 2015, ApJ, 808, 49. XMM-Newton, Chandra and Suzaku observations.
Sankrit et al. 2016, ApJ, 817, 36. HST for proper motion studies.
Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
Sato & Hughes 2017, ApJ, 845, 167. Chandra expansion studies.
Kasuga et al. 2018, PASJ, 70, 88. Chandra observations.
Sun & Chen 2019, ApJ, 872, 45. Chandra observations.
Weinberger et al. 2020, A&A, 638, A83. INTEGRAL observations.
Sato et al. 2020, ApJ, 890, 104. Chandra observations.
Millard et al. 2020, ApJ, 893, 98. Chandra spectroscopy.
Castelletti et al. 2021, A&A, 653, A62. VLA 74-MHz survey flux density, and other low-frequency radio flux densities.
Xiang & Jiang 2021, ApJ, 908, 22. Fermi observations.
Kasuga et al. 2021, ApJ, 915, 42. XMM-Newton spectroscopy.
Millard et al. 2021, ApJS, 257, 36. ISO far-IR spectroscopy.
Nagayoshi et al. 2021, PASJ, 73, 302. Suzaku observations.
Acero et al. 2022, A&A, 660, A129. Fermi observations.
H.E.S.S. Collaboration: Aharonian et al. 2022, A&A, 662, A65. H.E.S.S. observations.
Coffin et al. 2022, ApJ, 926, 84. Chandra proper motion study.

G4.8+6.2**RA:** 17^h33^m25^s**Dec:** –21°34′**1-GHz flux/Jy:** 3
Spectral index: 0.6**Size/arcmin:** 18**Type:** S

Has been called G4.5+6.2.

Radio: Faint shell.

References:

Duncan et al. 1995, MNRAS, 277, 36. Parkes 64-m at 2.4-GHz (10″4).
Duncan et al. 1997, MNRAS, 287, 722. Parkes 64-m at 2.4 GHz (11″: $S=1.3\pm0.2$ Jy).

Bhatnagar 2000, MNRAS, 317, 453. GMRT at 327 MHz (1″3×2″2: $S=5.5\pm1.2$ Jy), and NVSS at 1.4 GHz.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

G5.2–2.6

RA: 18^h07^m30^s
Dec: –25°45′

1-GHz flux/Jy: 2.6?
Spectral index: 0.6?

Size/arcmin: 18
Type: S

Radio: Poorly resolved shell.

References:

Reich et al. 1988, IAUCo, 101, 293. Summary of parameters.
 Reich et al. 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′3).
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

G5.4–1.2

RA: 18^h02^m10^s
Dec: –24°54′

1-GHz flux/Jy: 35?
Spectral index: 0.2?

Milne 56
Size/arcmin: 35
Type: C?

Part been called G5.3–1.0. Has been suggested that this is not a SNR.

Radio: Incomplete shell, including wide ‘v’ of emission to E with small flat-spectrum source at apex.

Optical: Detected.

X-ray: Pulsar detected, with faint extension.

Point sources: Pulsar nearby, in flat spectrum source.

Distance: H I absorption suggests > 4.3 kpc, optical extinction suggests 3.9 kpc.

References:

Clark et al. 1975, AuJPA, 37, 75. Molonglo at 408 MHz (3′ : S = 38 Jy).
 Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′).
 Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′4) and 5 GHz (4′4).
 Angerhofer et al. 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6′8 : S = 21.9 ± 2.4 Jy).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6).
 Zealey et al. 1979, A&AS, 38, 39. Optical detection.
 Becker & Helfand 1985, Nature, 313, 115. VLA at 1.4 and 5 GHz.
 Helfand & Becker 1985, Nature, 313, 118. Suggesting it is not a SNR.
 Manchester et al. 1985, MNRAS, 212, 975. Pulsar detection.
 Caswell et al. 1987, MNRAS, 225, 329. MOST at 843 MHz (42″ × 110″).
 Frail & Kulkarni 1991, Nature, 352, 785. Pulsar and remnant association.
 Manchester et al. 1991, MNRAS, 253, 7P. Pulsar and remnant association.
 Milne et al. 1992, MNRAS, 255, 707. Parkes 64-m at 4.75 (4′5 : S = 30.8 ± 2.1 Jy) and 8.4 GHz (3′ : S = 24 ± 3 Jy), including polarisation.

Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′0 × 4′9 : S = 38 Jy).
 Frail et al. 1994, AJ, 107, 1120. VLA at 327 MHz (68″ × 73″), plus H I absorption.
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
 Gaensler & Frail 2000, Nature, 406, 158. Pulsar observations, including proper motion.
 Kaspi et al. 2001, ApJ, 562, L163. X-ray detection of pulsar, and upper limit for remnant.
 Reich 2002, in NSPS, p1. Effelsberg 100-m at 10.6 GHz, including polarisation.
 Blazek et al. 2006, ApJ, 652, 1523. Proper motion study of pulsar.
 Zeiger et al. 2008, ApJ, 674, 271. Proper motion study of pulsar.
 Liszt et al. 2009, A&A, 508, 1331. CO and IR observations of region.
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser detection.
 Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G5.5+0.3

RA: 17^h57^m04^s
Dec: –24°00′

1-GHz flux/Jy: 5.5
Spectral index: 0.7

Size/arcmin: 15 × 12
Type: S

Has been called G5.55+0.32.

Radio: Shell.

Optical: Detected.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : S = 14.3 ± 0.3 Jy), plus other observations.
 Liszt et al. 2009, A&A, 508, 1331. CO and IR observations of region.

Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.

G5.9+3.1

RA: 17^h47^m20^s
Dec: –22°16′

1-GHz flux/Jy: 3.3?
Spectral index: 0.4?

Size/arcmin: 20
Type: S

Radio: Asymmetric shell.

References:

Reich et al. 1988, IAUCo, 101, 293. Effelsberg 100-m at 2.7 GHz (4′3).
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Onić et al. 2019, A&A, 625, A93. MWA at 72 and 231 MHz.

G6.1+0.5

RA: 17^h57^m29^s
Dec: –23°25′

1-GHz flux/Jy: 4.5
Spectral index: 0.9

Size/arcmin: 18×12
Type: S

Has been called G6.10+0.53. Identification as SNR has been questioned.

Radio: Partial shell.

Optical: Detected.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42′ : $S = 13.4 \pm 0.2$ Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.

Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18′ : $S = 0.1$ Jy) including polarisation, and Spitzer observations.

G6.1+1.2

RA: 17^h54^m55^s
Dec: –23°05′

1-GHz flux/Jy: 4.0?
Spectral index: 0.3?

Size/arcmin: 30×26
Type: F

Has been called G6.1+1.15.

Radio: Faint, diffuse emission.

Distance: Optical extinction suggests 3.3 or 3.7 kpc.

References:

Reich et al. 1988, IAUCo, 101, 293. Summary of parameters.
Junkes et al. 1988, LNP, 316, 134. Effelsberg 100-m at 2.7 GHz (4′3), including polarisation.
Reich et al. 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′3).

Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G6.4–0.1**W28****RA:** 18^h00^m30^s
Dec: –23°26′**1-GHz flux/Jy:** 310
Spectral index: varies**Size/arcmin:** 48
Type: C

Has been called G6.6–0.2.

Radio: Several non-thermal sources in a ring, with flat spectrum core.**Optical:** Diffuse emission.**X-ray:** Diffuse emission from most of the remnant.**Point sources:** Young pulsar near edge of remnant, but not thought to be related.**Distance:** H_I observations suggest 1.9 kpc, optical extinction suggests 3.6 kpc.**References:**

- Kundu & Velusamy 1972, A&A, 20, 237. NRAO 140-ft at 10 GHz (3′).
- van den Bergh et al. 1973, ApJS, 26, 19. Optical observations.
- Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′4) and 5 GHz (4′4).
- Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6).
- Lozinskaya 1981, SvAL, 7, 17. Mean optical velocity.
- Andrews et al. 1983, ApJ, 266, 684. VLA at 1.4 GHz (8′′) 4.9 GHz (3′′) and 15 GHz (1′′) of central region only, plus Einstein image of central region.
- Bohigas et al. 1983, RMxAA, 8, 155. Optical spectra.
- Andrews et al. 1985, AJ, 90, 310. VLA of central component.
- Long et al. 1991, ApJ, 373, 567. Einstein and optical observations.
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- Kaspi et al. 1993, ApJ, 409, L57. Pulsar association.
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- Frail et al. 1994, ApJ, 424, L111. VLA of associated OH masers.
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- Claussen et al. 1997, ApJ, 489, 143. VLA of OH masers.
- Claussen et al. 1999, ApJ, 522, 349. High resolution observations of OH masers.
- Yusef-Zadeh et al. 2000, ApJ, 540, 842. VLA at 327 MHz (2′6×5′5) and 1.48 GHz (40′′×65′′).
- Dubner et al. 2000, AJ, 120, 1933. VLA at 328 MHz (52′′×97′′ : S = 425±40 Jy) and 1415 MHz (48′′×88′′ : S = 246±20 Jy), and comparison with other observations.
- Reach & Rho 2000, ApJ, 544, 843. ISO observations of interactions with surroundings.
see also: Reach & Rho 2001, ApJ, 558, 943. Erratum.
- Douvion et al. 2001, A&A, 373, 281. ISO observations.
- Roberts et al. 2001, ApJS, 133, 451. ASCA observations.
- Velázquez et al. 2002, AJ, 124, 2145. Parkes 64-m at 1.4 GHz (15′) for H_I.
- Rho & Borkowski 2002, ApJ, 575, 201. ROSAT and ASCA observations.
- Claussen et al. 2002, ApJ, 580, 909. Observations of nearby source.
- Yusef-Zadeh et al. 2003, ApJ, 583, 267. OH observations.
- Caswell 2004, MNRAS, 349, 99. ATCA at 1.7 GHz of associated OH masers.
- Mavromatakis et al. 2004, A&A, 426, 567. Optical observations.
- Reach et al. 2005, ApJ, 618, 297. Molecular lines and near IR observations.
- Hoffman et al. 2005, ApJ, 620, 257. OH maser observations.
- Kawasaki et al. 2005, ApJ, 631, 935. ASCA observations.
- Neufeld et al. 2007, ApJ, 664, 890. Spitzer observations.
- Aharonian et al. 2008, A&A, 481, 401. H.E.S.S. observations.
- Casandjian & Grenier 2008, A&A, 489, 849. γ -ray observations.
- Hewitt et al. 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
- Giuliani et al. 2010, A&A, 516, L11. γ -ray observations.
- Marquez-Lugo & Phillips 2010, MNRAS, 407, 94. Mid-IR observations.
- Abdo et al. 2010, ApJ, 718, 348. Fermi observations.
- Yuan & Neufeld 2011, ApJ, 726, 76. Spitzer observations.
- Nichols et al. 2012, MNRAS, 419, 251. CO observations of selected regions.
- Gusdorf et al. 2012, A&A, 542, L19. CO observations of regions in NE.
- Vaupréé et al. 2014, A&A, 568, A50. CO, HCO⁺ and DCO⁺ molecular line observations.
- Pihlström et al. 2014, AJ, 147, 73. VLA observations of methanol masers.
- Neufeld et al. 2014, ApJ, 781, 102. Herschel and Spitzer IR spectroscopy.
- Hanabata et al. 2014, ApJ, 786, 145. Fermi observations of region.
- Zhou et al. 2014, ApJ, 791, 87. XMM-Newton observations.
- Gusdorf et al. 2014, IAUS, 296, 178. CO observations.
- Nakamura et al. 2014, PASJ, 66, 62. XMM-Newton observations of NE.
- Froeblich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
- Maxted et al. 2016, MNRAS, 462, 532. NH₃ observations of region.
- Acero et al. 2016, ApJS, 224, 8. Fermi observations.
- Pannuti et al. 2017, ApJ, 839, 59. Optical and X-ray observations.
- H.E.S.S. Collaboration: Abdalla et al. 2018, A&A, 612, A1. H.E.S.S. observations.
- Okon et al. 2018, PASJ, 70, 35. Suzaku observations.
- Nobukawa et al. 2018, ApJ, 854, 87. Suzaku observations.
- Cui et al. 2018, ApJ, 860, 69. Fermi observations.
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- Ogbodo et al. 2020, MNRAS, 493, 199. OH maser observations.
- Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
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- Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
- Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18′′) including polarisation, and Spitzer observations.
- Millard et al. 2021, ApJS, 257, 36. ISO far-IR spectroscopy.
- Mazumdar et al. 2022, A&A, 668, A180. Molecular line observations.
- Sapienza et al. 2022, ApJ, 935, 152. NuSTAR and XMM-Newton observations.
- Indriolo 2023, ApJ, 950, 64. IR absorption observations.
- Holland-Ashford et al. 2023, ApJ, 955, 77. Suzaku observations.
- Himono et al. 2023, PASJ, 75, 373. Suzaku observations.

G6.4+4.0

RA: 17^h45^m10^s
Dec: –21°22′

1-GHz flux/Jy: 1.3?
Spectral index: 0.4?

Size/arcmin: 31
Type: S

Radio: Faint asymmetric shell.

References:

Reich et al. 1988, IAUCo, 101, 293. Effelsberg 100-m at 2.7 GHz (4′3).
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

G6.5–0.4

RA: 18^h02^m11^s
Dec: –23°34′

1-GHz flux/Jy: 27
Spectral index: 0.6

Size/arcmin: 18
Type: S

Has been called G6.51–0.48, and part has been called G6.67–0.42.

Radio: Shell, overlapping G6.4–0.1.

Optical: Detected.

Distance: Optical extinction suggests 3.7 kpc.

References:

Yusef-Zadeh et al. 2000, ApJ, 540, 842. VLA at 330 MHz (2′6×5′5) and 1.4 GHz (0′7×1′1).
 Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S = 60.8 \pm 0.4$ Jy), plus other observations.
 Casandjian & Grenier 2008, A&A, 489, 849. γ -ray observations.
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.
 Ajello et al. 2016, ApJ, 819, 44. Fermi observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.

G7.0–0.1

RA: 18^h01^m50^s
Dec: –22°54′

1-GHz flux/Jy: 2.5?
Spectral index: 0.5?

Size/arcmin: 15
Type: S

Has been called G7.06–0.12.

Radio: Double rim, brightest in W, confused by bright HII region M20 in SE.

References:

Yusef-Zadeh et al. 2000, ApJ, 540, 842. VLA at 327 MHz (2′6×5′5) and 1.48 GHz (40″×65″).
 Dubner et al. 2000, AJ, 120, 1933. VLA at 328 MHz (52″×97″) and 1415 MHz (48″×88″).
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.

G7.2+0.2

RA: 18^h01^m07^s
Dec: –22°38′

1-GHz flux/Jy: 2.8
Spectral index: 0.6

Size/arcmin: 12
Type: S

Has been called G7.20+0.20.

Radio: Partial shell.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S = 5.2 \pm 0.2$ Jy), plus other observations.
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S = 0.1$ Jy) including polarisation, and Spitzer observations.

G7.5–1.7

RA: 18^h10^m00^s
Dec: –23°10′

1-GHz flux/Jy: 18?
Spectral index: 0.7?

Size/arcmin: 100
Type: S

Radio: Irregular shell.

Point sources: Pulsar within boundary.

References:

Roberts & Brogan 2008, ApJ, 681, 320. VLA at 327 MHz (2′0×2′6) plus IR and other observations.
 Van Etten et al. 2012, ApJ, 755, 151. Pulsar proper motion, away from centre.
 Hurley-Walker et al. 2019, PASA, 36, e048. MWA at 72 to 231 MHz (~2′).

G7.7–3.7

RA: 18^h17^m25^s
Dec: –24°04′

1-GHz flux/Jy: 11
Spectral index: 0.32

1814–24
Size/arcmin: 22
Type: S

Has been associated with the SN of AD386.

Radio: Shell, with high polarisation.

Optical: Faint filaments in S.

X-ray: Arc in S.

References:

Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′4) and 5 GHz (4′4).
 Milne et al. 1986, MNRAS, 223, 487. MOST at 843 MHz (44″×108″) and Parkes 64-m at 8.4 GHz (3′ : S=4.6±0.5 Jy), with polarisation, plus review of flux densities.

Dubner et al. 1996, AJ, 111, 1304. VLA at 1.4 GHz (35″×70″ : S=9.9±0.1 Jy), including polarisation.
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
 Zhou et al. 2018, ApJ, 865, L6. XMM-Newton observations.
 Domček et al. 2023, MNRAS, 526, 1112. Optical observations.

G8.7–5.0

RA: 18^h24^m10^s
Dec: –23°48′

1-GHz flux/Jy: 4.4
Spectral index: 0.3

Size/arcmin: 26
Type: S

Radio: Asymmetric shell.

References:

Reich et al. 1988, IAUCo, 101, 293. Summary of parameters.
 Reich et al. 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′3).
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

de Wilt et al. 2017, MNRAS, 468, 2093. Molecular line observations of region.
 Feijen et al. 2020, PASA, 37, 56. CO and H_I observations of region.

G8.7–0.1

(W30)

RA: 18^h05^m30^s
Dec: –21°26′**1-GHz flux/Jy:** 80
Spectral index: 0.5**Size/arcmin:** 45
Type: S?

Has been called G8.6–0.1.

Radio: Clumpy non-thermal shell, with low-frequency turnover.**X-ray:** Northern edge detected.**Point sources:** Pulsar inside W edge.**Distance:** Optical extinction suggests 4.2 kpc.**References:**

Odegard 1986, AJ, 92, 1372. TPT at 57.5 MHz (7′2″×9′7″: $S = 190 \pm 50$ Jy).
 Kassim & Weiler 1990, Nature, 343, 146. VLA at 327 MHz (3′0″×3′7″).
 Kassim & Weiler 1990, ApJ, 360, 184. VLA at 327 MHz (2′8″×4′1″: $S = 129 \pm 11$ Jy), and part at 1.4 GHz (0′9″×1′8″), plus review of flux densities.
 Frail et al. 1994, AJ, 107, 1120. VLA at 327 MHz (37″×55″).
 Finley & Ögelman 1994, ApJ, 434, L25. ROSAT observations, including pulsar.
 Aharonian et al. 2005, Science, 307, 1938. H.E.S.S. detection.
 Aharonian et al. 2006, ApJ, 636, 777. H.E.S.S. observations.
 Landi et al. 2006, ApJ, 651, 190. X-ray observations.

Briskin et al. 2006, ApJ, 652, 554. Pulsar proper motion.
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser detection.
 Castro & Slane 2010, ApJ, 717, 372. Fermi observations.
 Ajello et al. 2012, ApJ, 744, 80. Fermi observations.
 Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] IR observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.

G8.9+0.4**RA:** 18^h03^m58^s
Dec: –21°03′**1-GHz flux/Jy:** 9
Spectral index: 0.6**Size/arcmin:** 24
Type: S

Has been called G8.90+0.40.

Radio: Shell.**Distance:** Optical extinction suggests 3.5 kpc.**References:**

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″: $S = 18.2 \pm 0.5$ Jy), plus other observations.
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″: $S = 0.1$ Jy) including polarisation, and Spitzer observations.

G9.7–0.0**RA:** 18^h07^m22^s
Dec: –20°35′**1-GHz flux/Jy:** 3.7
Spectral index: 0.6**Size/arcmin:** 15×11
Type: S

Has been called G9.7–0.1, G9.70–0.06 and G9.7+0.0.

Radio: Shell.**References:**

Frail et al. 1994, AJ, 107, 1120. VLA at 327 MHz.
 Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″: $S = 6.5 \pm 0.2$ Jy), plus other observations.
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser detection.
 Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.

Yeung et al. 2016, ApJ, 827, 41. Fermi observations.
 Hurley-Walker et al. 2019, PASA, 36, e048. MWA at 72 to 231 MHz ($\sim 2'$).
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″: $S = 0.2$ Jy) including polarisation, and Spitzer observations.

G9.8+0.6

RA: 18^h05^m08^s
Dec: –20°14′

1-GHz flux/Jy: 3.9
Spectral index: 0.5

Size/arcmin: 12
Type: S

Radio: Asymmetric shell.

References:

Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
 Caswell 1983, MNRAS, 204, 833. Molonglo at 408 MHz (3′ : $S=5.8\pm0.6$ Jy).
 Dubner et al. 1993, AJ, 105, 2251. VLA at 1.47 GHz (41″×63″ : $S=3.5\pm0.4$ Jy).

Frail et al. 1994, AJ, 107, 1120. VLA at 327 MHz.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S=0.3$ Jy) including polarisation, and Spitzer observations.

G9.9–0.8

RA: 18^h10^m41^s
Dec: –20°43′

1-GHz flux/Jy: 6.7
Spectral index: 0.4

Size/arcmin: 12
Type: S

Has been called G9.95–0.81.

Radio: Shell.

Optical: Detected.

Distance: H₂ emission suggests 3.8 kpc.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S=11.0\pm0.3$ Jy), plus other observations.
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.

Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.
 Lee et al. 2019, AJ, 157, 123. H₂ IR observations.
 Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.

G11.0–0.0

RA: 18^h10^m04^s
Dec: –19°25′

1-GHz flux/Jy: 1.3
Spectral index: 0.6

Size/arcmin: 11×9
Type: S

Has been called G11.0+0.0, G11.03–0.05 and G11.00–0.05.

Radio: Partial shell.

X-ray: Diffuse emission.

Distance: Optical absorption suggests 2.4 kpc.

References:

Bamba et al. 2003, ApJ, 589, 253. ASCA observations.
 Brogan et al. 2004, AJ, 127, 355. VLA at 330 MHz (25″), 1.5 GHz (25″), and 74 MHz.
 Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S=3.1\pm0.2$ Jy), plus other observations.
 Castelletti et al. 2016, A&A, 587, A71. VLA at 1.4 GHz (4″4×8″3) and CO observations of region.

Araya et al. 2018, ApJ, 859, 69. Fermi observations.
 Shan et al. 2018, ApJS, 238, 35. Optical absorption for distance.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S=0.3$ Jy) including polarisation, and Spitzer observations.

G11.1–0.7

RA: 18^h12^m46^s
Dec: –19°38′

1-GHz flux/Jy: 1.0
Spectral index: 0.7

Size/arcmin: 11×7
Type: S

Has been called G11.15–0.71.

Radio: Partial shell.

References:

Brogan et al. 2004, AJ, 127, 355. VLA at 330 MHz (25″), 1.5 GHz (25″), and 74 MHz.
 Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S=2.3\pm0.1$ Jy), plus other observations.

Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S=0.8$ Jy) including polarisation, and Spitzer observations.

G11.1+0.1

RA: 18^h09^m47^s
Dec: −19°12′

1-GHz flux/Jy: 2.3
Spectral index: 0.4

Size/arcmin: 12×10
Type: S

Has been called G11.18+0.11.

Radio: Shell.

References:

Brogan et al. 2004, AJ, 127, 355. VLA at 330 MHz (25''), 1.5 GHz (25''), and 74 MHz.
 Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42'': $S = 3.5 \pm 0.2$ Jy), plus other observations.
 Castelletti et al. 2016, A&A, 587, A71. VLA at 1.4 GHz (4'4"×8'3") and CO observations of region.

Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18'') including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20'') of region.

G11.2−0.3

RA: 18^h11^m27^s
Dec: −19°25′

1-GHz flux/Jy: 22
Spectral index: 0.5

Size/arcmin: 4
Type: C

Probably associated with the SN of AD386.

Radio: Symmetrical clumpy shell, with flatter spectrum core.

X-ray: Shell, with hard spectrum centrally brightened region around pulsar.

Point sources: Central pulsar.

Distance: H_I absorption indicates 4.4 kpc, H₂ emission suggests 4.7 kpc.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3') and Parkes 64-m at 5 GHz (4').
 Radhakrishnan et al. 1972, ApJS, 24, 49. H_I absorption.
 Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3').
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2'6).
 Downes 1984, MNRAS, 210, 845. VLA at 1465 MHz (20''×25'') and Einstein observations, with review of flux densities.
 Becker et al. 1985, ApJ, 296, 461. VLA at 1.4 and 5 GHz, plus H_I absorption, Einstein observations.
 Morsi & Reich 1987, A&AS, 71, 189. Effelsberg 100-m at 32 GHz (26'5'': $S = 4.04 \pm 0.24$ Jy).
 Green et al. 1988, MNRAS, 231, 735. VLA at 1.4 and 5 GHz.
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3'2"×4'1'': $S = 39$ Jy).
 Reynolds et al. 1994, MNRAS, 271, L1. ROSAT image and spectra.
 Vasisht et al. 1996, ApJ, 456, L59. ASCA observations.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Torii et al. 1997, ApJ, 489, L145. ASCA detection of pulsar.
 Torii et al. 1999, ApJ, 523, L69. X-ray timing observations of pulsar.
 Kothas & Reich 2001, A&A, 372, 627. Effelsberg 100-m at 4.25, 10.45, 14.9 and 32 GHz (2'5, 1'1, 0'86 and 0'45'': $S = 9.6 \pm 0.5, 6.3 \pm 0.4, 5.7 \pm 0.4$ and 3.8 ± 0.4).
 Kaspi et al. 2001, ApJ, 560, 371. Chandra observations.
 Tam et al. 2002, ApJ, 572, 202. VLA at 1.4/1.5 GHz (1'8"×2'6'': $S = 16.6 \pm 0.9$ Jy) and 5 GHz (1'5"×2'1'': $S = 8.4 \pm 0.9$ Jy) for spectral studies.
 Reich 2002, in NSPS, p1. Effelsberg 100-m at 14.7 GHz.
 Roberts et al. 2003, ApJ, 588, 992. Chandra observations.
 Tam & Roberts 2003, ApJ, 598, L27. Multi-epoch VLA observations at 1.4/1.5 GHz and 5 GHz, for expansion studies.

Brogan et al. 2004, AJ, 127, 355. VLA at 330 MHz (25''), 1.5 GHz (25''), and 74 MHz.
 Bock & Gaensler 2005, ApJ, 626, 343. BIMA at 88.6 GHz (18'').
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Kaplan & Moon 2006, ApJ, 644, 1056. IR upper limit for pulsar.
 Koo et al. 2007, ApJ, 657, 308. IR observations.
 Dean et al. 2008, MNRAS, 384, L29. INTEGRAL observations of pulsar and nebula.
 Moon et al. 2009, ApJ, 703, L81. IR spectroscopy.
 Mizuno et al. 2010, AJ, 139, 1542. Spitzer observations.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9'5'': $S = 9.0 \pm 0.5$ Jy) including polarisation and review of flux densities.
 Andersen et al. 2011, ApJ, 742, 7. Spitzer observations.
 Lee et al. 2013, ApJ, 770, 143. IR observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.
 Borkowski et al. 2016, ApJ, 819, 160. Chandra observations.
 Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
 Lee et al. 2019, AJ, 157, 123. [FeII] and H₂ IR observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
 Madsen et al. 2020, ApJ, 889, 23. NuSTAR observations.
 Guest & Safi-Harb 2020, MNRAS, 498, 821. Chandra observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18'': $S = 1.9$ Jy) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20'') of region.
 Zheng et al. 2023, RAA, 23, 115007. NuSTAR and Chandra observations of pulsar.

G11.4–0.1

RA: $18^{\text{h}}10^{\text{m}}47^{\text{s}}$
Dec: $-19^{\circ}05'$

1-GHz flux/Jy: 6
Spectral index: 0.5

Size/arcmin: 8
Type: S?

Radio: Incomplete shell, possibly with central core.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3' : S = 9.4$ Jy) contaminated by sidelobes of a nearby source, and Parkes 64-m at 5 GHz ($4' : S = 2.8$ Jy).
 Angerhofer et al. 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz ($6.8 : S = 2.0 \pm 0.4$ Jy).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.6).
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz ($3.2 \times 4.1 : S = 18$ Jy).
 Dubner et al. 1993, AJ, 105, 2251. VLA at 1.47 GHz ($44'' \times 63'' : S = 5.1 \pm 0.6$ Jy).

Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Brogan et al. 2004, AJ, 127, 355. VLA at 330 MHz ($25''$), 1.5 GHz ($25''$), and 74 MHz.
 Rangelov et al. 2014, ApJ, 796, 34. X-ray upper limit.
 Castelletti et al. 2016, A&A, 587, A71. VLA at 1.4 GHz (4.4×8.3) and CO observations of region.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations ($20''$) of region.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz ($18'' : S = 0.8$ Jy) including polarisation, and Spitzer observations.

G11.8–0.2

RA: $18^{\text{h}}12^{\text{m}}25^{\text{s}}$
Dec: $-18^{\circ}44'$

1-GHz flux/Jy: 0.7
Spectral index: 0.3

Size/arcmin: 4
Type: S

Has been called G11.89–0.21.

Radio: Shell.

X-ray: Possibly detected.

References:

Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz ($42'' : S = 0.9 \pm 0.1$ Jy), plus other observations.
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz ($18''$) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations ($20''$) of region.

G12.0–0.1

RA: $18^{\text{h}}12^{\text{m}}11^{\text{s}}$
Dec: $-18^{\circ}37'$

1-GHz flux/Jy: 3.5
Spectral index: 0.7

Size/arcmin: 7?
Type: ?

Radio: Incomplete shell, defined in E only.

X-ray: Detected, including possible PWN.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3' : S = 6.6$ Jy) and Parkes 64-m at 5 GHz ($4' : S = 1.1$ Jy).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.6).
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.2×4.1).
 Dubner et al. 1993, AJ, 105, 2251. VLA at 1.47 GHz ($41'' \times 61'' : S = 0.7$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.

Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Yamauchi et al. 2014, PASJ, 66, 20. Suzaku observations of possible PWN.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations ($20''$) of region.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz ($18'' : S = 0.2$ Jy) including polarisation, and Spitzer observations.

G12.2+0.3

RA: $18^{\text{h}}11^{\text{m}}17^{\text{s}}$
Dec: $-18^{\circ}10'$

1-GHz flux/Jy: 0.8
Spectral index: 0.7

Size/arcmin: 6×5
Type: S

Has been called G12.26+0.30.

Radio: Partial shell.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz ($42'' : S = 1.5 \pm 0.1$ Jy), plus other observations.
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz ($18'' : S = 0.1$ Jy) including polarisation, and Spitzer observations.

G12.5+0.2

RA: 18^h12^m14^s
Dec: −17°55′

1-GHz flux/Jy: 0.6
Spectral index: 0.4

Size/arcmin: 6×5
Type: C?

Has been called G12.58+0.22.

Radio: Diffuse, central brightened.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S = 0.8 \pm 0.1$ Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S = 0.02$ Jy) including polarisation, and Spitzer observations.

G12.7−0.0

RA: 18^h13^m19^s
Dec: −17°54′

1-GHz flux/Jy: 0.8
Spectral index: 0.8

Size/arcmin: 6
Type: S

Has been called G12.72−0.00.

Radio: Shell.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S = 2.0 \pm 0.1$ Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S = 0.04$ Jy) including polarisation, and Spitzer observations.

G12.8−0.0

RA: 18^h13^m37^s
Dec: −17°49′

1-GHz flux/Jy: 0.8
Spectral index: 0.5

Size/arcmin: 3
Type: C?

Has been called G12.7+0.0, G12.82−0.02, G12.83−0.02.

Radio: Shell.

X-ray: Diffuse.

Point sources: Central X-ray pulsar.

References:

Brogan et al. 2005, ApJ, 629, L105. VLA at 330 MHz (19″×32″), plus other observations.
Ubertini et al. 2005, ApJ, 629, L109. INTEGRAL and other observations.
Aharonian et al. 2006, ApJ, 636, 777. H.E.S.S. detection.
Albert et al. 2006, ApJ, 637, L41. γ -ray observations.
Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S = 1.2 \pm 0.1$ Jy), plus other observations.
Landi et al. 2006, ApJ, 651, 190. X-ray observations.
Funk et al. 2007, A&A, 470, 249. XMM-Newton observations, CO observations of surroundings.
Helfand et al. 2007, ApJ, 665, 1297. Chandra observations.

Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Gotthelf & Halpern 2009, ApJ, 700, L158. Pulsar detection.
Halpern et al. 2012, ApJ, 753, L14. Pulsar observations.
Araya et al. 2018, ApJ, 859, 69. Fermi observations.
Dzib et al. 2018, ApJ, 866, 100. VLA of central source.
Ho et al. 2020, MNRAS, 498, 4396. Chandra and other X-ray observations, for proper motions of pulsar.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.
Camilo et al. 2021, ApJ, 917, 67. Radio detection of pulsar.
Dzib & Rodríguez 2021, ApJ, 923, 228. Pulsar proper motion.

G13.1−0.5

RA: 18^h16^m00^s
Dec: −17°49′

1-GHz flux/Jy: 11?
Spectral index: 0.6?

Size/arcmin: 38×28
Type: S

Radio: Faint shell.

References:

Gorham 1990, ApJ, 364, 187. Clark lake 30.9 MHz observations.
Hurley-Walker et al. 2019, PASA, 36, e048. MWA at 72 to 231 MHz ($\sim 2'$).

G13.3–1.3

RA: 18^h19^m20^s
Dec: –18°00′

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 70×40
Type: S?

Radio: Amorphous emission.

Optical: Filaments in S.

X-ray: Elongated emission.

Distance: Absorption indicates 2–4 kpc, optical extinction suggests 4.8 kpc.

References:

Seward et al. 1995, ApJ, 449, 681. ROSAT detection, optical studies and observations of CO.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.

Koralesky et al. 1998, AJ, 116, 1323. VLA search for OH emission.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G13.5+0.2

RA: 18^h14^m14^s
Dec: –17°12′

1-GHz flux/Jy: 3.5?
Spectral index: 1.0?

Size/arcmin: 5×4
Type: S

Has been called G13.46+0.16.

Radio: Elongated, incomplete shell.

Distance: H₂ emission suggests 12.4 kpc.

References:

Helfand et al. 1989, ApJ, 341, 151. VLA at 5 GHz ($S = 0.65 \pm 0.05$ Jy) and 1.4 GHz ($15'' : S = 2.67 \pm 0.5$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Lee et al. 2019, AJ, 157, 123. H₂ IR observations.

Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz ($18'' : S = 0.4$ Jy) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations ($20''$) of region.

G14.1–0.1

RA: 18^h16^m40^s
Dec: –16°41′

1-GHz flux/Jy: 0.5
Spectral index: 0.6

Size/arcmin: 6×5
Type: S

Has been called G14.18–0.12.

Radio: Shell.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz ($42'' : S = 0.9 \pm 0.1$ Jy), plus other observations.
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz ($18''$) including polarisation, and Spitzer observations.

G15.1–1.6

RA: 18^h24^m00^s
Dec: –16°34′

1-GHz flux/Jy: 5.5?
Spectral index: 0.0?

Size/arcmin: 30×24
Type: S?

Radio: Elongated, incomplete shell.

Optical: Diffuse shell.

Distance: Optical extinction suggests 2.9 kpc.

References:

Reich et al. 1988, IAUCo, 101, 293. Summary of parameters.
 Reich et al. 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz ($4'3$).
 Boumis et al. 2008, A&A, 481, 705. Optical detection.
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.

Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'5 : S = 4.8 \pm 0.3$ Jy) including polarisation and review of flux densities.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G15.4+0.1

RA: 18^h18^m02^s
Dec: −15°27′

1-GHz flux/Jy: 5.6
Spectral index: 0.62

Size/arcmin: 15×14
Type: C?

Has been called G15.42+0.18.

Radio: Shell.

X-ray: Centrally brightened.

Distance: H I observations suggest 4.8 kpc.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S = 10.9 \pm 0.3$ Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5″ : $S = 2.1 \pm 0.2$ Jy) including polarisation and review of flux densities.
Castelletti et al. 2013, A&A, 557, L15. GMRT at 1.4 GHz (15″) plus SGPS H I and CO observations of region.
H.E.S.S. Collaboration: Abramowski et al. 2014, A&A, 562, A40. H.E.S.S. and XMM-Newton observations.

Supan et al. 2015, A&A, 576, A81. GMRT at 624 MHz (10″).
H.E.S.S. Collaboration: Abdalla et al. 2018, A&A, 612, A1. H.E.S.S. observations.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S = 0.2$ Jy) including polarisation, and Spitzer observations.
Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.
Li et al. 2023, ApJ, 945, 21. Fermi observations.

G15.5−0.1

RA: 18^h19^m25^s
Dec: −15°32′

1-GHz flux/Jy: 1.2?
Spectral index: 0.55?

Size/arcmin: 9×8
Type: ?

Has been called G15.51−0.15.

Radio: Poorly defined.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S = 4.2 \pm 0.2$ Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Hurley-Walker et al. 2019, PASA, 36, e048. MWA at 72 to 231 MHz ($\sim 2'$).

G15.9+0.2

RA: 18^h18^m52^s
Dec: −15°02′

1-GHz flux/Jy: 5.0
Spectral index: 0.63

Size/arcmin: 7×5
Type: S?

Radio: Incomplete shell, with bright concentration to the E.

X-ray: Shell, brighter to S and E.

Point sources: Central X-ray source.

Distance: H I absorption suggests 7 to 16 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S = 7.7$ Jy) and Parkes 64-m at 5 GHz (4′ : $S = 1.9$ Jy).
Angerhofer et al. 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6′8″ : $S = 1.1 \pm 0.2$ Jy).
Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6″).
Caswell et al. 1982, MNRAS, 200, 1143. FIRST at 1415 MHz (44″×58″).
Dubner et al. 1996, AJ, 111, 1304. VLA at 330 MHz (61″×77″ : $S = 11.2 \pm 1.0$ Jy), 1.4 GHz (14″×23″ : $S = 3.9 \pm 0.1$ Jy) and 4.9 GHz (13″×16″).
Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Reynolds et al. 2006, ApJ, 652, L45. Chandra observations.
Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5″ : $S = 2.0 \pm 0.3$ Jy) including polarisation and review of flux densities.
Klochov et al. 2016, A&A, 592, L12. Chandra observations.

Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
Maggi & Acero 2017, A&A, 597, A65. XMM-Newton observations.
Sasaki et al. 2018, MNRAS, 479, 3033. Chandra and IR observations, plus H α non-detection.
Lee et al. 2019, AJ, 157, 123. [FeII] IR observations.
Tian et al. 2019, PASP, 131, 114301. H I absorption observations.
Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
Mayer & Becker 2021, A&A, 651, A40. Multi-epoch Chandra observations for proper motion of compact source.
Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S = 0.6$ Jy) including polarisation, and Spitzer observations.

G16.0–0.5

RA: 18^h21^m56^s
Dec: –15°14′

1-GHz flux/Jy: 2.7
Spectral index: 0.6

Size/arcmin: 15×10
Type: S

Has been called G16.05–0.57.

Radio: Shell.

Distance: H₂ emission suggests 4.1 kpc.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S = 4.9 \pm 0.2$ Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Beaumont et al. 2011, ApJ, 741, 14. CO of region.
Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.

Lee et al. 2019, AJ, 157, 123. H₂ IR observations.
Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S = 0.05$ Jy) including polarisation, and Spitzer observations.

G16.2–2.7

RA: 18^h29^m40^s
Dec: –16°08′

1-GHz flux/Jy: 2.5
Spectral index: 0.4

Size/arcmin: 17
Type: S

Radio: Double rim.

References:

Trushkin 1999, A&A, 352, L103. Review of radio observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5″ : $S = 1.28 \pm 0.10$ Jy) including polarisation and review of flux densities.

G16.7+0.1

RA: 18^h20^m56^s
Dec: –14°20′

1-GHz flux/Jy: 3.0
Spectral index: 0.6

Size/arcmin: 4
Type: C

Has been called G16.73+0.08.

Radio: Asymmetric shell with flat-spectrum core.

X-ray: Non-thermal core.

Distance: H_I absorption suggests about 14 kpc.

References:

Helfand et al. 1989, ApJ, 341, 151. VLA at 5 GHz ($S = 0.95$ Jy) and 1.4 GHz (15″ : $S = 2.43$ Jy) and Ooty at 327 MHz ($S = 5.13$ Jy).
Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations, including masers.
Reynoso & Mangum 2000, ApJ, 545, 874. CO observations of surroundings.
Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
Helfand et al. 2003, ApJ, 592, 941. XMM-Newton observations.
Bock & Gaensler 2005, ApJ, 626, 343. BIMA at 88.6 GHz (19″×25″).
Hewitt et al. 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Bhatnagar et al. 2011, ApJ, 739, L20. VLA at 6 GHz.

Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5″ : $S = 1.23 \pm 0.11$ Jy) including polarisation and review of flux densities.
Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.
Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.
Chang et al. 2018, MNRAS, 474, 2607. Chandra observations.
Tian et al. 2019, PASP, 131, 114301. H_I absorption observations.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S = 0.7$ Jy) including polarisation, and Spitzer observations.
Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.

G17.0–0.0

RA: $18^{\text{h}}21^{\text{m}}57^{\text{s}}$
Dec: $-14^{\circ}08'$

1-GHz flux/Jy: 0.5
Spectral index: 0.5

Size/arcmin: 5
Type: S

Has been called G17.0+0.0, G17.02–0.04.

Radio: Shell.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz ($42'' : S = 0.7 \pm 0.1$ Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz ($18''$) including polarisation, and Spitzer observations.

Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations ($20''$) of region.

G17.4–2.3

RA: $18^{\text{h}}30^{\text{m}}55^{\text{s}}$
Dec: $-14^{\circ}52'$

1-GHz flux/Jy: 5
Spectral index: 0.5?

Size/arcmin: 24?
Type: S

Radio: Incomplete, poorly defined shell.

Optical: Filaments to SE, and diffuse emission.

References:

Reich et al. 1988, IAUCo, 101, 293. Summary of parameters.
Reich et al. 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz ($4'3$).
Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Boumis et al. 2002, A&A, 385, 1042. Optical observations.

Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'5 : S = 2.3 \pm 0.2$ Jy) including polarisation and review of flux densities.

G17.4–0.1

RA: $18^{\text{h}}23^{\text{m}}08^{\text{s}}$
Dec: $-13^{\circ}46'$

1-GHz flux/Jy: 0.4
Spectral index: 0.7

Size/arcmin: 6
Type: S

Has been called G17.48–0.12.

Radio: Partial shell.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz ($42'' : S = 0.9 \pm 0.1$ Jy), plus other observations.
Acero et al. 2016, ApJS, 224, 8. Fermi observations.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz ($18'' : S = 0.05$ Jy) including polarisation, and Spitzer observations.

G17.8–2.6

RA: $18^{\text{h}}32^{\text{m}}50^{\text{s}}$
Dec: $-14^{\circ}39'$

1-GHz flux/Jy: 5
Spectral index: 0.5

Size/arcmin: 24
Type: S

Radio: Well defined shell.

References:

Reich et al. 1988, IAUCo, 101, 293. Summary of parameters.
Reich et al. 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz ($4'3$).
Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.

Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'5 : S = 2.23 \pm 0.13$ Jy) including polarisation and review of flux densities.

G17.8+16.7

RA: $17^{\text{h}}24^{\text{m}}10^{\text{s}}$
Dec: $-05^{\circ}10'$

1-GHz flux/Jy: 2.7
Spectral index: 0.8

Size/arcmin: 51×45
Type: S?

Radio: Faint diffuse emission.

Optical: Faint emission.

References:

Araya et al. 2022, MNRAS, 510, 2920. Radio, X-ray and γ -ray observations.

G18.1–0.1

RA: $18^{\text{h}}24^{\text{m}}34^{\text{s}}$
Dec: $-13^{\circ}11'$

1-GHz flux/Jy: 4.6
Spectral index: 0.5

Size/arcmin: 8
Type: S

Has been called G18.1–0.2, G18.16–0.16 and G18.15–0.17.

Radio: Shell.

X-ray: Diffuse emission.

Distance: H I absorption suggests 6.4 kpc, H₂ emission suggests about 5.3 kpc.

References:

Odegard 1986, AJ, 92, 1372. TPT at 57.5 MHz (8').
 Kassim et al. 1989, ApJ, 338, 152. VLA at 330 MHz ($2'.8 \times 3'.2$) and 1.5 GHz ($0'.9 \times 1'.5$).
 Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz ($42''$: $S = 7.6 \pm 0.1$ Jy), plus other observations.
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
 Paron et al. 2013, MNRAS, 433, 1619. CO, optical and other observations of region.
 Leahy et al. 2014, MNRAS, 438, 1813. VGPS H I observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Voison et al. 2016, MNRAS, 458, 2813. Molecular line observations of region.

Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H I absorption observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] and H₂ IR observations.
 Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
 H.E.S.S. Collaboration: Abdalla et al. 2020, A&A, 644, A112. H.E.S.S. observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz ($18''$: $S = 0.2$ Jy) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations ($20''$) of region.
 Bykov et al. 2023, A&A, 671, 18. eROSITA observations.
 Sofue et al. 2023, MNRAS, 525, 4540. CO observations of region, and survey observations.

G18.6–0.2

RA: $18^{\text{h}}25^{\text{m}}55^{\text{s}}$
Dec: $-12^{\circ}50'$

1-GHz flux/Jy: 1.4
Spectral index: 0.4

Size/arcmin: 6
Type: S

Has been called G18.62–0.28.

Radio: Partial shell.

Distance: H I absorption suggests 4.4 kpc.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz ($42''$: $S = 1.9 \pm 0.1$ Jy), plus other observations.
 Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.
 Voison et al. 2016, MNRAS, 458, 2813. Molecular line observations of region.
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H I absorption observations.

Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 H.E.S.S. Collaboration: Abdalla et al. 2020, A&A, 644, A112. H.E.S.S. observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz ($18''$: $S = 0.4$ Jy) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations ($20''$) of region.

G18.8+0.3

Kes 67

RA: 18^h23^m58^s
Dec: –12°23′**1-GHz flux/Jy:** 33
Spectral index: 0.46**Size/arcmin:** 17×11
Type: S

Has been called G18.9+0.3.

Radio: Incomplete shell, in complex region near the H_{II} region W39.**Distance:** Association with molecular cloud suggests 12 kpc, H_I absorption suggests 13.8 kpc.**References:**

Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz (5′ : S = 17±7 Jy).
 Clark et al. 1975, AuJPA, 37, 75. Molonglo at 408 MHz (3′ : S = 38 Jy).
 Caswell et al. 1975, A&A, 45, 239. Parkes H_I absorption.
 Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′.4) and 5 GHz (4′.4).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
 Milne et al. 1989, PASA, 8, 187. Parkes 64-m at 8.4 GHz (3′.0 : S = 12.9±1.0 Jy), including polarisation.
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (2′.9×3′.5 : S = 55 Jy).
 Dubner et al. 1996, AJ, 111, 1304. VLA at 1.4 GHz (55″×75″ : S = 29.9±0.3 Jy).
 Dubner et al. 1999, AJ, 118, 930. Parkes 64-m at 1.6 GHz (15″) for H_I, VLA at 1.6 GHz (12″×17″) for OH, plus CO observations.
 Dubner et al. 2004, A&A, 426, 201. CO observations of environment.

Tian et al. 2007, A&A, 474, 541. VGPS at 1.4 GHz (1′) including H_I, plus CO observations of region.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : S = 15.3±0.9 Jy) including polarisation and review of flux densities.
 Vasquez et al. 2012, A&A, 545, A89. CO observations of region.
 Paron et al. 2012, A&A, 547, A60. CO and other molecular observations of region.
 Paron et al. 2015, A&A, 580, A51. CO observations in S.
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H_I absorption observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : S = 2.2 Jy) including polarisation, and Spitzer observations.
 Castelletti et al. 2021, A&A, 653, A62. VLA 74-MHz survey flux density, and other low-frequency radio flux densities.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.

G18.9–1.1**RA:** 18^h29^m50^s
Dec: –12°58′**1-GHz flux/Jy:** 37
Spectral index: 0.39**Size/arcmin:** 33
Type: C?

Has been called G18.95–1.1 and G18.94–1.04.

Radio: Non-thermal, diffuse partially limb-brightened, with central ridge.**Optical:** Detected.**X-ray:** Partial shell.**Point sources:** Compact X-ray source, with diffuse nebula.**Distance:** Optical absorption suggests 1.8 kpc, H₂ emission suggests 4.7 kpc, optical extinction suggests 3.1 kpc.**References:**

Fürst et al. 1985, Nature, 314, 720. Effelsberg 100-m at 4.75 GHz (2′.4 : S = 23.8 Jy), plus other flux densities.
 Odegard 1986, AJ, 92, 1372. TPT at 57.5 MHz (7′.2×8′.0 : S = 82±15 Jy), plus review of flux densities.
 Barnes & Turtle 1988, IAUCom, 101, 347. Molonglo at 408 MHz (2′.9×3′.1 : S = 58±9 Jy) and Parkes 64-m at 5 GHz (4′.1×4′.4 : S = 23±6 Jy).
 Patnaik et al. 1988, Nature, 332, 136. Ooty at 327 MHz (0′.6×1′.6).
 Fürst et al. 1989, A&A, 209, 361. Effelsberg 100-m at 4.75 GHz (2′.45 : S = 23.8 Jy) and VLA at 1.5 and 4.9 GHz (14″×19″), and Effelsberg 100-m at 1.4 GHz (9′) for H_I.
 Aschenbach et al. 1991, A&A, 246, L32. ROSAT observations.
 Fürst et al. 1997, A&A, 319, 655. ROSAT observations, and Effelsberg 100-m at 10.6 GHz (1′.1).
 Reich 2002, in NSPS, p1. Effelsberg 100-m at 10.6 GHz, including polarisation.
 Harrus et al. 2004, ApJ, 603, 152. ROSAT and ASCA observations.

Tüllmann et al. 2010, ApJ, 720, 848. Chandra detection of compact source.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : S = 19.6±1.0 Jy) including polarisation and review of flux densities.
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Shan et al. 2018, ApJS, 238, 35. Optical absorption for distance.
 Lee et al. 2019, AJ, 157, 123. [FeII] and H₂ IR observations.
 Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.
 Bykov et al. 2022, A&A, 661, A19. eROSITA observations.

G19.1+0.2

RA: 18^h24^m56^s
Dec: –12°07′

1-GHz flux/Jy: 10
Spectral index: 0.5

Size/arcmin: 27
Type: S

Has been called G19.15+0.27.

Radio: Partial shell.

Distance: Optical extinction suggests 3.6 kpc.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S = 17.4 \pm 0.4$ Jy), plus other observations.
Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.

G20.0–0.2

RA: 18^h28^m07^s
Dec: –11°35′

1-GHz flux/Jy: 10
Spectral index: 0.1

Size/arcmin: 10
Type: F

Radio: Faint, filled-centre, polarised.

X-ray: Centrally brightened.

Point sources: OH source 20.1–0.1 is nearby.

Distance: H I absorption suggests 11.2 kpc.

References:

Becker & Helfand 1985, ApJ, 297, L25. VLA at 1.4 and 5 GHz (12″).
Odegard 1986, AJ, 92, 1372. TPT at 57.5 MHz (7′.2×8′ : $S = 8.5 \pm 2$ Jy), plus review of flux densities.
Junkes et al. 1988, LNP, 316, 134. Effelsberg 100-m at 2.7 GHz (4′.3), including polarisation.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S = 9.2 \pm 0.5$ Jy) including polarisation and review of flux densities.

Petriella et al. 2013, A&A, 554, A73. Chandra observations, plus CO and H I observations of region.
Acero et al. 2016, ApJS, 224, 8. Fermi observations.
Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H I absorption observations.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S = 0.8$ Jy) including polarisation, and Spitzer observations.
Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.

G21.0–0.4

RA: 18^h31^m12^s
Dec: –10°47′

1-GHz flux/Jy: 1.1
Spectral index: 0.6

Size/arcmin: 9×7
Type: S

Has been called G21.04–0.47.

Radio: Shell.

References:

Brogan et al. 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S = 2.3 \pm 0.2$ Jy), plus other observations.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S = 0.05$ Jy) including polarisation, and Spitzer observations.

G21.5–0.9

RA: 18^h33^m33^s
Dec: –10°35′

1-GHz flux/Jy: 7
Spectral index: varies

Size/arcmin: 5
Type: C

Early observations relate to the central core only.

Radio: Filled-centre, with high frequency turnover.

X-ray: Central core, with extended, faint halo.

Point sources: Central pulsar.

Distance: H_i absorption suggests 4.4 kpc.

References:

Wilson & Weiler 1976, A&A, 53, 89. WSRT at 5 GHz (6″×35″).
 Becker & Kundu 1976, ApJ, 204, 427. NRAO interferometer at 2.7 GHz (5″×20″) and 8 GHz (2″×7″), plus review of flux densities.
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.6).
 Becker & Szymkowiak 1981, ApJ, 248, L23. VLA at 5 GHz (8″), and Einstein observations.
 Davelaar et al. 1986, ApJ, 300, L59. EXOSAT X-ray spectrum, and VLA H_i observations.
 Morsi & Reich 1987, A&AS, 69, 533. Effelsberg 100-m at 32 GHz (26″5: S=5.64±0.29 Jy).
 Fürst et al. 1988, PASJ, 40, 347. NRO array at 22.3 GHz (4″4×7″3).
 Junkes et al. 1988, LNP, 316, 134. Effelsberg 100-m at 2.7 GHz (4.3), including polarisation.
 Salter et al. 1989, A&A, 225, 167. Observations at 90.7 (29″5: S=3.8±0.4 Jy) and 141.9 GHz (S=2.5±1.2 Jy).
 Salter et al. 1989, ApJ, 338, 171. NRAO 12-m at 84.2 GHz (S=3.94±0.70 Jy), plus review of flux densities.
 Asaoka & Koyama 1990, PASJ, 42, 625. Ginga X-ray spectrum.
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′3×3′4: S=9 Jy).
 Wallace et al. 1994, A&A, 286, 565. H_i of surroundings.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Slane et al. 2000, ApJ, 533, L29. Chandra observations identifying X-ray halo.
 Warwick et al. 2001, A&A, 365, L248. XMM-Newton observations of X-ray halo.
 Bock et al. 2001, ApJ, 561, L203. BIMA at 94 GHz (4″6×8″6).
 Safi-Harb et al. 2001, ApJ, 561, 308. Chandra and other X-ray observations.
 Reich 2002, in NSPS, p1. Effelsberg 100-m at 22 GHz (8″) and 32 GHz, including polarisation.
 La Palombara & Mereghetti 2002, A&A, 383, 916. XMM-Newton upper limit on pulsations.
 Bocchino et al. 2005, A&A, 442, 539. XMM-Newton and Chandra observations.
 Gupta et al. 2005, CSci, 89, 853. Pulsar discovery.

Camilo et al. 2006, ApJ, 637, 456. Pulsar discovery.
 Bietenholz & Bartel 2008, MNRAS, 386, 1411. VLA at 4.75 GHz (0″53×0″82) for expansion studies.
 Tian & Leahy 2008, MNRAS, 391, L54. VGPS at 1.4 GHz (1′) including H_i.
 Matheson & Safi-Harb 2010, ApJ, 724, 572. Chandra observations.
 Bietenholz et al. 2011, MNRAS, 412, 1221. VLA at 1.4 GHz (14″×18″).
 Bhatnagar et al. 2011, ApJ, 739, L20. VLA at 6 GHz.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5: S=6.5±0.4 Jy) including polarisation and review of flux densities.
 Zajczyk et al. 2012, A&A, 542, A12. IR observations, including polarisation.
 Nynka et al. 2014, ApJ, 789, 72. NuSTAR observations.
 Planck Collaboration: Arnaud et al. 2016, A&A, 586, A134. Planck flux densities at 70, 100 and 143 GHz.
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H_i absorption observations.
 Aharonian et al. 2018, PASJ, 70, 38. Hitomi observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] IR observations.
 Guest et al. 2019, MNRAS, 482, 1031. Deep Chandra observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Guest & Safi-Harb 2020, MNRAS, 498, 821. Chandra observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″: S=5.8 Jy) including polarisation, and Spitzer observations.
 Castelletti et al. 2021, A&A, 653, A62. VLA 74-MHz survey flux density, and other low-frequency radio flux densities.
 Millard et al. 2021, ApJS, 257, 36. ISO far-IR spectroscopy.
 Raycheva & Sezer 2022, AdSpR, 69, 531. Suzaku observations.
 Lai et al. 2022, ApJ, 930, 1. VLA at 5 (10″2×12″9) and 7.4 GHz (7″0×9″9), including polarisation.
 Rennie et al. 2022, ApJ, 933, 187. Observations at 26 to 34 GHz.

G21.6–0.8

RA: 18^h33^m40^s
Dec: –10°25′

1-GHz flux/Jy: 1.4
Spectral index: 0.5?

Size/arcmin: 13
Type: S

Has been called G21.64–0.84.

Radio: Faint, irregular shell.

References:

Bietenholz et al. 2011, MNRAS, 412, 1221. VLA at 327 MHz (85″: S=2.8 Jy) and 1.4 GHz (14″×18″).
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Lee et al. 2019, AJ, 157, 123. H₂ IR observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″: S=0.03 Jy) including polarisation, and Spitzer observations.

G21.8–3.0

RA: 18^h41^m50^s
Dec: –11°16′

1-GHz flux/Jy: 5
Spectral index: 0.7

Size/arcmin: 60
Type: S

Radio: Shell, polarised in E.

Optical: Filaments in N.

References:

Gao et al. 2020, MNRAS, 493, 2188. Urumqi 25-m at 5 GHz (9′5), Effelsberg 100-m at 2.4 to 2.7 GHz (4′7 to 4′2) including polarisation, and other observations.

G21.8–0.6

RA: 18^h32^m45^s
Dec: –10°08′

1-GHz flux/Jy: 65
Spectral index: 0.56

Kes 69
Size/arcmin: 20
Type: S

Radio: Incomplete shell.

X-ray: Centrally brightened.

Distance: Association with CO indicates 5.2 kpc, H_I absorption suggests 5.6 kpc, H₂ emission suggests 4.1 kpc, optical extinction suggests 4.9 kpc.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Wilson 1972, A&A, 19, 354. H₂CO absorption.
 Kundu et al. 1974, AJ, 79, 132. NRAO 140-ft at 5 GHz (6′) and 10 GHz (3′).
 Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft et 2.7 GHz (5′ : $S=42.3\pm4.6$ Jy).
 Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′4) and 5 GHz (4′4).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6).
 Seward 1990, ApJS, 73, 781. Einstein observations.
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′3×3′5 : $S=132$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations, including masers.
 Yusef-Zadeh et al. 2003, ApJ, 585, 319. X-ray observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Hewitt et al. 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
 Wood et al. 2008, AJ, 135, 2358. VLA at 4.8 GHz, including polarisation.
 Tian & Leahy 2008, MNRAS, 391, L54. VGPS at 1.4 GHz (1′) including H_I.
 Zhou et al. 2009, ApJ, 691, 516. CO and HCO⁺ of region.
 Hewitt et al. 2009, ApJ, 694, 1266. Spitzer spectroscopy.

Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5 : $S=24.0\pm1.3$ Jy) including polarisation and review of flux densities.
 Andersen et al. 2011, ApJ, 742, 7. Spitzer observations.
 Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H_I absorption observations.
 Sezer et al. 2018, MNRAS, 481, 1416. Suzaku observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] and H₂ IR observations.
 Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18′ : $S=1.8$ Jy) including polarisation, and Spitzer observations.
 Castelletti et al. 2021, A&A, 653, A62. VLA 74-MHz survey flux density, and other low-frequency radio flux densities.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20′′) of region.
 Rennie et al. 2022, ApJ, 933, 187. Observations at 26 to 34 GHz.
 Yamauchi & Pannuti 2023, PASJ, 75, 1273. Suzaku observations.

G22.7–0.2

RA: 18^h33^m15^s
Dec: –09°13′

1-GHz flux/Jy: 33
Spectral index: 0.6

Size/arcmin: 26
Type: S?

Radio: Non-thermal ring in complex region, overlapping G23.3–0.3.

X-ray: Possible detection.

Point sources: Variable radio source near centre, and γ -ray source near edge.

Distance: Association with CO indicates 4.4 kpc, H_I absorption suggests 4.7 kpc, optical extinction suggests 4.7 kpc.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6).
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′3×3′4 : $S = 82$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Becker et al. 2010, AJ, 140, 157. Variable radio source detection.
 Andersen et al. 2011, ApJ, 742, 7. Spitzer observations.
 Su et al. 2014, ApJ, 796, 122. CO observations.
 Su et al. 2015, ApJ, 811, 134. CO observations of region.

H.E.S.S. Collaboration: Abramowski et al. 2015, MNRAS, 446, 1163. H.E.S.S. observations.
 Mori et al. 2017, ApJ, 848, 80. NuSTAR, Chandra and XMM-Newton observations.
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H_I absorption observations.
 Hogge et al. 2019, ApJ, 887, 79. Molecular line observations.
 Tam et al. 2020, ApJ, 899, 75. Fermi observations of region.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18′ : $S = 0.7$ Jy) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20′) of region.

G23.3–0.3

W41

RA: 18^h34^m45^s
Dec: –08°48′

1-GHz flux/Jy: 70
Spectral index: 0.5

Size/arcmin: 27
Type: S

Radio: Distorted ring, in complex region, overlapping G22.7–0.2.

X-ray: Possible extended emission, with compact sources.

Point sources: Pulsar association suggested.

Distance: H_I and CO observations suggest 4.2 or 4.8 kpc, optical extinction suggests 3.4 kpc.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6).
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′3×3′4 : $S = 138$ Jy).
 Gaensler & Johnston 1995, MNRAS, 275, L73. Possible pulsar association.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Aharonian et al. 2005, Science, 307, 1938. H.E.S.S. detection.
 Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.
 Aharonian et al. 2006, ApJ, 636, 777. H.E.S.S. observations.
 Albert et al. 2006, ApJ, 643, L53. γ -ray observations.
 Landi et al. 2006, ApJ, 651, 190. X-ray observations.
 Tian et al. 2007, ApJ, 657, L25. VGPS at 1.4 GHz (1′) including H_I, plus XMM-Newton observations.
 Leahy & Tian 2008, AJ, 135, 167. VGPS at 1.4 GHz (1′) including H_I, plus CO observations.
 Mukherjee et al. 2009, ApJ, 691, 1707. XMM-Newton and SWIFT observations.

Frail et al. 2013, ApJ, 773, L19. OH observations.
 Castro et al. 2013, ApJ, 774, 36. Fermi observations.
 H.E.S.S. Collaboration: Abramowski et al. 2015, A&A, 574, A27. H.E.S.S. observations.
 Su et al. 2015, ApJ, 811, 134. CO observations of region.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H_I absorption observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] IR observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18′ : $S = 1.8$ Jy) including polarisation, and Spitzer observations.
 Castelletti et al. 2021, A&A, 653, A62. VLA 74-MHz survey flux density, and other low-frequency radio flux densities.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20′) of region.

G24.7–0.6

RA: 18^h38^m43^s
Dec: –07°32′

1-GHz flux/Jy: 8
Spectral index: 0.5

Size/arcmin: 15?
Type: S?

Radio: Incomplete shell, defined in SW.

Distance: H_I absorption and CO suggests 3.8 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S = 12.3$ Jy) and Parkes 64-m at 5 GHz (4′ : $S = 3.6$ Jy).
 Angerhofer et al. 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6′8″ : $S = 2.2 \pm 0.5$ Jy).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6″).
 Dubner et al. 1993, AJ, 105, 2251. VLA at 1.47 GHz (44″ × 56″ : $S = 1.9$ Jy).
 Frail et al. 1996, AJ, 111, 1651. OH emission near remnant.

Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
 Ranasinghe & Leahy 2018, MNRAS, 477, 2243. VGPS H_I absorption, plus CO observations.
 Sun et al. 2020, MNRAS, 494, 3405. Fermi observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S = 0.7$ Jy) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.

G24.7+0.6

RA: 18^h34^m10^s
Dec: –07°05′

1-GHz flux/Jy: 20?
Spectral index: 0.2?

Size/arcmin: 30 × 15
Type: C?

Radio: Filled-centre, with faint shell, and a compact H_{II} region to the S.

Distance: Optical extinction suggests 2.7 kpc.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6″).
 Reich et al. 1984, A&A, 133, L4. Effelsberg 100-m at 2.7 GHz (4′3″ : $S = 19 \pm 3$ Jy) and 4.75 GHz (2′4″ : $S = 17 \pm 4$ Jy) and NRO 45-m at 10.2 GHz (2′7″ : $S = 15 \pm 3$ Jy).
 Becker & Helfand 1987, ApJ, 316, 660. VLA at 1.4 GHz (12″), and X-ray upper limit.
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.

Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Lee et al. 2019, AJ, 157, 123. H₂ IR observations.
 MAGIC Collaboration, Acciari et al. 2019, MNRAS, 483, 4578. γ -ray observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S = 0.9$ Jy) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.

G25.1–2.3

RA: 18^h45^m10^s
Dec: –08°00′

1-GHz flux/Jy: 8
Spectral index: 0.5?

Size/arcmin: 80 × 30?
Type: S

Radio: Incomplete shell, extent not well defined.

Distance: Optical extinction suggests 3.5 kpc.

References:

Gao et al. 2011, A&A, 532, A144. Urumqi 25-m at 5 GHz (9′5″ : $S = 3.7 \pm 0.4$ Jy), plus other observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G27.4+0.0

RA: 18^h41^m19^s
Dec: −04°56′

1-GHz flux/Jy: 6
Spectral index: 0.68

4C−04.71

Size/arcmin: 4
Type: S

Early references refer to G27.3−0.1 (Kes 73), a supposed larger remnant.

Radio: Incomplete shell.

X-ray: Diffuse emission, with central low period pulsar.

Point sources: Central AXP.

Distance: H I absorption suggests 7.5 to 9.8 or 5.8 kpc, association with CO suggests 9 kpc, H₂ emission suggests 5.8 kpc.

References:

Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′).
 Clark et al. 1975, AuJPA, 37, 75. Molonglo at 408 MHz (3′ : $S = 4.4$ Jy).
 Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′4) and 5 GHz (4′4).
 Angerhofer et al. 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6′8 : $S = 2.0 \pm 0.5$ Jy).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6).
 Caswell et al. 1982, MNRAS, 200, 1143. FIRST at 1415 MHz (45″ × 60″ : $S = 3.5$ Jy). Revise $S_{408 \text{ MHz}} = 10.4$ Jy, and $S_5 \text{ GHz} = 1.9 \pm 0.2$ Jy.
 Kriss et al. 1985, ApJ, 288, 703. Einstein observations, plus VLA at 1.4 and 5 GHz (12″).
 Sanbonmatsu & Helfand 1992, AJ, 104, 2189. VLA at 1.4 GHz for H I absorption.
 Helfand et al. 1994, ApJ, 434, 627. ROSAT observations, particularly of central source.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations, including nearby masers.
 Vasisht & Gotthelf 1997, ApJ, 486, L129. ASCA detection of pulsar.
 Gotthelf & Vasisht 1997, ApJ, 486, L133. ASCA observations.
 Gotthelf et al. 1999, ApJ, 522, L49. X-ray timing observations of pulsar.
 Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Mereghetti et al. 2001, MNRAS, 321, 143. Search for optical/IR counterpart to pulsar.

Kuiper et al. 2004, ApJ, 613, 1173. X-ray observations of pulsar.
 Tian & Leahy 2008, ApJ, 677, 292. VGPS at 1.4 GHz (1′) including H I.
 Mizuno et al. 2010, AJ, 139, 1542. Spitzer observations.
 An et al. 2013, ApJ, 779, 163. NuSTAR and other observations.
 Kumar et al. 2014, ApJ, 781, 41. Chandra and XMM-Newton observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.
 Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
 Yeung et al. 2017, ApJ, 837, 69. Fermi observations.
 Borkowski & Reynolds 2017, ApJ, 846, 13. Chandra expansion studies.
 Liu et al. 2017, ApJ, 851, 37. Fermi and CO observations.
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H I absorption observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] and H₂ IR observations.
 Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S = 0.8$ Jy) including polarisation, and Spitzer observations.
 Castelletti et al. 2021, A&A, 653, A62. VLA 74-MHz survey flux density, and other low-frequency radio flux densities.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.

G27.8+0.6

RA: 18^h39^m50^s
Dec: −04°24′

1-GHz flux/Jy: 30
Spectral index: varies

Size/arcmin: 50 × 30
Type: F

Radio: Filled-centre, with spectral turnover.

X-ray: Possible pulsar wind nebula.

Distance: Optical extinction suggests 4.0 kpc.

References:

Reich et al. 1984, A&A, 133, L4. Effelsberg 100-m at 2.7 GHz (4′3 : $S = 23 \pm 2$ Jy), and 4.75 GHz (2′4 : $S = 18 \pm 2$ Jy) and NRO 45-m at 10.2 GHz (smoothed to 4′3 : $S = 8.5 \pm 2$ Jy).
 Frail et al. 1996, AJ, 111, 1651. OH emission near remnant.
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
 Casandjian & Grenier 2008, A&A, 489, 849. γ -ray observations.
 Misanojic et al. 2010, ApJ, 725, 931. XMM-Newton pulsar/wind nebula search.

Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5 : $S = 21.0 \pm 1.1$ Jy) including polarisation and review of flux densities.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] and H₂ IR observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G28.3+0.2

RA: 18^h42^m30^s
Dec: −03°58′

1-GHz flux/Jy: 1.3?
Spectral index: 0.7?

Size/arcmin: 10
Type: S

Has been called G28.36+0.21.

Radio: Asymmetric shell.

References:

Helfand et al. 2006, AJ, 131, 2525. VLA at 327 MHz and 1.4 GHz and IR.
 Anderson et al. 2017, A&A, 605, A58. THOR radio and IR survey data.

Hurley-Walker et al. 2019, PASA, 36, e048. MWA at 72 to 231 MHz ($\sim 2'$).
 Dokara et al. et al. 2023, A&A, 671, A145. VLA and Effelsberg 100-m at 6 GHz, including polarisation.

G28.6−0.1

RA: 18^h43^m55^s
Dec: −03°53′

1-GHz flux/Jy: 3?
Spectral index: ?

Size/arcmin: 13×9
Type: S

Radio: Poorly defined regions of non-thermal emission.

X-ray: Diffuse shell, with thermal and non-thermal emission.

Point sources: Pulsar in NE.

Distance: H_I absorption and CO suggests 9.6 kpc.

References:

Helfand et al. 1989, ApJ, 341, 151. VLA at 1.4 GHz (15'') and 5 GHz (15'').
 Bamba et al. 2001, PASJ, 53, L21. ASCA observations.
 Ueno et al. 2003, ApJ, 588, 338. Chandra observations.
 Ebisawa et al. 2005, ApJ, 635, 214. Chandra observations.
 Zyuzin et al. 2018, MNRAS, 476, 2177. Pulsar observations.
 Ranasinghe & Leahy 2018, MNRAS, 477, 2243. VGPS H_I absorption, plus CO observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] IR observations.
 Devin et al. 2021, A&A, 647, A68. Fermi observations.

Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18'': S=1.2 Jy) including polarisation, and Spitzer observations.
 Castelletti et al. 2021, A&A, 653, A62. VLA 74-MHz survey flux density, and other low-frequency radio flux densities.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20'') of region.
 Amenomori et al. 2022, ApJ, 932, 120. γ -ray observations.
 Dokara et al. et al. 2023, A&A, 671, A145. VLA and Effelsberg 100-m at 6 GHz, including polarisation, plus other radio flux densities.

G28.7−0.4

RA: 18^h45^m30^s
Dec: −03°54′

1-GHz flux/Jy: 0.9?
Spectral index: 0.8?

Size/arcmin: 9
Type: S

Has been called G28.7−0.44.

Radio: Asymmetric shell.

References:

Helfand et al. 2006, AJ, 131, 2525. VLA at 327 MHz and 1.4 GHz and IR.
 Anderson et al. 2017, A&A, 605, A58. THOR radio and IR survey data.
 Hurley-Walker et al. 2019, PASA, 36, e048. MWA at 72 to 231 MHz ($\sim 2'$).

G28.8+1.5

RA: 18^h39^m00^s
Dec: −02°55′

1-GHz flux/Jy: ?
Spectral index: 0.4?

Size/arcmin: 100?
Type: S?

Radio: Part of rim detected.

X-ray: Diffuse, Centrally brightened.

References:

Schwentker 1994, A&A, 286, L47. ROSAT observations.
 Song et al. 2000, PASJ, 52, 181. ASCA observations.
 Casandjian & Grenier 2008, A&A, 489, 849. γ -ray observations.
 Misanovic et al. 2010, ApJ, 725, 931. XMM-Newton pulsar/wind nebula search.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.

G29.3+0.1

RA: 18^h44^m36^s
Dec: −03°06′

1-GHz flux/Jy: 2.5?
Spectral index: ?

Size/arcmin: 10?
Type: C?

Has been called G29.37+0.10 and G29.38+0.10.

Radio: Faint shell, with central brighter, polarised emission.

X-ray: Extended emission.

References:

Helfand et al. 2006, AJ, 131, 2525. VLA at 327 MHz and 1.4 GHz and IR.
 Castelletti et al. 2017, A&A, 602, A31. GMRT and other observations.
 Anderson et al. 2017, A&A, 605, A58. THOR radio and IR survey data.

Petriella et al. 2019, A&A, 626, A65. Chandra and XMM-Newton observations.
 Dokara et al. 2023, A&A, 671, A145. VLA and Effelsberg 100-m at 6 GHz, including polarisation.

G29.6+0.1

RA: 18^h44^m52^s
Dec: −02°57′

1-GHz flux/Jy: 0.5?
Spectral index: 0.5?

Size/arcmin: 5
Type: S

Radio: Diffuse shell.

Point sources: AXP associated.

References:

Gaensler et al. 1999, ApJ, 526, L37. VLA at 5 GHz (13′′) and 8 GHz (8′′).
 Vasisht et al. 2000, ApJ, 542, L49. X-ray observations of AXP.
 Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18′′ : S=0.1 Jy) including polarisation, and Spitzer observations.

Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20′′) of region.
 Dokara et al. et al. 2023, A&A, 671, A145. VLA and Effelsberg 100-m at 6 GHz, including polarisation, plus other radio flux densities.

G29.7–0.3

Kes 75

RA: 18^h46^m25^s
Dec: –02°59′**1-GHz flux/Jy:** 9
Spectral index: 0.7**Size/arcmin:** 3
Type: C

Has erroneously been called G29.6+0.1.

Radio: Shell with flatter spectrum emission from centre.**X-ray:** Thermal shell and non-thermal core, and central pulsar.**Point sources:** X-ray pulsar.**Distance:** Association with CO implies 11 kpc, and H I absorption suggests 5.6 kpc.**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Milne & Dickel 1974, AuJPh, 27, 549. Parkes 64-m at 2.7 GHz (8′4″: $S = 5 \pm 20\%$ Jy).
 Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′).
 Becker & Kundu 1976, ApJ, 204, 427. NRAO interferometer at 2.7 GHz (7″×20″) and 8 GHz (8″×25″), plus review of flux densities.
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6″).
 Becker et al. 1983, ApJ, 268, L93. VLA at 1.4 GHz (3″), plus Einstein observations.
 Becker & Helfand 1984, ApJ, 283, 154. VLA at 5 GHz (2″6″), plus H I.
 Morsi & Reich 1987, A&AS, 71, 189. Effelsberg 100-m at 32 GHz (26′5″: $S = 1.02 \pm 0.07$ Jy).
 Salter et al. 1989, ApJ, 338, 171. NRAO 12-m at 84.2 GHz of core, plus review of flux densities.
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′4″×3′7″: $S = 27.4$ Jy).
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
 Blanton & Helfand 1996, ApJ, 470, 961. ASCA observations.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Gotthelf et al. 2000, ApJ, 542, L37. X-ray pulsar detection.
 Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Mereghetti et al. 2002, ApJ, 574, 873. BeppoSAX observations of pulsar.
 Helfand et al. 2003, ApJ, 582, 783. Chandra observations.
 Bock & Gaensler 2005, ApJ, 626, 343. BIMA at 88.6 GHz (10″×13″).
 Morton et al. 2007, ApJ, 667, 219. Spitzer and Chandra observations.
 McBride et al. 2008, A&A, 477, 249. INTEGRAL and Chandra observations.
 Leahy & Tian 2008, A&A, 480, L25. VGPS at 1.4 GHz (1′) including H I.

Kumar & Safi-Harb 2008, ApJ, 678, L43. Chandra observations.
 Ng et al. 2008, ApJ, 686, 508. Chandra observations.
 Gavril et al. 2008, Science, 319, 1802. X-ray observations of pulsar.
 Su et al. 2009, ApJ, 694, 376. CO observations of region, plus Chandra observations.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5″: $S = 3.6 \pm 0.6$ Jy) including polarisation and review of flux densities.
 Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.
 Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H I absorption observations.
 Reynolds et al. 2018, ApJ, 856, 133. Chandra observations for expansion and brightness change studies.
 Temim et al. 2019, ApJ, 878, L19. Herschel observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Guest & Safi-Harb 2020, MNRAS, 498, 821. Chandra observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″: $S = 2.0$ Jy) including polarisation, and Spitzer observations.
 Castelletti et al. 2021, A&A, 653, A62. VLA 74-MHz survey flux density, and other low-frequency radio flux densities.
 Gotthelf et al. 2021, ApJ, 908, 212. Chandra and NuSTAR observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.
 Millard et al. 2021, ApJS, 257, 36. ISO far-IR spectroscopy.
 Dokara et al. et al. 2023, A&A, 671, A145. VLA and Effelsberg 100-m at 6 GHz, including polarisation, plus other radio flux densities.
 Straal et al. 2023, ApJ, 942, 103. Fermi observations.

G30.7–2.0**RA:** 18^h54^m25^s
Dec: –02°54′**1-GHz flux/Jy:** 0.5?
Spectral index: 0.7?**Size/arcmin:** 16
Type: ?**Radio:** Poorly defined.**References:**

Reich et al. 1988, IAUCo, 101, 293. Summary of parameters.
 Reich et al. 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′3″).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.

G30.7+1.0

RA: 18^h44^m00^s
Dec: −01°32′

1-GHz flux/Jy: 6
Spectral index: 0.4

Size/arcmin: 24×18
Type: S?

Radio: Non-thermal, highly polarised part shell?

Point sources: Compact source near centre.

Distance: Optical extinction suggests 3.6 kpc.

References:

Reich et al. 1986, A&A, 155, 185. Effelsberg 100-m at 4.75 GHz (2′.4 : $S=3.4\pm0.4$ Jy), plus other flux densities.
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′.6×3′.9 : $S=8.6$ Jy).
 Gorham et al. 1996, ApJ, 458, 257. Pulsar search.

Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S=2.93\pm0.19$ Jy) including polarisation and review of flux densities.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G31.5−0.6

RA: 18^h51^m10^s
Dec: −01°31′

1-GHz flux/Jy: 2?
Spectral index: ?

Size/arcmin: 18?
Type: S?

Has been called G31.55−0.65.

Radio: Distorted shell? Near HII region.

Optical: Diffuse, incomplete shell.

References:

Fürst et al. 1987, A&AS, 69, 403. Effelsberg 100-m at 4.75 GHz (2′.4), plus other flux densities.
 Mavromatakis et al. 2001, A&A, 370, 265. Optical observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18′ : $S=0.3$ Jy) including polarisation, and Spitzer observations.

Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20′′) of region.
 Dokara et al. et al. 2023, A&A, 671, A145. VLA and Effelsberg 100-m at 6 GHz, including polarisation, plus other radio flux densities.

G31.9+0.0

3C391

RA: 18^h49^m25^s
Dec: –00°55′**1-GHz flux/Jy:** 25
Spectral index: varies**Size/arcmin:** 7×5
Type: S**Radio:** Shell, brightest in NW, with low frequency turnover.**X-ray:** Diffuse with central core.**Distance:** H_i absorption and CO association suggests 7.1 kpc, as does H₂ emission.**References:**

Radhakrishnan et al. 1972, ApJS, 24, 49. H_i absorption.
 Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′).
 Green et al. 1975, A&A, 44, 187. Effelsberg 100-m at 15 GHz (58′′ : $S > 1.6$).
 Becker & Kundu 1976, ApJ, 204, 427. NRAO interferometer at 2.7 GHz (20′′×23′′) and 8 GHz (9′′×24′′), plus review of flux densities.
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.6).
 Goss et al. 1979, A&A, 78, 75. FIRST at 1.4 GHz (54′′×66′′ : $S = 20 \pm 2$ Jy) and Effelsberg 100-m at 10.7 GHz (77′′ : $S = 7.5 \pm 0.8$ Jy).
 Wang & Seward 1984, ApJ, 279, 705. Einstein observations.
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.4×3.7′ : $S = 44.8$ Jy).
 Reynolds & Moffett 1993, AJ, 105, 2226. VLA at 1.4 GHz (6′′), including possible associated CO.
 Moffett & Reynolds 1994, ApJ, 425, 668. VLA at 330 MHz (smoothed to 30′′ : $S = 38.5 \pm 0.5$ Jy) 1.46 GHz (6′′.7) and 4.85 GHz (6′.2×6′.4), including spectral index and polarisation studies.
 Frail et al. 1996, AJ, 111, 1651. OH emission near remnant, including masers.
 Gorham et al. 1996, ApJ, 458, 257. Pulsar search.
 Reach & Rho 1996, A&A, 315, L277. ISO spectroscopy.
 Rho & Petre 1996, ApJ, 467, 698. ROSAT observations.
 Wilner et al. 1998, AJ, 115, 247. CO observations of surroundings.
 Reach & Rho 1998, ApJ, 507, L93. ISO observations.
 Reach & Rho 1999, ApJ, 511, 836. CO, HCO⁺ and CS observations of surroundings.
 Reach & Rho 2000, ApJ, 544, 843. ISO observations of interactions with surroundings.
 see also: Reach & Rho 2001, ApJ, 558, 943. Erratum.
 Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Chen & Slane 2001, ApJ, 563, 202. ASCA observations.
 Reach et al. 2002, ApJ, 564, 302. Observations of shocked molecular species.
 Chen et al. 2004, ApJ, 616, 885. Chandra observations.
 Brogan et al. 2005, AJ, 130, 148. VLA at 74 MHz, 330 MHz and 1.5 GHz (70′′).

Kawasaki et al. 2005, ApJ, 631, 935. ASCA observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Neufeld et al. 2007, ApJ, 664, 890. Spitzer observations.
 Hewitt et al. 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
 Castro & Slane 2010, ApJ, 717, 372. Fermi observations.
 Yuan & Neufeld 2011, ApJ, 726, 76. Spitzer observations.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.5 : $S = 8.9 \pm 0.6$ Jy) including polarisation and review of flux densities.
 Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.
 Neufeld et al. 2014, ApJ, 781, 102. Spitzer and Herschel IR spectroscopy.
 Ergin et al. 2014, ApJ, 790, 65. Fermi and Suzaku observations.
 Gusdorf et al. 2014, IAUS, 296, 178. CO observations.
 Su et al. 2014, IAUS, 296, 372. VGPS for H_i absorption.
 Lee et al. 2014, MNRAS, 443, 2650. [FeII] IR survey observations.
 Sato et al. 2014, PASJ, 66, 124. Suzaku observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.
 Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
 Ranasinghe & Leahy 2017, ApJ, 843, 119. H_i and CO observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] and H₂ IR observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18′′ : $S = 1.5$ Jy) including polarisation, and Spitzer observations.
 Castelletti et al. 2021, A&A, 653, A62. VLA 74-MHz survey flux density, and other low-frequency radio flux densities.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20′′) of region.
 Rennie et al. 2022, ApJ, 933, 187. Observations at 26 to 34 GHz.
 Dokara et al. et al. 2023, A&A, 671, A145. VLA and Effelsberg 100-m at 6 GHz, including polarisation.

G32.0–4.9

3C396.1

RA: 19^h06^m00^s
Dec: –03°00′**1-GHz flux/Jy:** 22?
Spectral index: 0.5?**Size/arcmin:** 60?
Type: S?**Radio:** Possible large shell?**References:**

Milne & Hill 1969, AuJPh, 22, 211. Parkes 64-m at 635 MHz (31′ : $S = 25 \pm 30\%$ Jy), 1410 MHz (15′ : $S = 19 \pm 15\%$ Jy) and 2650 MHz (8.4′ : $S = 8.6 \pm 30\%$ Jy). Fluxes if size is 60′, plus review of flux densities.

Caswell 1970, AuJPh, 23, 105. Revision of low frequency flux densities.
 Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo at 111 MHz ($S = 105 \pm 30$ Jy).

G32.1–0.9

RA: 18^h53^m10^s
Dec: –01°08′

1-GHz flux/Jy: 4?
Spectral index: 0.7?

Size/arcmin: 40?
Type: C?

Radio: Possible faint shell, not well defined.

X-ray: Diffuse, with clumps.

Distance: H₂ emission suggests 5 kpc, optical extinction suggests 4.7 kpc.

References:

Folgheraiter et al. 1997, MNRAS, 292, 365. ROSAT and ASCA observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Lee et al. 2019, AJ, 157, 123. H₂ IR observations.
 Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18′′) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20′′) of region.
 Dokara et al. et al. 2023, A&A, 671, A145. VLA and Effelsberg 100-m at 6 GHz, including polarisation, plus other radio flux densities.

G32.4+0.1

RA: 18^h50^m05^s
Dec: –00°25′

1-GHz flux/Jy: 0.8?
Spectral index: 0.2?

Size/arcmin: 6
Type: S

Has been called G32.45+0.1.

Radio: Shell.

X-ray: Shell.

Distance: X-ray absorption suggests 17 kpc.

References:

Yamaguchi et al. 2004, PASJ, 56, 1059. XMM-Newton and other observations.
 Ueno et al. 2005, in XRRC, E4.18. XMM-Newton observations.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.

Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18′′) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20′′) of region.
 Dokara et al. et al. 2023, A&A, 671, A145. VLA and Effelsberg 100-m at 6 GHz, including polarisation, plus other radio flux densities.

G32.8–0.1

RA: 18^h51^m25^s
Dec: –00°08′

1-GHz flux/Jy: 12
Spectral index: 0.3

Size/arcmin: 22×15
Type: S?

Kes 78

Part has been called G33.1–0.1.

Radio: Incomplete, elongated shell.

Optical: Detected.

X-ray: Patchy, elongated shell.

Distance: Association with CO and H_i absorption indicate 4.8 kpc, H₂ emission suggests 5.4 kpc.

References:

Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′:S=7.2±0.5 Jy).
 Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo at 430 MHz (S=19.0±15.5 Jy).
 Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′).
 Caswell et al. 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′:S=12.8 Jy) and Parkes 64-m at 5 GHz (4′:S=7.7 Jy).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6).
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′6×3′8:S=31.3 Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Koralesky et al. 1998, AJ, 116, 1323. VLA detection of compact OH emission.
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.
 Zhou & Chen 2011, ApJ, 743, 4. XMM-Newton observations, plus CO of region.

Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Bamba et al. 2016, ApJ, 818, 63. Suzaku observations.
 Miceli et al. 2017, A&A, 599, A45. XMM-Newton observations.
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H_i absorption observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] and H₂ IR observations.
 Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18′′) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20′′) of region.
 Dokara et al. et al. 2023, A&A, 671, A145. VLA and Effelsberg 100-m at 6 GHz, including polarisation, plus other radio flux densities.

G33.2–0.6

RA: 18^h53^m50^s
Dec: –00°02′

1-GHz flux/Jy: 3
Spectral index: 0.3

Size/arcmin: 18
Type: S

Radio: Incomplete shell.

Optical: Filaments and diffuse emission.

Distance: H₂ emission suggests 4.9 kpc.

References:

Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
 Reich 1982, A&A, 106, 314. Effelsberg 100-m at 2.7 GHz (4′.4: $S=2.6\pm0.3$ Jy) and 4.75 GHz (2′.5: $S=1.75\pm0.2$ Jy).
 Dubner et al. 1996, AJ, 111, 1304. VLA at 1.4 GHz (52″×68″: $S=2.7\pm0.3$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Boumis et al. 2009, A&A, 499, 789. Optical observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Lee et al. 2019, AJ, 157, 123. H₂ IR observations.

Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″: $S=0.2$ Jy) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.
 Dokara et al. et al. 2023, A&A, 671, A145. VLA and Effelsberg 100-m at 6 GHz, including polarisation, plus other radio flux densities.

G33.6+0.1

RA: 18^h52^m48^s
Dec: +00°41′

1-GHz flux/Jy: 20
Spectral index: 0.51

Kes 79, 4C00.70, HC13

Size/arcmin: 10
Type: S

Has been called G33.7+0.0 and G33.7+0.05.

Radio: Shell, with bright central region, in complex region.

X-ray: Multiple shells and filaments.

Point sources: Central X-ray pulsar.

Distance: H_I absorption suggests 7.8 or 3.5 kpc, and CO observations suggest 5.5 kpc.

References:

Caswell et al. 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′: $S=35.5$ Jy) and Parkes 64-m at 5 GHz (4′: $S=7.8$ Jy).
 Caswell et al. 1975, A&A, 45, 239. H_I absorption.
 Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo S_{430} MHz = 69±33 Jy.
 Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′: $S=6.8\pm1.5$ Jy).
 Angerhofer et al. 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6′.8: $S=11.4\pm1.1$ Jy).
 Caswell et al. 1981, MNRAS, 195, 89. FIRST at 1415 MHz (1′), plus observations of the nearby point source.
 van Gorkom et al. 1982, MNRAS, 198, 757. WSRT H_I absorption to nearby point source, possibly extragalactic.
 Seaquist & Gilmore 1982, AJ, 87, 378. VLA observations of nearby source, plus Einstein observations.
 Green 1989, MNRAS, 238, 737. OH absorption.
 Frail & Clifton 1989, ApJ, 336, 854. VLA at 1.4 GHz (1′×2′.9), including H_I absorption.
 Velusamy et al. 1991, AJ, 102, 676. VLA at 327 MHz (1′), 1.5 (7″×14″) and 5 GHz (7″), including spectral comparison.
 Green & Dewdney 1992, MNRAS, 254, 686. Observations of adjacent molecular material.
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′.6×3′.8: $S=34.8$ Jy).
 Seward & Velusamy 1995, ApJ, 439, 715. ROSAT observations.
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 Koralesky et al. 1998, AJ, 116, 1323. VLA search for OH emission.
 Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
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 Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.
 Halpern et al. 2007, ApJ, 665, 1304. X-ray pulsar timing observations.
 Giacani et al. 2009, A&A, 507, 841. VLA at 74 MHz (36″×39″: $S=76\pm10$ Jy), 324 MHz (13″: $S=39\pm8$ Jy) and 1.5 GHz (17″×19″: $S=11.5\pm1.5$ Jy), plus review of flux densities and XMM-Newton observations.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5: $S=9.4\pm0.5$ Jy) including polarisation and review of flux densities.
 Auchettl et al. 2014, ApJ, 783, 32. Fermi detection.
 Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.
 Zhou et al. 2016, ApJ, 831, 192. CO and other observations.
 Sato et al. 2016, PASJ, 68, S8. Suzaku observations.
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H_I absorption observations.
 Kuriki et al. 2018, ApJ, 864, 161. CO observations.
 Mayer & Becker 2021, A&A, 651, A40. Multi-epoch Chandra observations for proper motion of compact source.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″: $S=1.2$ Jy) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.
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 Dokara et al. et al. 2023, A&A, 671, A145. VLA and Effelsberg 100-m at 6 GHz, including polarisation, plus other radio flux densities.

G34.7–0.4

RA: 18^h56^m00^s
Dec: +01°22′

1-GHz flux/Jy: 240
Spectral index: 0.37

W44, 3C392

Size/arcmin: 35×27
Type: C

Has been called G34.6–0.5.

Radio: Distorted shell, brighter to the E, with pulsar and associated nebula.

Optical: Diffuse emission.

X-ray: Centrally concentrated, thermal spectrum, plus pulsar wind nebula.

Point sources: Pulsar within the boundary of the remnant.

Distance: H_I absorption suggests 3.0 kpc, optical absorption suggests 2.1 or 2.7 kpc, H₂ emission suggests 2.8 kpc.

References:

- Caswell et al. 1975, A&A, 45, 239. H_I absorption.
 Clark et al. 1975, AuJPA, 37, 75. Molonglo at 408 MHz (3′ : S = 299 Jy).
 Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo S₄₃₀ MHz = 540±187 Jy.
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 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
 Wolszczan et al. 1991, ApJ, 372, L99. Pulsar detection.
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′.6×3′.8 : S = 469 Jy).
 Jones et al. 1993, MNRAS, 265, 631. VLA at 1.4 GHz (15″), plus X-ray spectra.
 Rho et al. 1994, ApJ, 430, 757. Optical and ROSAT observations.
 Koo & Heiles 1995, ApJ, 442, 679. H_I of surrounding shell.
 Harrus et al. 1996, ApJ, 464, L161. ASCA observations.
 Frail et al. 1996, ApJ, 464, L165. VLA at 1.5 and 8.4 GHz (7″.8×8″.9) of pulsar nebula.
 Frail et al. 1996, AJ, 111, 1651. OH maser emission.
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 Reach & Rho 1996, A&A, 315, L277. ISO spectroscopy.
 Harrus et al. 1997, ApJ, 488, 781. X-ray observations.
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 see also: Reach & Rho 2001, ApJ, 558, 943. Erratum.
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 Mavromatakis et al. 2003, A&A, 405, 591. Optical observations.
 Shelton et al. 2004, ApJ, 611, 906. Chandra observations of part.
 Reach et al. 2005, ApJ, 618, 297. Molecular line and near-IR observations.
 Hoffman et al. 2005, ApJ, 627, 803. Observations of OH masers.
 Kawasaki et al. 2005, ApJ, 631, 935. ASCA observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
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 Castelletti et al. 2007, A&A, 471, 537. VLA at 74 MHz (36″×39″ : S = 634±70 Jy) and 324 MHz (13″ : S = 411±50 Jy).
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 Abdo et al. 2010, Science, 327, 1103. Fermi observations.
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 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : S = 118±6 Jy) including polarisation and review of flux densities.
 Giuliani et al. 2011, ApJ, 742, L30. γ -ray observations.
 Uchiyama et al. 2012, ApJ, 749, L35. Fermi observations.
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 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
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 Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
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 Génova-Santos et al. 2017, MNRAS, 464, 4107. Radio observations at 10 to 20 GHz.
 Egron et al. 2017, MNRAS, 470, 1329. SRT at 1.5 GHz (11′ : S = 214±6 Jy) and 7 GHz (2′.7 : S = 94±4 Jy).
 Yamada et al. 2017, ApJ, 834, L3. CO and HCO⁺ observations.
 Shan et al. 2018, ApJS, 238, 35. Optical absorption for distance.
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H_I absorption observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] and H₂ IR observations.
 Beuther et al. 2019, A&A, 628, A90. OH maser observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
 Okon et al. 2020, ApJ, 890, 62. XMM-Newton observations.
 Peron et al. 2020, ApJ, 896, L23. Fermi observations.
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 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.
 Rennie et al. 2022, ApJ, 933, 187. Observations at 26 to 34 GHz.
 Dokara et al. et al. 2023, A&A, 671, A145. VLA and Effelsberg 100-m at 6 GHz, including polarisation, plus other radio flux densities.

G35.6–0.4

RA: 18^h57^m55^s
Dec: +02°13′

1-GHz flux/Jy: 9
Spectral index: varies

Size/arcmin: 15×11
Type: S?

Re-identified as SNR in 2009.

Radio: Diffuse, with some limb brightening.

Distance: H_I absorption suggests 3.8 kpc.

References:

Green 2009, MNRAS, 399, 177. Identification in the radio as a SNR.
 Paron & Giacani 2010, A&A, 509, L4. CO and IR observations of region.
 Zhu et al. 2013, ApJ, 775, 95. H_I and other observations.
 Paredes et al. 2014, A&A, 561, A56. GMRT at 610 MHz (4″8×12″2).
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H_I absorption observations.
 Beuther et al. 2019, A&A, 628, A90. OH maser observations.
 Cui et al. 2021, A&A, 646, A114. Fermi observations of region, and X-ray limit.

Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : S=0.3 Jy) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.
 Zhang et al. 2022, ApJ, 931, 128. Fermi, CO and H_I observations.
 Rennie et al. 2022, ApJ, 933, 187. Observations at 26 to 34 GHz.
 Dokara et al. et al. 2023, A&A, 671, A145. VLA and Effelsberg 100-m at 6 GHz, including polarisation, plus other radio flux densities.

G36.6–0.7

RA: 19^h00^m35^s
Dec: +02°56′

1-GHz flux/Jy: 1.0
Spectral index: 0.7?

Size/arcmin: 25?
Type: S?

Radio: polarised arc, possibly part of a larger shell?

Distance: Optical extinction suggests 8.7 kpc.

References:

Fürst et al. 1987, A&AS, 69, 403. Effelsberg 100-m at 4.75 GHz (2′4), plus other flux densities.
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′4×3′7 : S = 6.7 Jy).
 Gorham et al. 1996, ApJ, 458, 257. Pulsar search.
 Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5 : S = 0.39±0.04 Jy) including polarisation and review of flux densities.

Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.

G36.6+2.6

RA: 18^h48^m49^s
Dec: +04°26′

1-GHz flux/Jy: 0.7?
Spectral index: 0.5?

Size/arcmin: 17×13?
Type: S

Radio: Poorly resolved shell.

References:

Reich et al. 1988, IAUCo, 101, 293. Summary of parameters.
 Reich et al. 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′3).

G38.7–1.3

RA: 19^h06^m40^s
Dec: +04°28′

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 32×19?
Type: S

G38.7–1.4 refers to the E portion.

Radio: Incomplete shell.

Optical: Arc of filaments, brighter to E.

X-ray: Detected in E.

Distance: Optical extinction suggests 4.1 kpc.

References:

Schaudel et al. 2002, ASPC, 271, 391. ROSAT of E, and radio survey observations.
 Sabin et al. 2013, MNRAS, 431, 279. H α and radio survey observations.

Huang et al. 2014, ApJ, 785, 118. XMM-Newton and Chandra observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G39.2–0.3

RA: 19^h04^m08^s
Dec: +05°28′

1-GHz flux/Jy: 18
Spectral index: 0.34

3C396, HC24, NRAO 593

Size/arcmin: 8×6
Type: C

Radio: Shell, brighter to W, with faint ‘tail’ to E.

X-ray: Diffuse, brighter to W, with central core.

Point sources: Central X-ray source.

Distance: H_i absorption suggests 8.5 kpc, H₂ emission suggests 9.5 kpc.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′).
 Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo S_{430} MHz = 54±38 Jy.
 Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′ : $S=4.1\pm1.0$ Jy).
 Caswell et al. 1975, A&A, 45, 239. H_i absorption.
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
 Caswell et al. 1982, MNRAS, 200, 1143. FIRST at 1.4 GHz (48″×65″).
 Becker & Helfand 1987, AJ, 94, 1629. VLA at 1.4 GHz (12″ : $S=14$ Jy) and 5 GHz, plus Einstein observations.
 Patnaik et al. 1990, A&A, 232, 467. VLA at 1.4 GHz (7″.5×7″.8) and 5 GHz (25″) including polarisation, plus Ooty at 327 MHz (31″×100″), including review of flux densities.
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 Anderson & Rudnick 1993, ApJ, 408, 514. VLA at 1.45 and 4.89 GHz for spectral index studies.
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
 Gorham et al. 1996, ApJ, 458, 257. Pulsar search.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Koralesky et al. 1998, AJ, 116, 1323. VLA search for OH emission.
 Harrus & Slane 1999, ApJ, 516, 811. ASCA observations.
 Aharonian et al. 2001, A&A, 375, 1008. H.E.S.S. limit.
 Olbert et al. 2003, ApJ, 592, L45. Chandra observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Scaife et al. 2007, MNRAS, 377, L69. 33 GHz observations.
 Lee et al. 2009, ApJ, 691, 1042. IR observations.
 Hewitt et al. 2009, ApJ, 694, 1266. Spitzer spectroscopy.

Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S=8.8\pm0.5$ Jy) including polarisation and review of flux densities.
 Su et al. 2011, ApJ, 727, 43. Chandra and CO observations of region.
 Andersen et al. 2011, ApJ, 742, 7. Spitzer observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
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 Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
 Cruciani et al. 2016, MNRAS, 459, 4224. Parkes 64 m at 8.4, 13.5, 18.6 and 21.5 GHz, plus review of flux densities.
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H_i absorption observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] and H₂ IR observations.
 Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
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 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 de Oña Wilhelmi et al. 2020, MNRAS, 497, 3581. Fermi and CO observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S=1.0$ Jy) including polarisation, and Spitzer observations.
 Castelletti et al. 2021, A&A, 653, A62. VLA 74-MHz survey flux density, and other low-frequency radio flux densities.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.
 Rennie et al. 2022, ApJ, 933, 187. Observations at 26 to 34 GHz.
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G39.7–2.0

RA: 19^h12^m20^s
Dec: +04°55′

1-GHz flux/Jy: 85?
Spectral index: 0.7?

W50, SS433

Size/arcmin: 120×60
Type: ?

Eastern part has been called G40.0–3.1. Is this a SNR?

Radio: Elongated shell, containing SS433, adjacent to the HII region S74.

Optical: Faint filaments at the edge of the radio emission.

X-ray: Emission from SS433 and two lobes.

Point sources: SS433 is the compact source in the centre of the W50.

Distance: H I absorption and CO observations indicate 4.9 kpc, optical emission gives 4.7 kpc.

References:

van den Bergh 1980, ApJ, 236, L23. Optical in H α and [Si].
 Zealey et al. 1980, MNRAS, 192, 731. Optical spectra.
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 Watson et al. 1983, ApJ, 273, 688. X-ray observations.
 Downes et al. 1986, MNRAS, 218, 393. Effelsberg 100-m at 4.75 GHz (2′.4 : $S = 34 \pm 4$ Jy), plus previous 1.7 and 2.7 GHz data.
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 Kawai et al. 1989, PASJ, 41, 491. X-ray observations of SS433.
 Band 1989, ApJ, 336, 937. Einstein and EXOSAT observations.
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 Brinkmann et al. 1996, A&A, 312, 306. ROSAT observations.
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 Safi-Harb & Ögelman 1997, ApJ, 483, 868. ROSAT observations.
 Dubner et al. 1998, AJ, 116, 1842. VLA at 328 MHz (60′′×64′′ : $S = 160 \pm 20$ Jy), and 1.4 GHz (54′′×56′′), plus NRAO 140-ft at 1.4 GHz (21′) for H I observations.

Safi-Harb & Petre 1999, ApJ, 512, 784. X-ray observations.
 Aharonian et al. 2001, A&A, 375, 1008. H.E.S.S. limit.
 Brinkmann et al. 2007, A&A, 463, 611. XMM-Newton observations of E lobe.
 Boumis et al. 2007, MNRAS, 381, 308. Optical observations.
 Lockman et al. 2007, MNRAS, 381, 881. H I observations.
 Gao et al. 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′.5 : $S = 37 \pm 4$ Jy), including polarisation and review of flux densities.
 Farnes et al. 2017, MNRAS, 467, 4777. ATCA at 1.4 to 3.1 GHz, including polarisation and H α observations.
 Broderick et al. 2018, MNRAS, 475, 5360. LOFAR at 115 to 189 MHz, including 140 MHz (55′′×78′′).
 Su et al. 2018, ApJ, 863, 103. CO and H I observations.
 Sun et al. 2019, A&A, 626, A113. Fermi observations.
 Liu et al. 2020, ApJ, 892, 143. CO and CN observations of W edge.
 Rosado et al. 2021, MNRAS, 506, 4263. Optical spectroscopy, including distance.
 Hayakawa et al. 2022, PASJ, 74, 510. Chandra observations of E.
 Kayama et al. 2022, PASJ, 74, 1143. Chandra observations.
 Safi-Harb et al. 2022, ApJ, 935, 163. NuSTAR, Chandra and XMM-Newton observations.

G40.5–0.5

RA: 19^h07^m10^s
Dec: +06°31′

1-GHz flux/Jy: 11
Spectral index: 0.4

Size/arcmin: 22
Type: S

Radio: Shell, brightest to the NE.

Point sources: Central pulsar.

Distance: Optical extinction suggests 5.1 kpc.

References:

Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
 Downes et al. 1980, A&A, 92, 47. Effelsberg 100-m at 1.7 GHz (7′.6 : $S = 9.3 \pm 1.3$ Jy), and 2.7 GHz (4′.4 : $S = 7.2 \pm 0.5$ Jy), plus review of flux densities.
 Aharonian et al. 2001, A&A, 375, 1008. H.E.S.S. limit.
 Yang et al. 2006, ChJAA, 6, 210. CO observations of surroundings.
 Abdo et al. 2007, ApJ, 664, L91. γ -ray observations.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S = 6.4 \pm 0.3$ Jy) including polarisation and review of flux densities.
 Aliu et al. 2014, ApJ, 787, 166. γ -ray observations of region.

Lyne et al. 2017, ApJ, 834, 137. Pulsar detection.
 Duvidovich et al. 2020, MNRAS, 491, 5732. VLA at 1.5 GHz (39′.5×51′.1), and CO observations of part.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18′ : $S = 0.05$ Jy) including polarisation, and Spitzer observations.
 Li et al. 2021, ApJ, 913, L33. Fermi observations of region.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20′′) of region.
 Crestan et al. 2021, MNRAS, 505, 2309. Fermi observations of region.

G41.1–0.3

3C397

RA: 19^h07^m34^s
Dec: +07°08′**1-GHz flux/Jy:** 25
Spectral index: 0.50**Size/arcmin:** 4.5×2.5
Type: S**Radio:** 3C397 is two sources: the E is the SNR, the W is a HII region.**X-ray:** Brighter to the E and W, with central component.**Distance:** H I absorption suggest 8.5 kpc.**References:**

Kundu et al. 1974, AJ, 79, 132. NRAO 140-ft at 10 GHz (3′) and 5 GHz (6′).
 Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′ : $S=21.3\pm1.2$ Jy for both components).
 Caswell et al. 1975, A&A, 45, 239. H I absorption.
 Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo S_{430} MHz = 82 ± 51 Jy, also Algonquin 46-m at 10.6 GHz (3′ : $S=12\pm2$ Jy), and Haystack 36-m at 15.5 GHz (2′.3 : $S=8.5\pm3.0$ Jy).
 Caswell et al. 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′ : $S=29.8$ Jy) and Parkes 64-m at 5 GHz (4′ : $S=8.7$ Jy).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
 Caswell et al. 1982, MNRAS, 200, 1143. FIRST at 1.4 GHz (52″×58″).
 Becker et al. 1985, ApJ, 296, 461. VLA at 1.4 and 5 GHz (8″), plus Einstein observations.
 Morsi & Reich 1987, A&AS, 71, 189. Effelsberg 100-m at 32 GHz (smoothed to 30″ : $S=4.10\pm0.19$ Jy).
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′.5×3′.6 : $S=46.3$ Jy).
 Anderson & Rudnick 1993, ApJ, 408, 514. VLA at 1.45 and 4.89 GHz, for spectral index studies.
 Gorham et al. 1996, ApJ, 458, 257. Pulsar search.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Chen et al. 1999, ApJ, 520, 737. ASCA and ROSAT observations.
 Dyer & Reynolds 1999, ApJ, 526, 365. VLA at 1.5 GHz (6″.6×6″.9) and 4.8 GHz (5″.6×6″.4), including polarisation and comparison with ROSAT image.
 Safi-Harb et al. 2000, ApJ, 545, 922. ROSAT, ASCA and other X-ray observations.

Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Aharonian et al. 2001, A&A, 375, 1008. H.E.S.S. limit.
 Safi-Harb et al. 2005, ApJ, 618, 321. Chandra observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Jiang et al. 2010, ApJ, 712, 1147. CO observations of region.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S=18.5\pm1.1$ Jy) including polarisation and review of flux densities.
 Yang et al. 2013, ApJ, 766, 44. Suzaku spectroscopy.
 Yamaguchi et al. 2015, ApJ, 801, L31. Suzaku observations.
 Clark et al. 2015, ApJ, 809, L2. Fermi observations.
 Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.
 Leahy & Ranasinghe 2016, ApJ, 817, 74. VGPS for H I absorption.
 Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H I absorption observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] IR observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S=1.3$ Jy) including polarisation, and Spitzer observations.
 Castelletti et al. 2021, A&A, 653, A62. VLA 74-MHz survey flux density, and other low-frequency radio flux densities.
 Ohshiro et al. 2021, ApJ, 913, L34. XMM-Newton observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.
 Ergin et al. 2021, MNRAS, 501, 4226. Fermi limit.
 Shanahan et al. 2022, ApJ, 939, 92. VLA at 1 to 2 GHz, including polarisation.

G41.5+0.4**RA:** 19^h05^m50^s
Dec: +07°46′**1-GHz flux/Jy:** 1?
Spectral index: ?**Size/arcmin:** 10
Type: S?**Radio:** Partial clumpy shell, brighter to NE.**References:**

Kaplan et al. 2002, ApJ, 566, 378. VLA at 332 MHz (20″ : $S=1.8\pm0.4$ Jy).
 Alves et al. 2012, MNRAS, 422, 2429. Radio observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] IR observations.

Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S=0.7$ Jy) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.

G42.0–0.1**RA:** 19^h08^m10^s
Dec: +08°00′**1-GHz flux/Jy:** 0.5?
Spectral index: ?**Size/arcmin:** 8
Type: S?**Radio:** Irregular shell.**References:**

Kaplan et al. 2002, ApJ, 566, 378. VLA at 332 MHz (20″ : $S=1.8\pm0.4$ Jy).
 Alves et al. 2012, MNRAS, 422, 2429. Radio observations.

Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.

G42.8+0.6

RA: 19^h07^m20^s
Dec: +09°05′

1-GHz flux/Jy: 3?
Spectral index: 0.5?

Size/arcmin: 24
Type: S

Has been called G42.8+0.65.

Radio: Faint shell.

Point sources: Near soft gamma repeater, and young pulsar.

Distance: Optical extinction suggests 4.2 kpc.

References:

Fürst et al. 1987, A&AS, 69, 403. Effelsberg 100-m at 4.75 GHz (2′4″:S=1.5±0.2 Jy), plus other flux densities.
 Vasisht et al. 1994, ApJ, 431, L35. VLA at 327 MHz (3′2″×3′4″).
 Hurley et al. 1996, ApJ, 463, L13. Observations of soft gamma repeater field.
 Lorimer & Xilouris 2000, ApJ, 545, 385. Pulsar detection.
 Aharonian et al. 2001, A&A, 375, 1008. H.E.S.S. limit.

Kaplan et al. 2002, ApJ, 566, 378. VLA at 333 MHz (50″), and other observations of the region.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″:S=0.04 Jy) including polarisation, and Spitzer observations.

G43.3–0.2

RA: 19^h11^m08^s
Dec: +09°06′

1-GHz flux/Jy: 38
Spectral index: 0.46

Size/arcmin: 4×3
Type: S

Radio: Shell, brightest to the SE and W, near the HII region W49A.

X-ray: Centrally brightened, elongated E–W.

Point sources: Compact X-ray source.

Distance: H I absorption suggests 11.3 kpc, H₂ emission suggests 7.5 kpc.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 2.7 GHz (4′).
 Downes & Wilson 1974, A&A, 34, 133. Effelsberg 100-m at 10.7 GHz (1′3″).
 Green et al. 1975, A&A, 44, 187. Effelsberg 100-m at 15.0 GHz (58″:S=9.0±0.7 Jy).
 Lockhart & Goss 1978, A&A, 67, 355. H I absorption.
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6″).
 Pye et al. 1984, MNRAS, 207, 649. Einstein observations, and VLA at 1.4 and 5 GHz (both 12″).
 Smith et al. 1985, ApJ, 296, 469. EXOSAT spectrum.
 Morsi & Reich 1987, A&AS, 71, 189. Effelsberg 100-m at 32 GHz (smoothed to 30″:S=6.90±0.38 Jy).
 Moffett & Reynolds 1994, ApJ, 437, 705. VLA at 330 MHz (6′7″×7′7″:S=64.4 Jy), 1.48 GHz (4′8″×5′2″:S=31.8 Jy) and 4.85 GHz (4′0″×4′1″), including polarisation.
 Fujimoto et al. 1995, PASJ, 47, L31. ASCA observations.
 Gorham et al. 1996, ApJ, 458, 257. Pulsar search.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Hwang et al. 2000, ApJ, 532, 970. ROSAT image and ASCA spectroscopy.
 Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Aharonian et al. 2001, A&A, 375, 1008. H.E.S.S. limit.
 Brogan & Troland 2001, ApJ, 550, 799. VLA at 1.4 GHz (24″×27″ and 5″) for H I Zeeman splitting.
 Lacey et al. 2001, ApJ, 559, 954. VLA at 74 MHz (23″×26″:S=55.6 Jy) and 326 MHz (6′2″×6′6″:S=56.0 Jy).
 Kaplan et al. 2002, ApJ, 566, 378. VLA at 333 MHz (50″), and other observations of the region.
 Kawasaki et al. 2005, ApJ, 631, 935. ASCA observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Miceli et al. 2006, A&A, 453, 567. XMM-Newton observations.
 Keohane et al. 2007, ApJ, 654, 938. IR and Chandra observations.
 Ozawa et al. 2009, ApJ, 706, L71. Suzaku observations.
 Abdo et al. 2010, ApJ, 722, 1303. Fermi observations.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5″:S=19.1±1.0 Jy) including polarisation and review of flux densities.

Rodes-Roca 2013, A&A, 555, A115. IR of compact X-ray source.
 Yang et al. 2013, ApJ, 766, 44. Suzaku spectroscopy.
 Lopez et al. 2013, ApJ, 777, 145. Chandra spectroscopy.
 Zhu et al. 2014, ApJ, 793, 95. Spitzer and other observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.
 Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
 H.E.S.S. Collaboration: Abdalla et al. 2018, A&A, 612, A1. H.E.S.S. observations.
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H I absorption observations.
 H.E.S.S. Collaboration: Abdalla et al. 2018, A&A, 612, A5. H.E.S.S. observations.
 Zhou & Vink 2018, A&A, 615, A150. Chandra observations.
 Tanaka et al. 2018, ApJ, 866, L26. NuSTAR observations.
 Yamaguchi et al. 2018, ApJ, 868, L35. NuSTAR observations.
 Lee et al. 2019, AJ, 157, 123. [FeII] and H₂ IR observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
 Sun & Chen 2020, ApJ, 893, 90. XMM-Newton observations.
 Holland-Ashford et al. 2020, ApJ, 903, 108. XMM-Newton observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″:S=3.3 Jy) including polarisation, and Spitzer observations.
 Castelletti et al. 2021, A&A, 653, A62. VLA 74-MHz survey flux density, and other low-frequency radio flux densities.
 Sano et al. 2021, ApJ, 919, 123. ALMA CO observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20″) of region.
 Zhou et al. 2022, ApJ, 931, 144. Molecular line observations.
 Shanahan et al. 2022, ApJ, 939, 92. VLA at 1 to 2 GHz, including polarisation.

G43.9+1.6

RA: 19^h05^m50^s
Dec: +10°30′

1-GHz flux/Jy: 9.0
Spectral index: 0.5

Size/arcmin: 60?
Type: S?

Radio: Large, poorly defined faint shell.

Point sources: Soft gamma repeater nearby.

Distance: Association with CO suggests 3.1 kpc, optical extinction suggests 1.5 kpc.

References:

Reich et al. 1988, IAUCo, 101, 293. Summary of parameters.
 Reich et al. 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′3).
 Vasisht et al. 1994, ApJ, 431, L35. VLA at 327 MHz (3′2×3′4).
 Hurley et al. 1996, ApJ, 463, L13. Observations of soft gamma repeater field.
 Kaplan et al. 2002, ApJ, 566, 378. VLA at 333 MHz (50′′), and other observations of the region.

Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5 : $S = 4.55 \pm 0.24$ Jy) including polarisation and review of flux densities.
 Zhou et al. 2020, ApJ, 900, 155. CO observations of region.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G45.7–0.4

RA: 19^h16^m25^s
Dec: +11°09′

1-GHz flux/Jy: 4.2?
Spectral index: 0.4?

Size/arcmin: 22
Type: S

Radio: Shell, brightest to the SE, poorly defined to NW.

Distance: Optical extinction suggests 6.0 kpc.

References:

Fürst et al. 1987, A&AS, 69, 403. Effelsberg 100-m at 4.75 GHz (2′4 : $S = 2.6 \pm 0.3$ Jy), plus other flux densities.
 Gorham et al. 1996, ApJ, 458, 257. Pulsar search.
 Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18′′ : $S = 0.15$ Jy) including polarisation, and Spitzer observations.
 Zhang et al. 2021, ApJ, 923, 106. Fermi observations of region.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20′′) of region.

G46.8–0.3

RA: 19^h18^m10^s
Dec: +12°09′

1-GHz flux/Jy: 16
Spectral index: 0.54

Size/arcmin: 15
Type: S

(HC30)

Has been called G46.6–0.2.

Radio: Shell, two bright arcs to NNW and SSE.

Distance: H_I absorption gives 7.3 kpc.

References:

Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz (5′ : $S = 9.8 \pm 0.9$ Jy), and 37-m at 1.7 GHz ($S = 14.5 \pm 5.5$ Jy).
 Caswell et al. 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′ : $S = 20.3$ Jy) and Parkes 64-m at 5 GHz (4′ : $S = 7.1$ Jy).
 Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo S_{430} MHz = 46 ± 21 Jy.
 Angerhofer et al. 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6′8 : $S = 5.9 \pm 0.6$ Jy).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6).
 Dubner et al. 1996, AJ, 111, 1304. VLA at 1.4 GHz (53′′×58′′ : $S = 13.3 \pm 0.1$ Jy).

Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5 : $S = 7.02 \pm 0.18$ Jy) including polarisation and review of flux densities.
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H_I absorption observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18′′ : $S = 0.9$ Jy) including polarisation, and Spitzer observations.
 Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20′′) of region.
 Supan et al. 2022, A&A, 664, A89. Review of radio spectrum, H_I absorption for distance, and CO observations.
 Shanahan et al. 2023, ApJ, 957, 60. VLA at 1 to 2 GHz, including polarisation.

G49.2–0.7

(W51)

RA: 19^h23^m50^s
Dec: +14°06′**1-GHz flux/Jy:** 160?
Spectral index: 0.3?**Size/arcmin:** 30
Type: S?

Has erroneously been called G49.1–0.1.

Radio: In complex region, parameters uncertain.**Optical:** Some diffuse emission possibly associated.**X-ray:** Elongated east–west.**Distance:** Association with CO gives 6 kpc, optical absorption suggests 5.7 kpc, H_I absorption suggests 5.4 kpc.**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Parkes 64-m at 5 GHz (4').

Sato 1973, PASJ, 25, 135. H_I absorption.

Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5'), $S=51.5\pm3.2$ Jy, for the non-thermal component, but probably confused.

Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2'6).

Seward 1990, ApJS, 73, 781. Einstein observations.

Copetti & Schmidt 1991, MNRAS, 250, 127. 151 MHz observations.

Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3'1×3'5).

Subrahmanyan & Goss 1995, MNRAS, 275, 755. VLA at 330 MHz (1'1).

Koo et al. 1995, ApJ, 447, 211. ROSAT observations.

Frail et al. 1996, AJ, 111, 1651. OH emission near remnant.

Gorham et al. 1996, ApJ, 458, 257. Pulsar search.

Green et al. 1997, AJ, 114, 2058. OH masers.

Koo & Moon 1997, ApJ, 475, 194. Arecibo (3') and VLA (40''×42'') at 1.4 GHz for H_I.

Koo & Moon 1997, ApJ, 485, 263. NRAO 12-m CO and HCO⁺ observations.

Brogan et al. 2000, ApJ, 537, 875. VLA at 1.7 GHz for OH Zeeman splitting.

Mavromatakis et al. 2001, A&A, 370, 265. Optical observations.

Koo et al. 2002, AJ, 123, 1629. ASCA observations.

Koo et al. 2005, ApJ, 633, 946. Chandra observations.

Kang & Koo 2007, ApJS, 173, 85. High velocity H_I.

Hewitt et al. 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.

Abdo et al. 2009, ApJ, 706, L1. Fermi observations.

Koo et al. 2010, AJ, 140, 262. H_I Zeeman splitting observations.

Ceccarelli et al. 2011, ApJ, 740, L4. Molecular line observations of region.

Aleksić et al. 2012, A&A, 541, A13. γ -ray observations.

Hanabata et al. 2013, PASJ, 65, 42. Suzaku observations.

Tian & Leahy 2013, ApJ, 769, L17. H_I observations of region.

Brogan et al. 2013, ApJ, 771, 91. VLA at 74 MHz (84''×92'') and 320 MHz (33''×35''), plus OH, molecular line and other observations.

Park et al. 2013, ApJ, 777, 14. Arecibo of H_I in region.

Sasaki et al. 2014, A&A, 563, A9. XMM-Newton observations.

Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.

Dumes et al. 2014, ApJ, 786, L24. Molecular line observations.

Jogler & Funk 2016, ApJ, 816, 100. Fermi observations.

McEwen et al. 2016, ApJ, 826, 189. NH₃ and CH₃OH observations.

Acero et al. 2016, ApJS, 224, 8. Fermi observations.

Shan et al. 2018, ApJS, 238, 35. Optical absorption for distance.

Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H_I absorption observations.

Lee et al. 2019, AJ, 157, 123. [FeII] IR observations.

Beuther et al. 2019, A&A, 628, A90. OH maser observations.

Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18'' : $S=0.8$ Jy) including polarisation, and Spitzer observations.

Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observations (20'') of region.

Reyes-Iturbide et al. 2022, MNRAS, 516, 6055. Optical and XMM-Newton observations.

Shimoguchi et al. 2022, PASJ, 74, 656. Suzaku observations.

Yamagishi et al. 2023, PASJ, 75, 883. CO and [C_I] observations of region.

G53.4+0.0**RA:** 19^h29^m57^s
Dec: +18°10′**1-GHz flux/Jy:** 1.5
Spectral index: 0.6?**Size/arcmin:** 10?
Type: S

Has been called G53.41+0.03.

Radio: Asymmetric shell.**X-ray:** Half shell, brighter to N.**References:**

Anderson et al. 2017, A&A, 605, A58. VLA at 1 to 2 GHz.

Driessen et al. 2018, ApJ, 860, 133. LOFAR at 140 MHz, plus other radio observations, and XMM-Newton observations.

Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18'' : $S=0.03$ Jy) including polarisation, and Spitzer observations.

Domček et al. 2022, A&A, 659, A63. XMM-Newton observations.

G53.6–2.2

RA: 19^h38^m50^s
Dec: +17°14′

1-GHz flux/Jy: 8
Spectral index: 0.50

3C400.2, NRAO 611

Size/arcmin: 33×28
Type: S

Has been called G53.7–2.2.

Radio: Ring of emission, with extension to NW.

Optical: Filaments and diffuse emission.

X-ray: Centrally brightened, offset to NW.

Distance: Association with H_I gives 2.8 kpc.

References:

Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz ($5' : S = 5.3 \pm 0.6$ Jy).
 Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz ($5' : S = 4.8 \pm 0.3$ Jy).
 Clark et al. 1975, A&A, 37, 75. Molonglo at 408 MHz ($3' : S = 11.7$ Jy).
 Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo S_{430} MHz = 20 ± 10 Jy, S_{318} MHz = 20 ± 3.6 Jy.
 Goss et al. 1975, A&A, 43, 459. WSRT at 610 MHz ($1' \times 3' : S = 13.2 \pm 1.6$ Jy).
 Sabbadin & D'Odorico 1976, A&A, 49, 119. Optical spectra.
 van den Bergh 1978, ApJS, 38, 119. Optical observations.
 Rosado 1983, RMxAA, 8, 59. Optical spectra.
 Blair & Long 1988, PASP, 100, 461. Optical imaging and spectroscopy.
 see also: Blair & Long 1988, PASP, 100, 651. Erratum.
 Long et al. 1991, ApJ, 373, 567. Einstein and optical observations.

Winkler et al. 1993, ApJ, 405, 608. Optical imaging.
 Dubner et al. 1994, AJ, 108, 207. VLA at 327 MHz ($59''$) and 1.49 GHz ($52''$), plus X-rays.
 Saken et al. 1995, ApJ, 443, 231. ROSAT observations.
 Gorham et al. 1996, ApJ, 458, 257. Pulsar search.
 Giacani et al. 1998, A&AS, 133, 61. DRAO at 1.4 GHz for H_I studies, including distance.
 Yoshita et al. 2001, PASJ, 53, 93. ASCA observations, and spectral comparison with ROSAT.
 Ambrocio-Cruz et al. 2006, RMxAA, 42, 241. Optical imaging and spectroscopy.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9.5' : S = 4.00 \pm 0.22$ Jy) including polarisation and review of flux densities.
 Broersen & Vink 2015, MNRAS, 446, 3885. Chandra observations.
 Ergin et al. 2017, ApJ, 842, 22. Suzaku and Fermi observations.
 Sett et al. 2021, A&A, 647, A183. Pulsar radio search.

G54.1+0.3

RA: 19^h30^m31^s
Dec: +18°52′

1-GHz flux/Jy: 0.5
Spectral index: 0.1

Size/arcmin: 12?
Type: C?

Radio: Filled-centre core, with possible faint diffuse emission.

X-ray: Centrally concentrated, with more extended diffuse emission.

Point sources: Central pulsar.

Distance: H_I absorption suggests 4.9, association with CO suggests 8.2 kpc, and optical absorption suggests 6.3 kpc.

References:

Green 1985, MNRAS, 216, 691. Radio at 2.7 GHz ($7'' \times 20''$).
 Reich et al. 1985, A&A, 151, L10. Effelsberg 100-m at 4.75 GHz ($2.4' : S = 0.37 \pm 0.04$ Jy).
 Velusamy & Becker 1988, AJ, 95, 1162. VLA at 1.4 ($14'' : S = 0.48 \pm 0.03$ Jy), 1.6 ($14'' : S = 0.42 \pm 0.03$ Jy) and 5 GHz ($5'' : S = 0.33 \pm 0.02$ Jy), Ooty at 327 MHz ($S = 0.50 \pm 0.08$ Jy), plus review of flux densities.
 Seward 1989, AJ, 97, 481. Einstein observations.
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
 Gorham et al. 1996, ApJ, 458, 257. Pulsar search.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Lu et al. 2001, A&A, 370, 570. ROSAT and ASCA observations.
 Lu et al. 2002, ApJ, 568, L49. Chandra observations.
 Camilo et al. 2002, ApJ, 574, L71. Pulsar detection.
 Kaplan & Moon 2006, ApJ, 644, 1056. IR upper limit for pulsar.
 Leahy et al. 2008, AJ, 136, 1477. VGPS at 1.4 GHz ($1'$) including H_I.
 Koo et al. 2008, ApJ, 673, L147. Akari observations of surroundings.
 Hurley-Walker et al. 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
 Bocchino et al. 2010, A&A, 520, A71. XMM-Newton and Suzaku observations.

Lang et al. 2010, ApJ, 709, 1125. VLA at 1.4 GHz ($6.6'' \times 6.8''$), 4.7 GHz ($3.2'' \times 3.3''$), and 8.2 GHz ($3.0'' \times 3.2''$) and Spitzer observations.
 Acciari et al. 2010, ApJ, 719, L69. γ -ray observations.
 Lee et al. 2012, JKAS, 45, 117. CO observations of region.
 Krivonos et al. 2017, MNRAS, 470, 512. INTEGRAL observations.
 Temim et al. 2017, ApJ, 836, 129. Spitzer, Herschel and Akari observations.
 Shan et al. 2018, ApJS, 238, 35. Optical absorption for distance.
 Ranasinghe & Leahy 2018, AJ, 155, 204. VGPS H_I absorption observations.
 Rho et al. 2018, MNRAS, 479, 5101. Spitzer, Herschel and other observations.
 Driessen et al. 2018, ApJ, 860, 133. LOFAR at 144 MHz, plus other observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Guest & Safi-Harb 2020, MNRAS, 498, 821. Chandra observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz ($18''$) including polarisation, and Spitzer observations.
 Millard et al. 2021, ApJS, 257, 36. ISO far-IR spectroscopy.
 Albert et al. 2023, ApJ, 942, 96. γ -ray observations.

G54.4–0.3

(HC40)

RA: 19^h33^m20^s
Dec: +18°56′**1-GHz flux/Jy:** 28
Spectral index: 0.5**Size/arcmin:** 40
Type: S

Has been called G54.5–0.3.

Radio: Shell, in complex region.**Optical:** Faint filaments.**Point sources:** Pulsar outside NW rim.**Distance:** H_I and CO observations suggest 6.6 kpc, H₂ emission suggests 5.4 kpc, optical extinction suggests 6.6 kpc.**References:**

Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′ : $S=34.4\pm5.0$ Jy).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
 Caswell 1985, AJ, 90, 1224. DRAO at 1.4 GHz (1′.3×2′.6 : $S=18\pm4$ Jy).
 Velusamy et al. 1986, JApA, 7, 105. WSRT at 609 MHz (50″×191″ smoothed to 100″×200″).
 Junkes et al. 1992, A&AS, 96, 1. Surrounding CO.
 Junkes et al. 1992, A&A, 261, 289. Nearby IRAS sources.
 Boumis et al. 2005, A&A, 443, 175. Optical observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Kang & Koo 2007, ApJS, 173, 85. High velocity H_I.
 Andersen et al. 2011, ApJ, 742, 7. Spitzer observations.

Park et al. 2013, ApJ, 777, 14. Arecibo of H_I in region.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Karpova et al. 2017, MNRAS, 466, 1757. X-ray observations of pulsar.
 Ranasinghe & Leahy 2017, ApJ, 843, 119. H_I and CO observations.
 Lee et al. 2019, AJ, 157, 123. H₂ IR observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Lee et al. 2020, AJ, 160, 263. H₂ IR observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″ : $S=0.6$ Jy) including polarisation, and Spitzer observations.

G55.0+0.3**RA:** 19^h32^m00^s
Dec: +19°50′**1-GHz flux/Jy:** 0.5?
Spectral index: 0.5?**Size/arcmin:** 20×15?
Type: S

Has been called G55.2+0.5.

Radio: Faint, partial shell.**Point sources:** Old pulsar nearby.**Distance:** Association with H_I features implies 14 kpc, optical extinction suggests 10.2 kpc.**References:**

Taylor et al. 1992, AJ, 103, 931. WSRT at 327 MHz (1′.0×2′.5), and northern sky survey at 4.9 GHz.
 Matthews et al. 1998, ApJ, 493, 312. WSRT at 327 MHz (1′.0×2′.9 : $S=0.98\pm0.15$ Jy), DRAO at 1.4 GHz (1′.0×2′.9 : $S=0.25\pm0.12$ Jy), plus H_I observations.

Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.

G55.7+3.4**RA:** 19^h21^m20^s
Dec: +21°44′**1-GHz flux/Jy:** 1?
Spectral index: 0.3?**Size/arcmin:** 23
Type: S**Radio:** Incomplete shell.**Point sources:** Old pulsar within the boundary of the remnant.**References:**

Goss et al. 1977, A&A, 61, 93. WSRT at 610 MHz (57″×156″ : $S=1.9\pm0.2$ Jy) and 1415 MHz (27″×72″ : $S=1.0\pm0.1$ Jy).
 Bhatnagar et al. 2011, ApJ, 739, L20. VLA at 1.3 to 1.9 GHz (30″).

Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S=0.52\pm0.03$ Jy) including polarisation and review of flux densities.

G57.2+0.8

(4C21.53)

RA: 19^h34^m59^s**1-GHz flux/Jy:** 1.8**Size/arcmin:** 12?**Dec:** +21°57′**Spectral index:** 0.35**Type:** S?**Radio:** Extended non-thermal arc.**Point sources:** Central magnetar/SGR.**Distance:** H_i observations suggest 12.5 kpc, other associations suggests 4.4 to 9.0 kpc.**References:**

Sieber & Seiradakis 1984, A&A, 130, 257. Effelsberg 100-m at 1.4 GHz (8′8″:1.34±0.1), 2.7 GHz (4′3″:0.86±0.1), plus other surveys of the area.
 Caswell et al. 1985, AJ, 90, 488. DRAO at 1.4 GHz (1′×3′).
 Hurley-Walker et al. 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5″: S = 0.74±0.04 Jy) including polarisation and review of flux densities.
 Surnis et al. 2016, ApJ, 826, 184. GMRT at 610 MHz and VLA at 1.4 GHz.

Israel et al. 2016, MNRAS, 457, 3448. Chandra, XMM-Newton and Swift observations of magnetar.
 Kothes et al. 2018, ApJ, 852, 54. DRAO at 408 MHz (2′8″×8′5″) and 1.4 GHz (0′82″×2′5″), including H_i and polarisation, plus other radio observations.
 Zhong et al. 2020, ApJ, 898, L5. Distance from association with FRB.
 Mereghetti et al. 2020, ApJ, 898, L29. INTEGRAL observations of FRB, for distance.
 Zhou et al. 2020, ApJ, 905, 99. CO observations.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″: S = 0.2 Jy) including polarisation, and Spitzer observations.

G59.5+0.1**RA:** 19^h42^m33^s**1-GHz flux/Jy:** 3?**Size/arcmin:** 15**Dec:** +23°35′**Spectral index:** ?**Type:** S

Has been called G59.6+0.1.

Radio: Incomplete shell.**Optical:** Diffuse shell.**References:**

Taylor et al. 1992, AJ, 103, 931. WSRT at 327 MHz (1′0″×2′5″: S = 5.1±0.2 Jy), and northern sky survey at 4.9 GHz.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Gök et al. 2008, Ap&SS, 318, 207. Optical observations.

Hurley-Walker et al. 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
 Xu & Wang 2012, A&A, 543, A24. CO observations of SE.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″: S = 0.03 Jy) including polarisation, and Spitzer observations.

G63.7+1.1**RA:** 19^h47^m52^s**1-GHz flux/Jy:** 1.8**Size/arcmin:** 8**Dec:** +27°45′**Spectral index:** 0.24**Type:** F**Radio:** Centrally brightened, with core.**X-ray:** Diffuse emission.**References:**

Taylor et al. 1992, AJ, 103, 931. WSRT at 327 MHz (1′0″×2′2″), and northern sky survey at 4.9 GHz.
 Wallace et al. 1997, AJ, 114, 2068. WSRT at 1.4 GHz (14″×26″: S = 1.63 Jy), DRAO at 1.4 GHz (smoothed to 2′), plus review of flux densities and other observations.
 Hurley-Walker et al. 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.

Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5″: S = 1.12±0.06 Jy) including polarisation and review of flux densities.
 Matheson et al. 2016, ApJ, 825, 134. XMM-Newton and Chandra observations.

G64.5+0.9

RA: 19^h50^m25^s
Dec: +28°16′

1-GHz flux/Jy: 0.15?
Spectral index: 0.5

Size/arcmin: 8
Type: S?

Radio: Shell with central source.

Optical: Filaments in N and W.

References:

Tian & Leahy 2006, A&A, 455, 1053. CGPS at 408 MHz (2′8×5′9) and 1.4 GHz (0′8×1′7) including H_i.
 Hurley-Walker et al. 2009, MNRAS, 398, 249. Radio identification.
 Neustadt et al. 2017, MNRAS, 469, 516. Optical observations.

G65.1+0.6

RA: 19^h54^m40^s
Dec: +28°35′

1-GHz flux/Jy: 5.5
Spectral index: 0.61

Size/arcmin: 90×50
Type: S

Radio: Large, faint shell.

Point sources: Old pulsar nearby.

Distance: Possible association with H_i suggests 9 kpc, optical extinction suggests 4.2 kpc.

References:

Landecker et al. 1990, A&A, 232, 207. DRAO at 408 MHz (3′5×7′0 : $S = 9.5 \pm 0.1$ Jy), and 1.4 GHz (1′0×2′0 : $S = 5.4 \pm 1.0$ Jy).
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Tian & Leahy 2006, A&A, 455, 1053. CGPS at 408 MHz (2′8×5′9 : $S = 8.6 \pm 0.8$ Jy) and 1.4 GHz (0′8×1′7 : $S = 4.9 \pm 0.5$ Jy) including H_i.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$: $S = 9.1 \pm 1.0$ Jy) and 1420 MHz ($\sim 1'$: $S = 3.9 \pm 0.5$ Jy), including review of flux densities.

Aleksić et al. 2010, ApJ, 725, 1629. γ -ray observations.
 Gao et al. 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′5 : $S = 3.2 \pm 0.3$ Jy), including polarisation and review of flux densities.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Xing et al. 2022, ApJ, 930, 164. Fermi observations.

G65.3+5.7

RA: 19^h33^m00^s
Dec: +31°10′

1-GHz flux/Jy: 42
Spectral index: 0.6

Size/arcmin: 310×240
Type: S?

Has been called G65.2+5.7.

Radio: Large, faint ring, near S91 and S94.

Optical: Filamentary ring.

X-ray: Diffuse, centrally brightened.

Distance: Optical proper motions and velocities indicates 0.8 kpc, optical extinction suggests 1.5 kpc.

References:

Gull et al. 1977, ApJ, 215, L69. Optical plates.
 Reich et al. 1979, A&A, 72, 270. Effelsberg 100-m at 1.42 GHz (smoothed to 11′ : $S = 42.4 \pm 1.6$ Jy), estimate $S_{408 \text{ MHz}} = 91 \pm 5$ Jy from previous sky survey.
 Lozinskaya 1981, SvAL, 7, 17. Mean optical velocity.
 Rosado 1981, ApJ, 250, 222. Optical interferometry.
 Fesen et al. 1983, ApJS, 51, 337. Deep [OIII] imagery.
 Fesen et al. 1985, ApJ, 292, 29. Optical spectra.
 Seward 1990, ApJS, 73, 781. Einstein observations.
 Gorham et al. 1996, ApJ, 458, 257. Pulsar search.
 Mavromatakis et al. 2002, A&A, 388, 355. Optical observations.

Boumis et al. 2004, A&A, 424, 583. Optical observations.
 Shelton et al. 2004, ApJ, 615, 275. ROSAT observations.
 Kaplan et al. 2006, ApJS, 163, 344. X-ray upper limit on compact sources.
 Xiao et al. 2009, A&A, 503, 827. Effelsberg 100-m at 2.7 GHz (4′4 : $S = 22 \pm 3$ Jy), and Urumqi 25-m at 4.8 GHz (9′5 : $S = 16.8 \pm 1.8$ Jy) including polarisation and review of flux densities.
 Gosachinskii 2010, AstL, 36, 260. H_i observations.
 Kim et al. 2010, ApJ, 722, 388. Far UV observations.
 Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.

G65.7+1.2

DA 495

RA: 19^h52^m10^s
Dec: +29°26′**1-GHz flux/Jy:** 5.1
Spectral index: varies**Size/arcmin:** 22
Type: F

Has erroneously been called G55.7+1.2.

Radio: Centrally brightened with thick shell?**X-ray:** Centrally brightened.**Point sources:** Compact X-ray source near centre.**Distance:** Hi polarisation observations suggest 1.5 kpc.**References:**

Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz ($5' : S = 2.8 \pm 0.4$ Jy), and 37-m at 1.7 GHz ($S = 4.4 \pm 0.5$ Jy), plus review of flux densities.
 see also: Willis 1973, A&A, 27, 483. Erratum.
 Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo $S_{430 \text{ MHz}} = 8.7 \pm 4.9$ Jy, $S_{318 \text{ MHz}} = 9.7 \pm 2.2$ Jy.
 Landecker & Caswell 1983, AJ, 88, 1810. DRAO at 1.4 GHz ($0'9 \times 1'5 : S = 4.4 \pm 0.2$ Jy).
 Velusamy et al. 1989, JApA, 10, 161. Ooty at 327 MHz ($36'' \times 64''$), WSRT at 610 MHz ($62''$) and VLA at 1.4 GHz ($36''$ and $12''$), including IRAS imaging.
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
 Gorham et al. 1996, ApJ, 458, 257. Pulsar search.
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Kothes et al. 2004, ApJ, 607, 855. Hi polarisation absorption.
 Arzoumanian et al. 2004, ApJ, 610, L101. ROSAT and ASCA observations of compact source.

Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 6.5 \pm 0.6$ Jy) and 1420 MHz ($\sim 1' : S = 4.0 \pm 0.2$ Jy), including polarisation and review of flux densities.
 Arzoumanian et al. 2008, ApJ, 687, 505. Chandra observations.
 Kothes et al. 2008, ApJ, 687, 516. CGPS at 408 MHz ($2'9 \times 6'0 : S = 6.5 \pm 0.5$ Jy) and 1.4 GHz ($0'82 \times 1'75 : S = 4.0 \pm 0.2$ Jy), Effelsberg 100-m at 4.85 GHz ($2'45 : S = 1.6 \pm 0.1$ Jy) and 10.55 GHz (smoothed to $2'45 : S = 1.1 \pm 0.1$ Jy), plus review of flux densities.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'5 : S = 1.95 \pm 0.10$ Jy) including polarisation and review of flux densities.
 Karpova et al. 2015, MNRAS, 453, 2241. Chandra and XMM-Newton observations.
 Coerver et al. 2019, ApJ, 878, 126. γ -ray observations.

G66.0–0.0**RA:** 19^h57^m50^s
Dec: +29°03′**1-GHz flux/Jy:** ?
Spectral index: ?**Size/arcmin:** 31×25?
Type: S

Has been called G66.0+0.0.

Radio: Some emission in N.**Optical:** Incomplete shell.**Distance:** Optical absorption suggests 2.3 or 3.9 kpc.**References:**

Sabin et al. 2013, MNRAS, 431, 279. H α and radio survey observations.
 Shan et al. 2018, ApJS, 238, 35. Optical absorption for distance.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G67.6+0.9**RA:** 19^h57^m45^s
Dec: +30°53′**1-GHz flux/Jy:** ?
Spectral index: ?**Size/arcmin:** 50×45?
Type: S**Radio:** Arc in S.**Optical:** Filamentary shell.**Distance:** Optical absorption suggests 2.0 kpc.**References:**

Sabin et al. 2013, MNRAS, 431, 279. H α and radio survey observations.
 Shan et al. 2018, ApJS, 238, 35. Optical absorption for distance.

G67.7+1.8

RA: 19^h54^m32^s
Dec: +31°29′

1-GHz flux/Jy: 1.0
Spectral index: 0.61

Size/arcmin: 15×12
Type: S

Radio: Double arc shell.

Optical: Filaments in N.

X-ray: Detected.

Point sources: Compact X-ray source.

Distance: Optical absorption suggests 1.5–5.7 kpc.

References:

Taylor et al. 1992, AJ, 103, 931. WSRT at 327 MHz (1′0×1′9 :
 $S = 1.9 \pm 0.1$ Jy), and northern sky survey at 4.9 GHz ($S =$
 0.42 ± 0.05 Jy).
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Mavromatakis et al. 2001, A&A, 370, 265. Optical observations.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$:
 $S = 1.1 \pm 0.1$ Jy) and 1420 MHz ($\sim 1'$: $S = 0.68 \pm 0.04$ Jy), in-
 cluding polarisation and review of flux densities.

Gök et al. 2008, Ap&SS, 318, 207. Optical observations.
 Hurley-Walker et al. 2009, MNRAS, 396, 365. Radio observa-
 tions at 14 to 18 GHz.
 Hui & Becker 2009, A&A, 494, 1005. Chandra observations.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5 :
 $S = 0.30 \pm 0.03$ Jy) including polarisation and review of flux
 densities.
 Shan et al. 2018, ApJS, 238, 35. Optical absorption for distance.

G67.8+0.5

RA: 20^h00^m00^s
Dec: +30°51′

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 7×5
Type: ?

Radio: Poorly resolved arc.

Optical: Diffuse shell, brighter to W.

References:

Sabin et al. 2013, MNRAS, 431, 279. H α and radio survey ob-
 servations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observa-
 tions.

G68.6–1.2

RA: 20^h08^m40^s
Dec: +30°37′

1-GHz flux/Jy: 1.1
Spectral index: 0.2

Size/arcmin: 23
Type: ?

Radio: Faint, poorly defined source.

References:

Reich et al. 1988, IAUCo, 101, 293. Summary of parameters.
 Junkes et al. 1988, LNP, 316, 134. Effelsberg 100-m at 2.7 GHz
 (4′3), including polarisation.
 Reich et al. 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz
 (4′3).
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.

Kothes et al. 2006, A&A, 457, 1081. CGPS at 1420 MHz ($\sim 1'$:
 $S = 0.57 \pm 0.08$ Jy), including review of flux densities.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5 :
 $S = 0.80 \pm 0.04$ Jy), including polarisation and review of flux
 densities.

G69.0+2.7

CTB 80

RA: 19^h53^m20^s
Dec: +32°55′**1-GHz flux/Jy:** 120?
Spectral index: varies**Size/arcmin:** 80?
Type: ?

An association with a SN in AD1408 has been suggested. Has been called G68.8+2.8.

Radio: Compact core, flat spectrum plateau, and steeper spectrum extensions, with spectral break?

Optical: Expanding nebulosity near centre, with filaments to the SW and far NE.

X-ray: Diffuse emission with compact source.

Point sources: Pulsar at W edge of core.

Distance: H_i observations suggest 1.5 kpc, and optical absorption suggests 4.6 kpc.

References:

Angerhofer et al. 1981, A&A, 94, 313. WSRT at 610 MHz (56″×103″) 1.4 GHz (24″×44″) and 5 GHz (7″×13″), plus optical.
Becker et al. 1982, ApJ, 255, 557. X-ray observations.
Sofue et al. 1983, PASJ, 35, 437. NRO 45-m at 10.2 GHz (2′/7).
Velusamy & Kundu 1983, JApA, 4, 253. VLA of compact sources.
Blair et al. 1984, ApJ, 282, 161. Optical images and spectra.
Wang & Seward 1984, ApJ, 285, 607. Einstein observations.
Strom et al. 1984, A&A, 139, 43. Radio observations of flat spectrum component, VLA 5 GHz (1″/7) and 1.4 GHz.
Mantovani et al. 1985, A&A, 145, 50. Bologna at 408 MHz (2′6×4′9 : $S = 67.5 \pm 10.5$ Jy), Effelsberg 100-m at 1.41 (9′ : $S = 62 \pm 9$ Jy), 1.72 (7′6 : $S = 66 \pm 5$ Jy), 2.7 (4′5 : $S = 52 \pm 4$ Jy) and 4.75 GHz (2′4 : $S = 44 \pm 3.3$ Jy), plus review of flux densities.
Kulkarni et al. 1988, Nature, 331, 50. Pulsar detection.
Angelini et al. 1988, ApJ, 330, L43. EXOSAT spectra.
Fesen et al. 1988, Nature, 334, 229. IRAS of surrounding shell.
Junkes et al. 1988, LNP, 316, 134. Effelsberg 100-m at 2.7 GHz (4′3), including polarisation.
Whitehead et al. 1989, MNRAS, 237, 1109. Optical of core.
Salter et al. 1989, ApJ, 338, 171. NRAO 12-m at 84.2 GHz of core, plus review of flux densities.
Hester & Kulkarni 1989, ApJ, 340, 362. Optical imaging and spectroscopy.
Koo et al. 1990, ApJ, 364, 178. Large, expanding H_i shell.
Greidanus & Strom 1990, A&A, 240, 376. Optical kinematics of core.
Koo et al. 1993, ApJ, 417, 196. VLA at 1.4 GHz of surrounding H_i (1′), plus IRAS.
Safi-Harb et al. 1995, ApJ, 439, 722. ROSAT observations.

Srinivasan 1997, ApJ, 489, 170. γ -ray observations of pulsar.
Mavromatakis et al. 2001, A&A, 371, 300. Optical observations.
Butler et al. 2002, A&A, 395, 845. HST detection of pulsar.
Migliazzo et al. 2002, ApJ, 567, L141. Pulsar proper motion study.
Castelletti et al. 2003, AJ, 126, 2114. GMRT at 240 and 618 MHz (17″×26″ and 6″×10″) and VLA at 324 and 1380 MHz (63″×73″ and 78″×93″).
Moon et al. 2004, ApJ, 610, L33. Chandra and HST observations of core.
Li et al. 2005, ApJ, 628, 931. Chandra observations of pulsar and surroundings.
Golden et al. 2005, ApJ, 635, L153. High resolution radio observations of pulsar and surroundings.
Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3′$: $S = 72 \pm 7$ Jy) and 1420 MHz ($\sim 1′$: $S = 56 \pm 5$ Jy), including polarisation and review of flux densities.
Kang & Koo 2007, ApJS, 173, 85. High velocity H_i.
Albert et al. 2007, ApJ, 669, 1143. γ -ray observations.
Zeiger et al. 2008, ApJ, 674, 271. Proper motion of pulsar.
Gao et al. 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′5 : $S = 36 \pm 4$ Jy), including polarisation and review of flux densities.
Leahy & Ranasinghe 2012, MNRAS, 423, 718. CGPS at 1.4 GHz, including H_i, plus ROSAT observations.
Park et al. 2013, ApJ, 777, 14. Arecibo of H_i in region.
Planck Collaboration: Arnaud et al. 2016, A&A, 586, A134. Planck flux densities at 30 and 44 GHz.
Shan et al. 2018, ApJS, 238, 35. Optical absorption for distance.
Li et al. 2020, RAA, 20, 186. Radio study from various surveys.
Araya & Herrera 2021, MNRAS, 502, 472. Fermi observations.

G69.7+1.0**RA:** 20^h02^m40^s
Dec: +32°43′**1-GHz flux/Jy:** 2.0
Spectral index: 0.7**Size/arcmin:** 16×14
Type: S

Radio: Poorly resolved source.

X-ray: Detected.

References:

Reich et al. 1988, IAUCo, 101, 293. Summary of parameters.
Junkes et al. 1988, LNP, 316, 134. Effelsberg 100-m at 2.7 GHz (4′3), including polarisation.
Reich et al. 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′3).
Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
Yoshita et al. 2000, PASJ, 52, 867. ROSAT and ASCA observations.

Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3′$: $S = 3.2 \pm 0.4$ Jy) and 1420 MHz ($\sim 1′$: $S = 1.5 \pm 0.1$ Jy), including review of flux densities.
Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5 : $S = 0.78 \pm 0.07$ Jy) including polarisation and review of flux densities.

G70.0–21.5

RA: $21^{\text{h}}24^{\text{m}}00^{\text{s}}$
Dec: $+19^{\circ}23'$

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 330×240
Type: S

Radio: Not detected.

Optical: Large, faint shell of filaments.

X-ray: Partially detected.

Point sources: Possible associated WD.

Distance: Association with WD implies 1 kpc.

References:

Boumis et al. 2002, A&A, 396, 225. Optical and ROSAT observations.
 Fesen et al. 2015, ApJ, 812, 37. H α and other optical/UV line and ROSAT observations.

Shen et al. 2018, ApJ, 865, 15. GAIA of WD.
 Raymond et al. 2020, ApJ, 888, 90. Optical observations.
 Bracco et al. 2020, A&A, 636, L8. Optical, IR and dust observations.

G73.9+0.9

RA: $20^{\text{h}}14^{\text{m}}15^{\text{s}}$
Dec: $+36^{\circ}12'$

1-GHz flux/Jy: 9
Spectral index: 0.23

Size/arcmin: 27
Type: S?

Radio: Diffuse, centrally brightened to SW.

Optical: Faint shell.

Distance: Optical extinction suggests 4.0 kpc.

References:

Reich et al. 1986, A&A, 155, 185. Effelsberg 100-m at 4.75 GHz ($2'.4 : S = 6.7 \pm 0.5$ Jy), plus other flux densities.
 Chastenay & Pineault 1988, IAUCom, 101, 297. DRAO at 408 MHz ($3'.5 \times 5'.9$) and 1.4 GHz ($1'.0 \times 1'.7$).
 Pineault & Chastenay 1990, MNRAS, 246, 169. DRAO at 408 MHz ($3'.4 \times 5'.8 : S = 12.7 \pm 1.2$ Jy) and 1.4 GHz ($1'.0 \times 1'.7 : S = 7.4 \pm 1.0$ Jy).
 Gorham et al. 1996, ApJ, 458, 257. Pulsar search.
 Pineault et al. 1996, AJ, 112, 201. DRAO at 1.4 GHz (smoothed to $2'$) for H α .
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Mavromatakis 2003, A&A, 398, 153. Optical observations.

Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 10.0 \pm 1.7$ Jy) and 1420 MHz ($\sim 1' : S = 7.6 \pm 0.6$ Jy), including polarisation and review of flux densities.
 Sitnik 2010, ARep, 54, 317. H α and CO observations of region.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'.5 : S = 6.2 \pm 0.3$ Jy) including polarisation and review of flux densities.
 Jeong et al. 2012, Ap&SS, 342, 389. CO observations of region.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Zdziarski et al. 2016, MNRAS, 455, 1451. Fermi observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G74.0–8.5

Cygnus Loop

RA: 20^h51^m00^s**1-GHz flux/Jy:** 210**Size/arcmin:** 230×160**Dec:** +30°40′**Spectral index:** varies**Type:** S

Has been suggested that this is two overlapping remnants.

Radio: Shell, brightest to the NE, with fainter breakout region to S, with spectral variations.

Optical: Large filamentary loop, brightest to the NE, not well defined to the S or W.

X-ray: Shell in soft X-rays.

Point sources: Several compact radio sources within the boundary of the remnant.

Distance: Stellar interactions gives 0.73 kpc.

References:

- Green 1990, AJ, 100, 1927. DRAO at 408 MHz (3′.3×6′.7) for spectral index study, plus X-ray and optical.
- Graham et al. 1991, AJ, 101, 175. Shocked molecular H outside rim in NE.
- Fesen et al. 1992, AJ, 104, 719. H α imagery.
- Arendt et al. 1992, ApJ, 400, 562. IRAS observations.
- Hester et al. 1994, ApJ, 420, 721. H α , [OIII] and other optical observations of Balmer dominated filaments in NE.
- Gorham et al. 1996, ApJ, 458, 257. Pulsar search.
- Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
- Leahy et al. 1997, AJ, 114, 2081. DRAO at 1.4 GHz (1′×2′), including polarisation.
- Leahy & Roger 1998, ApJ, 505, 784. DRAO at 1.4 GHz (1′.0×1′.9) and 408 MHz (3′.4×6′.9), for spectral index studies in comparison with other radio observations.
- Levenson et al. 1998, ApJS, 118, 541. Optical images.
- Roger et al. 1999, A&AS, 137, 7. 22 MHz flux density ($S = 1400 \pm 400$ Jy).
- Bohigas et al. 1999, ApJ, 518, 324. Optical spectroscopy of surroundings.
- Levenson et al. 1999, ApJ, 526, 874. ROSAT images.
- Blair et al. 1999, AJ, 118, 942. HST observations, for distance.
- Danforth et al. 2000, AJ, 119, 2319. UV, optical and X-ray comparison of selected regions.
- Miyata et al. 2001, ApJ, 550, 1023. ASCA observations of compact X-ray sources.
- Danforth et al. 2001, AJ, 122, 938. Far-UV spectroscopy, H α and other optical observations of NE region.
- Levenson & Graham 2001, ApJ, 559, 948. HST of SE region.
- Uyaniker et al. 2002, A&A, 389, L61. Effelsberg 100-m at 2.7 GHz (4′.3) including polarisation, and comparison with ROSAT data.
- Leahy 2002, AJ, 123, 2689. DRAO at 1.4 GHz (2′×4′) for Hi.
- Blair et al. 2002, ApJS, 140, 367. UV spectroscopy.
- Levenson et al. 2002, ApJ, 576, 798. Chandra observations of W edge.
- Reich et al. 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz (14′.5: $S = 184 \pm 18$ Jy).
- Leahy 2004, MNRAS, 351, 385. Chandra observations of SW.
- Uyaniker et al. 2004, A&A, 426, 909. Effelsberg 100-m at 2.7 GHz (4′.3), with comparison with other data for spectral index studies.
- Blair et al. 2005, AJ, 129, 2268. HST of outer filaments.
- Leahy 2005, AJ, 130, 165. DRAO at 1.4 GHz of SE.
- Levenson & Graham 2005, ApJ, 622, 366. Chandra observations of knot in SE.
- Sun et al. 2006, A&A, 447, 937. Urumqi 25-m at 4.8 GHz (9′.5: $S = 90 \pm 9$ Jy), with comparisons with other data for spectral index studies.
- Kaplan et al. 2006, ApJS, 163, 344. X-ray upper limit on compact sources.
- Seon et al. 2006, ApJ, 644, L175. Far UV observations.
- Sankrit et al. 2007, AJ, 133, 1383. UV observations of part.
- Tsunemi et al. 2007, ApJ, 671, 1717. XMM-Newton observations of NE to SW.
- Nemes et al. 2008, ApJ, 675, 1293. XMM-Newton observations of NE.
- Katsuda et al. 2008, ApJ, 680, 1198. Chandra observations of NE.
- Uchida et al. 2008, ApJ, 688, 1102. XMM-Newton observations.
- Uchida et al. 2009, PASJ, 61, 503. Suzaku observations of N.
- Kimura et al. 2009, PASJ, 61, S137. Suzaku observations from NE to SW.
- Tsunemi et al. 2009, PASJ, 61, S147. Suzaku observations of SE.
- Kosugi et al. 2010, PASJ, 62, 1035. Suzaku observations of SE.
- Sankrit et al. 2010, ApJ, 712, 1092. Spitzer observations.
- McEntaffer & Brantseg 2011, ApJ, 730, 99. Chandra observations of E.
- Katagiri et al. 2011, ApJ, 741, 44. Fermi observations.
- Leahy & Hassan 2013, ApJ, 764, 55. Suzaku and XMM-Newton observations of SW.
- Oakley et al. 2013, ApJ, 766, 51. X-ray spectroscopy.
- Kim et al. 2014, ApJ, 784, 12. Far UV observations.
- Sankrit et al. 2014, ApJ, 787, 3. Spitzer spectroscopy in SE.
- Medina et al. 2014, ApJ, 791, 30. Optical spectroscopy in NE.
- Raymond et al. 2015, ApJ, 805, 152. HST observations in NE. *see also:* Raymond et al. 2015, ApJ, 814, 165. Erratum.
- Roberts & Wang 2015, MNRAS, 449, 1340. Suzaku observations.
- Planck Collaboration: Arnaud et al. 2016, A&A, 586, A134. Planck flux density 30 GHz.
- Katsuda et al. 2016, ApJ, 819, L32. H α spectroscopy of NE.
- Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
- Acero et al. 2016, ApJS, 224, 8. Fermi observations.
- Boubert et al. 2017, A&A, 606, A14. Gaia search for runaway progenitor companion.
- Seok et al. 2020, ApJ, 893, 79. Optical spectroscopy.
- Raymond et al. 2020, ApJ, 903, 2. Optical spectroscopy.
- Fesen et al. 2021, MNRAS, 507, 244. Gaia observations for distance.
- Sun et al. 2022, RAA, 22, 125011. FAST at 1.27 GHz (4′), including polarisation.
- Sankrit et al. 2023, ApJ, 948, 97. Multi-epoch HST observations.
- Raymond et al. 2023, ApJ, 954, 34. Optical spectroscopy and proper motion study of filaments in E.

G74.9+1.2

CTB 87

RA: 20^h16^m02^s
Dec: +37°12′

1-GHz flux/Jy: 9
Spectral index: 0.3

Size/arcmin: 8×6
Type: F

Radio: Filled-centre, with high polarisation, and larger faint halo,

X-ray: Centrally brightened.

Point sources: Compact X-ray source in SE.

Distance: Optical extinction gives 6.1 kpc.

References:

Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo S_{430} MHz = 12.2 ± 9.7 Jy, S_{318} MHz = 17.7 ± 5.0 Jy.
 Weiler & Shaver 1978, A&A, 70, 389. WSRT at 610 MHz ($57'' \times 94''$: $S = 9.1 \pm 1.2$ Jy), 1.4 ($24'' \times 40''$: $S = 8.7 \pm 1.2$ Jy) and 5 GHz ($24'' \times 40''$: $S = 5.6 \pm 1.3$ Jy).
 Geldzahler et al. 1980, A&A, 84, 237. Effelsberg 100-m at 2.7 GHz (4.4 : $S = 7.6 \pm 0.5$ Jy).
 Wilson 1980, ApJ, 241, L19. Einstein observations.
 van Gorkom et al. 1982, MNRAS, 198, 757. WSRT H α absorption of nearby compact source.
 Seaquist & Gilmore 1982, AJ, 87, 378. VLA observations of nearby source.
 Morsi & Reich 1987, A&AS, 69, 533. Effelsberg 100-m at 32 GHz (smoothed to $40''$: $S = 1.47 \pm 0.19$ Jy).
 Green & Gull 1989, MNRAS, 237, 555. VLA at 1.4 GHz (1.2×1.4) including H α .
 Salter et al. 1989, ApJ, 338, 171. NRAO 12-m at 84.2 GHz, plus review of flux densities.
 Pineault & Chastenay 1990, MNRAS, 246, 169. DRAO at 408 MHz (3.4×5.8 : $S = 11.6 \pm 0.4$ Jy) and 1.4 GHz (1.0×1.7 : $S = 7.2 \pm 0.3$ Jy).
 Asaoka & Koyama 1990, PASJ, 42, 625. Ginga X-ray spectrum.
 Wendker et al. 1991, A&A, 241, 551. DRAO at 408 MHz (3.5×5.2 : $S = 13.3 \pm 0.8$ Jy) and Effelsberg 100-m at 4.8 GHz ($S = 7.5 \pm 0.7$ Jy).
 Wallace et al. 1994, A&A, 286, 565. H α of surroundings.
 Cho et al. 1994, AJ, 108, 634. CO of adjacent molecular clouds.
 Gorham et al. 1996, ApJ, 458, 257. Pulsar search.
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
 Wallace et al. 1997, A&A, 317, 212. DRAO at 408 MHz (3.4×5.5) and 1.4 GHz (1.0×1.6) including H α (smoothed to $2'$).

Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Kothes et al. 2003, ApJ, 588, 852. CGPS at 1.4 GHz ($1' \times 1.6$) including H α , plus CO observations.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$: $S = 11.9 \pm 0.9$ Jy) and 1420 MHz ($\sim 1'$: $S = 7.1 \pm 1.1$ Jy), including polarisation and review of flux densities.
 Hurley-Walker et al. 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
 Sitnik 2010, ARep, 54, 317. H α and CO observations of region.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.5 : $S = 6.4 \pm 0.4$ Jy) including polarisation and review of flux densities.
 Matheson et al. 2013, ApJ, 774, 33. Chandra observations.
 Bassani et al. 2014, A&A, 561, A108. X-ray and γ -ray observations.
 Aliu et al. 2014, ApJ, 788, 78. γ -ray detection.
 Saha 2016, MNRAS, 460, 3563. Fermi observations.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Liu et al. 2018, ApJ, 859, 173. CO observations.
 Abeysekara et al. 2018, ApJ, 861, 134. γ -ray observations.
 Guest et al. 2020, MNRAS, 491, 3013. XMM-Newton observations.
 Kothes et al. 2020, MNRAS, 496, 723. Effelsberg 100-m at 4.75 (2.5), 10.55 (1.2), 14.7 (0.85) and 32 GHz (0.45), plus other radio survey observations.
 Reich et al. 2022, A&A, 668, A39. Effelsberg 100-m at 14.7 ($51''$: $S = 4.3 \pm 0.4$ Jy) and 17.3 GHz ($43''$: $S = 3.9 \pm 0.3$ Jy), plus review of radio spectrum.

G76.9+1.0

RA: 20^h22^m20^s
Dec: +38°43′

1-GHz flux/Jy: 2?
Spectral index: ?

Size/arcmin: 9
Type: C

Radio: Bipolar shell.

Point sources: Central pulsar.

References:

Taylor et al. 1992, AJ, 103, 931. WSRT at 327 MHz (1.0×1.6), and northern sky survey at 4.9 GHz.
 Landecker et al. 1993, A&A, 276, 522. VLA at 1.49 GHz ($14''$), 4.86 GHz ($13'' \times 16''$) and 8.55 GHz ($11'' \times 12''$), including polarisation and review of flux densities.
 Landecker et al. 1997, A&AS, 123, 199. Miyun at 232-MHz (3.8×5.4).
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$: $S = 2.3 \pm 0.2$ Jy) and 1420 MHz ($\sim 1'$: $S = 1.35 \pm 0.07$ Jy), including polarisation and review of flux densities.

Hurley-Walker et al. 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.5 : $S = 0.79 \pm 0.07$ Jy) including polarisation and review of flux densities.
 Marthi et al. 2011, MNRAS, 416, 2560. GMRT at 618 MHz ($51'' \times 54''$), 1160 MHz (2.2×3.4), and Chandra observations of central source.
 Arzoumanian et al. 2011, ApJ, 739, 39. Pulsar detection.
 Jeong et al. 2012, Ap&SS, 342, 389. CO observations of region.

G78.2+2.1

RA: 20^h20^m50^s
Dec: +40°26′

1-GHz flux/Jy: 320
Spectral index: 0.51

DR4, γ Cygni SNR

Size/arcmin: 60
Type: S

Has been called G78.1+1.8.

Radio: In complex region (early catalogues refer to other proposed remnants in this region).

Optical: Faint filaments, spectra indicate a SNR superposed on a HII region.

X-ray: Weak emission from the SE of the remnant.

Point sources: X-ray pulsar at edge of remnant, with nebula.

Distance: Associations with other objects suggests 1.7 to 2.6 kpc, optical extinction suggests 0.98 kpc.

References:

Higgs et al. 1977, AJ, 82, 718. DRAO at 1.4 GHz ($2' \times 3' : S = 270 \pm 40$ Jy) plus some 10 GHz ($4'$) survey data, reveals true extent of remnant.
D'Odorico & Sabbadin 1977, A&AS, 28, 439. Optical spectra.
van den Bergh 1978, ApJS, 38, 119. Optical observations.
Landecker et al. 1980, A&AS, 39, 133. DRAO HI observations ($2' \times 3.1'$).
Higgs et al. 1983, AJ, 88, 97. CO of surroundings.
Bohigas et al. 1983, RMxAA, 8, 155. Optical spectra, find thermal only.
Braun & Strom 1986, A&AS, 63, 345. WSRT HI observations.
Fukui & Tatematsu 1988, IAUCom, 101, 261. CO observations of the vicinity ($2.7'$).
Green 1989, MNRAS, 238, 737. OH observations.
Pineault & Chastenay 1990, MNRAS, 246, 169. DRAO at 408 MHz ($3.4 \times 5.8 : S = 480 \pm 60$ Jy) and 1.4 GHz ($1.0 \times 1.7 : S = 270 \pm 40$ Jy).
Wendker et al. 1991, A&A, 241, 551. DRAO at 408 MHz ($3.5 \times 5.2 : S = 540 \pm 40$ Jy) and Effelsberg 100-m at 4.8 GHz ($S = 150 \pm 15$ Jy).
Esposito et al. 1996, ApJ, 461, 820. Associated γ -ray emission.
Brazier et al. 1996, MNRAS, 281, 1033. γ -ray and X-ray point source.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Zhang et al. 1997, A&A, 324, 641. Multi-frequency radio comparison.
Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
Roberts et al. 2001, ApJS, 133, 451. ASCA observations.
Uchiyama et al. 2002, ApJ, 571, 866. ASCA observations.
Mavromatakis 2003, A&A, 408, 237. Optical observations.

Bykov 2004, A&A, 427, L21. Hard X-ray observations.
Becker et al. 2004, ApJ, 615, 897. Chandra and other observations of compact sources.
Weisskopf et al. 2006, ApJ, 652, 387. Chandra and other observations of compact sources.
Kothés et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 500 \pm 35$ Jy) and 1420 MHz ($\sim 1' : S = 226 \pm 19$ Jy), including review of flux densities.
Kang & Koo 2007, ApJS, 173, 85. High velocity HI.
Casandjian & Grenier 2008, A&A, 489, 849. γ -ray observations.
Ladouceur & Pineault 2008, A&A, 490, 197. CGPS at 408 MHz (2.9×4.5) and 1.4 GHz (0.8×1.5).
Gao et al. 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz ($9.5 : S = 170 \pm 18$ Jy), including polarisation and review of flux densities.
Leahy et al. 2013, MNRAS, 436, 968. ROSAT and Chandra observations, and CGPS for HI.
Aliu et al. 2013, ApJ, 770, 93. γ -ray observations.
Lin et al. 2013, ApJ, 770, L9. Pulsar detection.
Hui et al. 2015, ApJ, 799, 76. XMM-Newton and Chandra observations of pulsar, including proper motion.
Fraija & Araya 2016, ApJ, 826, 31. Fermi observations.
Acero et al. 2016, ApJS, 224, 8. Fermi observations.
Abeysekara et al. 2018, ApJ, 861, 134. γ -ray observations.
Piano et al. 2019, ApJ, 878, 54. γ -ray observations.
Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.
Sett et al. 2021, A&A, 647, A183. Pulsar radio search.
MAGIC Collaboration: Acciari et al. 2023, A&A, 670, A8. γ -ray observations.

G82.2+5.3

RA: 20^h19^m00^s
Dec: +45°30′

1-GHz flux/Jy: 120?
Spectral index: 0.5?

W63

Size/arcmin: 95 $\times$ 65
Type: S

Has been called G82.5+5.3.

Radio: Shell in the Cygnus X complex.

Optical: In complex region, but spectra indicate SNR filaments.

X-ray: Detected.

Distance: Optical absorption suggests 3.2 kpc, optical extinction suggests 1.3 kpc.

References:

Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz ($5' : S = 59.0 \pm 3.5$ Jy).
Sabbadin 1976, A&A, 51, 159. Optical spectra.
Angerhofer et al. 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz ($6.8'$). Incomplete mapping.
Rosado & González 1981, RMxAA, 5, 93. Optical spectra.
Seward 1990, ApJS, 73, 781. Einstein observations.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
Reich et al. 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz ($14.5 : S = 82.5 \pm 5.5$ Jy).

Uyaniker et al. 2003, ApJ, 585, 785. CGPS at 1.4 GHz ($1'$) including polarisation, of part.
Mavromatakis et al. 2004, A&A, 415, 1051. ROSAT, ASCA and optical observations.
Kothés et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 144 \pm 12$ Jy) and 1420 MHz ($\sim 1' : S = 93 \pm 5$ Jy), including review of flux densities.
Gao et al. 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz ($9.5 : S = 49 \pm 5$ Jy), including polarisation and review of flux densities.
Shan et al. 2018, ApJS, 238, 35. Optical absorption for distance.
Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.

G83.0–0.3

RA: 20^h46^m55^s
Dec: +42°52′

1-GHz flux/Jy: 1
Spectral index: 0.4

Size/arcmin: 9×7
Type: S

Radio: Incomplete shell.

References:

Taylor et al. 1992, AJ, 103, 931. WSRT at 327 MHz (1′0×1′5), and northern sky survey at 4.9 GHz.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$: $S=1.2\pm0.3$ Jy) and 1420 MHz ($\sim 1'$: $S=0.8\pm0.1$ Jy, including polarisation and review of flux densities.

G84.2–0.8

RA: 20^h53^m20^s
Dec: +43°27′

1-GHz flux/Jy: 11
Spectral index: 0.5

Size/arcmin: 20×16
Type: S

Radio: Elongated shell, with a filament aligned with the major axis.

X-ray: Detected.

Distance: H I absorption suggests 6 kpc.

References:

Matthews et al. 1977, A&A, 55, 1. WSRT at 610 MHz ($56''\times81''$: $S=12.4\pm1.5$ Jy) and Effelsberg 100-m at 2.7 GHz ($4'4$: $S=6.8\pm1.3$ Jy).
 Matthews & Shaver 1980, A&A, 87, 255. WSRT at 1415 MHz ($23''\times32''$), and Effelsberg 100-m at 2.7 GHz ($4'4$: $S=5.6\pm0.5$ Jy).
 Feldt & Green 1993, A&A, 274, 421. DRAO at 1.4 GHz ($1'\times1'5$), including H I, plus CO observations.
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Uyaniker et al. 2003, ApJ, 585, 785. CGPS at 1.4 GHz ($1'$) including polarisation.

Kaplan et al. 2004, ApJS, 153, 269. Chandra limits for any compact source.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$: $S=14.5\pm0.5$ Jy) and 1420 MHz ($\sim 1'$: $S=7.2\pm0.8$ Jy), including review of flux densities.
 Leahy & Green 2012, ApJ, 760, 25. CGPS, including H I, plus Chandra observations.
 Jeong et al. 2012, Ap&SS, 342, 389. CO observations of region.

G85.4+0.7

RA: 20^h50^m40^s
Dec: +45°22′

1-GHz flux/Jy: ?
Spectral index: 0.2

Size/arcmin: 24?
Type: S

Radio: Faint, incomplete shell, within larger thermal shell.

X-ray: Centrally brightened.

Distance: H I observations suggest 3.5 kpc, optical absorption suggests 4.4 or 3.8 kpc.

References:

Kothes et al. 2001, A&A, 376, 641. CGPS at 408 MHz ($2'8\times4'4$: $S<0.45$ Jy) and 1.4 GHz ($0'8\times1'1$), plus H I and X-ray data.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$: $S=2.9\pm0.5$ Jy) and 1420 MHz ($\sim 1'$: $S=2.3\pm0.2$ Jy), including review of flux densities.

Jackson et al. 2008, ApJ, 674, 936. XMM-Newton and H I observations.
 Jeong et al. 2012, Ap&SS, 342, 389. CO observations of region.
 Shan et al. 2018, ApJS, 238, 35. Optical absorption for distance.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G85.9–0.6

RA: 20^h58^m40^s
Dec: +44°53′

1-GHz flux/Jy: ?
Spectral index: 0.2

Size/arcmin: 24
Type: S

Radio: Faint, incomplete shell.

Optical: Diffuse shell.

X-ray: Centrally brightened.

Distance: H_I observations suggest 4.8 kpc, optical extinction suggests 3.3 kpc.

References:

Kothes et al. 2001, A&A, 376, 641. CGPS at 408 MHz (2′8×4′4: $S < 0.9$ Jy) and 1.4 GHz (0′8×1′1), plus H_I, X-ray and optical data.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$: $S = 3.0 \pm 1.3$ Jy) and 1420 MHz ($\sim 1'$: $S = 2.2 \pm 0.8$ Jy), including review of flux densities.

Jackson et al. 2008, ApJ, 674, 936. XMM-Newton and H_I observations.
 Gök et al. 2009, Ap&SS, 324, 17. Optical observations.
 Jeong et al. 2012, Ap&SS, 342, 389. CO observations of region.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G89.0+4.7

HB21

RA: 20^h45^m00^s
Dec: +50°35′

1-GHz flux/Jy: 220
Spectral index: 0.38

Size/arcmin: 120×90
Type: S

Radio: Distorted shell (4C50.52, an extragalactic double, is within the boundary of the remnant).

Optical: Filaments and patches.

X-ray: Centrally brightened.

Distance: Various associations suggest 0.8 kpc, optical extinction suggests 2.3 kpc.

References:

Hirabayashi & Takahashi 1972, PASJ, 24, 231. 30-m dish at 4.2 GHz (11′: $S = 160 \pm 40$ Jy).
 Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz (5′: $S = 148 \pm 16$ Jy), plus optical filaments.
 Hill 1974, MNRAS, 169, 59. Half-Mile Telescope at 1.4 GHz (3′×3′9).
 Haslam et al. 1975, A&A, 39, 453. Effelsberg 100-m at 2.7 GHz (4′4).
 Fukui & Tatematsu 1988, IAUCo, 101, 261. CO observations of the vicinity (2′7).
 Tatematsu et al. 1990, A&A, 237, 189. DRAO at 408 MHz (3′5×4′5) and 1.4 GHz (1′0×1′3), including H_I, plus CO observations of adjacent molecular cloud.
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
 Leahy & Aschenbach 1996, A&A, 315, 260. ROSAT observations.
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Koo et al. 2001, ApJ, 552, 175. NRAO 12-m and other CO observations (27″ and 45″) of eastern part.
 Reich et al. 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz (14′5: $S = 228 \pm 5$ Jy).
 Uyaniker et al. 2003, ApJ, 585, 785. CGPS at 1.4 GHz (1′) including polarisation.
 Byun et al. 2006, ApJ, 637, 283. CO observations of surroundings.
 Lazendic & Slane 2006, ApJ, 647, 350. X-ray observations.

Leahy 2006, ApJ, 647, 1125. CGPS at 408 MHz (2′8×3′7) and 1.4 GHz (0′8×1′1).
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$: $S = 259 \pm 19$ Jy) and 1420 MHz ($\sim 1'$: $S = 183 \pm 9$ Jy), including polarisation and review of flux densities.
 Kang & Koo 2007, ApJS, 173, 85. High velocity H_I.
 Mavromatakis et al. 2007, A&A, 461, 991. Optical observations.
 Shinn et al. 2009, ApJ, 693, 1883. IR observations.
 Pannuti et al. 2010, AJ, 140, 1787. ASCA and observations.
 Shinn et al. 2010, AdSpR, 45, 445. IR observations in S.
 Gao et al. 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′5: $S = 107 \pm 11$ Jy), including polarisation and review of flux densities.
 Reichardt et al. 2012, A&A, 546, A21. Fermi detection.
 Shinn et al. 2012, ApJ, 759, 34. Akari observations of H₂.
 Pivato et al. 2013, ApJ, 779, 179. Fermi observations.
 Planck Collaboration: Arnaud et al. 2016, A&A, 586, A134. Planck flux densities at 30 and 44 GHz.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Boubert et al. 2017, A&A, 606, A14. Gaia search for runaway progenitor companion.
 Shan et al. 2018, ApJS, 238, 35. Optical absorption for distance.
 Suzuki et al. 2018, PASJ, 70, 75. Suzaku observations.
 Ambrogio et al. 2019, A&A, 623, A86. Fermi detection.
 Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.
 Sett et al. 2021, A&A, 647, A183. Pulsar radio search.

G93.3+6.9

RA: 20^h52^m25^s
Dec: +55°21′

1-GHz flux/Jy: 9
Spectral index: 0.45

DA 530, 4C(T)55.38.1

Size/arcmin: 27×20
Type: C?

Has been called G93.2+6.7.

Radio: Shell, with two bright limbs, highly polarised.

X-ray: Compact central source.

Distance: H_I and observations imply > 4.4 kpc.

References:

Roger & Costain 1976, A&A, 51, 151. DRAO at 1.42 GHz (2′0×2′4: $S=6.9$ Jy).
 Haslam et al. 1980, A&A, 92, 57. Effelsberg 100-m at 1.72 GHz (7′6: $S=6.47\pm0.52$ Jy) and 2.7 GHz (4′4: $S=5.64\pm0.64$ Jy), plus review of flux densities.
 Lalitha et al. 1984, A&A, 131, 196. Effelsberg 100-m at 4.75 GHz (smoothed to 3′: $S=4.01\pm0.57$ Jy).
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Landecker et al. 1999, ApJ, 527, 866. DRAO at 408 MHz (3′5×4′3) and 1.4 GHz (1′0×1′2), including polarisation and H_I.
 Foster & Routledge 2003, ApJ, 598, 1005. H_I for distance.

Kaplan et al. 2004, ApJS, 153, 269. Chandra limits for any compact source.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$: $S=10.5\pm0.7$ Jy) and 1420 MHz, including review of flux densities.
 Jiang et al. 2007, ApJ, 670, 1142. Chandra observations.
 Bocchino et al. 2008, AdSpR, 41, 407. XMM-Newton observations.
 Jeong et al. 2012, Ap&SS, 342, 389. CO observations of region.
 Deniz et al. 2022, AdSpR, 69, 2342. Suzaku observations.
 Booth et al. 2022, ApJ, 941, 17. DRAO and VLA at 1.4 GHz for H_I polarisation absorption, for distance.
 Xin & Guo 2023, ApJ, 955, 84. Fermi observations.

G93.7–0.2

RA: 21^h29^m20^s
Dec: +50°50′

1-GHz flux/Jy: 65
Spectral index: 0.65

CTB 104A, DA 551

Size/arcmin: 80
Type: S

Has been called G93.6–0.2 and G93.7–0.3.

Radio: Distorted, faint shell.

Distance: Association with H_I features suggests 1.5 kpc, optical extinction suggests 2.2 or 2.0 kpc.

References:

Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′: $S=18.4\pm1.0$ Jy).
 Mantovani et al. 1982, A&A, 105, 176. Effelsberg 100-m at 1.7 GHz (7′6: $S=53.5\pm5.0$ Jy), plus review of flux densities.
 Landecker et al. 1985, AJ, 90, 1082. DRAO at 1.4 GHz (smoothed to 2′: $S=58\pm6$ Jy).
 Mantovani et al. 1991, A&A, 247, 545. Effelsberg 100-m at 4.75 GHz (smoothed to 3′: $S=33.5\pm4.0$ Jy), including polarisation, plus review of flux densities.
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Koralesky et al. 1998, AJ, 116, 1323. VLA search for OH emission.

Uyaniker et al. 2002, ApJ, 565, 1022. CGPS 1.4 GHz (49′′×54′′), including H_I, and 408 MHz (2′8×3′7).
 Uyaniker et al. 2003, ApJ, 585, 785. CGPS at 1.4 GHz (1′) including polarisation.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$: $S=67\pm6$ Jy) and 1420 MHz ($\sim 1'$: $S=35\pm4$ Jy), including polarisation and review of flux densities.
 Gao et al. 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′5: $S=25.0\pm2.5$ Jy), including polarisation and review of flux densities.
 Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G94.0+1.0

3C434.1

RA: 21^h24^m50^s
Dec: +51°53′**1-GHz flux/Jy:** 13
Spectral index: 0.45**Size/arcmin:** 30×25
Type: S**Radio:** Incomplete shell, containing H_I shell.**X-ray:** Extended emission.**Distance:** Association with stellar wind bubble implies 5.2 kpc, optical extinction suggests 2.5 kpc.**References:**

Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz ($5' : S = 6.1 \pm 0.8$ Jy), and 37-m at 1.7 GHz ($S = 11 \pm 3$ Jy).
 Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz ($5' : S = 5.8 \pm 0.4$ Jy). Also NRAO 140-ft at 5 GHz ($6'$).
 Mantovani et al. 1982, A&A, 105, 176. Effelsberg 100-m at 1.7 GHz ($7.6' : S = 12.0 \pm 1.3$ Jy), plus review of flux densities.
 Goss et al. 1984, A&A, 138, 469. WSRT at 610 MHz (smoothed to $100'' : S = 16 \pm 1.7$ Jy) and Effelsberg 100-m at 4.75 GHz ($2.4' : S = 7.2 \pm 0.5$ Jy).
 Landecker et al. 1985, AJ, 90, 1082. DRAO at 1.4 GHz (smoothed to $2' : S = 16 \pm 3$ Jy).
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Uyaniker et al. 2003, ApJ, 585, 785. CGPS at 1.4 GHz ($1'$) including polarisation.
 Foster et al. 2004, A&A, 417, 79. DRAO at 1.4 GHz, including H_I.

Foster 2005, A&A, 441, 1043. CGPS at 408 MHz ($2.8 \times 3.6'$) and 1.4 GHz ($0.8 \times 1.0'$) for spectral index studies, plus other observations.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 20 \pm 2$ Jy) and 1420 MHz ($\sim 1' : S = 11.3 \pm 1.0$ Jy), including review of flux densities.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9.5' : S = 6.2 \pm 0.4$ Jy) including polarisation and review of flux densities.
 Jeong et al. 2012, Ap&SS, 342, 389. CO observations of region.
 Jeong et al. 2013, ApJ, 770, 105. CO observations of region.
 Doroshenko et al. 2019, A&A, 631, A179. XMM-Newton observations.
 Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.

G96.0+2.0**RA:** 21^h30^m30^s
Dec: +53°59′**1-GHz flux/Jy:** 0.35
Spectral index: 0.6**Size/arcmin:** 26
Type: S**Radio:** Faint, arc in S, poorly defined in N.**Distance:** Association for H_I indicates 4 kpc.**References:**

Kothes et al. 2005, A&A, 444, 871. CGPS at 408 MHz ($2.8 \times 3.5'$) and 1.4 GHz ($50'' \times 61''$) including H_I.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 0.42 \pm 0.06$ Jy) and 1420 MHz ($\sim 1' : S = 0.24 \pm 0.02$ Jy), including review of flux densities.

Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9.5' : S = 0.14 \pm 0.02$ Jy) including polarisation and review of flux densities.

G106.3+2.7**RA:** 22^h27^m30^s
Dec: +60°50′**1-GHz flux/Jy:** 6
Spectral index: 0.6**Size/arcmin:** 60×24
Type: C?

Incorporates the pulsar wind nebula G106.6+2.9 (the ‘Boomerang’).

Radio: Faint extended source, which brighter ‘head’ to NE.**X-ray:** Pulsar and wind nebula.**Point sources:** Pulsar.**References:**

Pineault & Joncas 2000, AJ, 120, 3218. DRAO at 408 MHz ($3.5 \times 3.9' : S = 10.5 \pm 0.3$ Jy) and 1.4 GHz ($1.0 \times 1.2' : S = 4.9 \pm 0.6$ Jy), plus H_I.
 Halpern et al. 2001, ApJ, 547, 323. X-ray and radio observations of the ‘head’.
 Halpern et al. 2001, ApJ, 552, L125. Pulsar detection.
 Kothes et al. 2001, ApJ, 560, 236. CGPS at 1.4 GHz, including H_I, plus CO and other observations.
 Ng & Romani 2004, ApJ, 601, 479. Chandra detection of pulsar wind nebula.
 Kothes et al. 2004, ApJ, 607, 855. H_I polarisation absorption.
 Kothes et al. 2006, ApJ, 638, 225. Effelsberg 100-m at 4.85 ($2.4'$), 8.35 ($1.4'$), 10.5 ($1.2'$) and 32 GHz ($0.45'$) of pulsar wind nebula, including polarisation.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 8.6 \pm 1.0$ Jy) and 1420 MHz ($\sim 1' : S = 4.8 \pm 0.5$ Jy), including polarisation and review of flux densities.

Abdo et al. 2007, ApJ, 664, L91. γ -ray observations.
 Casandjian & Grenier 2008, A&A, 489, 849. γ -ray observations.
 Acciari et al. 2009, ApJ, 703, L6. γ -ray observations.
 Gao et al. 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz ($9.5' : S = 2.0 \pm 0.3$ Jy), including polarisation and review of flux densities.
 Xin et al. 2019, ApJ, 885, 162. Fermi observations.
 Albert et al. 2020, ApJ, 896, L29. γ -ray observations.
 Fujita et al. 2021, ApJ, 912, 133. Suzaku observations.
 Tibet AS γ Collaboration: Amenomori et al. 2021, NatAs, 5, 460. High energy γ -ray observations.
 Ge et al. 2021, The Innovation, 2, 100118. Chandra and XMM-Newton observations.
 Liu et al. 2022, ApJ, 926, 124. CO observations.
 MAGIC Collaboration: Abe et al. 2023, A&A, 671, A12. γ -ray observations.

G107.0+9.0**RA:** 22^h01^m00^s**Dec:** +66°30′**1-GHz flux/Jy:** 11?**Spectral index:** 0.9?**Size/arcmin:** 180?**Type:** ?**Radio:** Faint extended emission.**Optical:** Filaments.**References:**

Fesen et al. 2020, MNRAS, 498, 5194. H α and [OIII] imaging.
 Reich et al. 2021, A&A, 655, A10. Urumqi 25-m a 4.8 GHz
 (9′5), Effelsberg 1.4-GHz (9′4) including polarisation, and
 other observations.

G108.2–0.6**RA:** 22^h53^m40^s**Dec:** +58°50′**1-GHz flux/Jy:** 8**Spectral index:** 0.5**Size/arcmin:** 70×54**Type:** S**Radio:** Faint shell.**Distance:** Possible associated H I structures suggest 3.2 kpc, optical extinction suggests 1.0 kpc.**References:**

Tian et al. 2007, A&A, 465, 907. DRAO at 408 MHz (2′8×3′3 :
 $S = 11.5 \pm 1.2$ Jy) and 1.4 GHz (1′0×1′2 : $S = 6.6 \pm 0.7$ Jy) in-
 cluding H I.
 Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.

G109.1–1.0

CTB 109

RA: 23^h01^m35^s**1-GHz flux/Jy:** 20**Size/arcmin:** 28**Dec:** +58°53′**Spectral index:** 0.45**Type:** S**Radio:** Semicircular shell, with the Molecular cloud S152 is to the immediate W.**Optical:** Faint optical filaments.**X-ray:** Semicircular shell, with pulsar at W edge.**Point sources:** Long period X-ray pulsar (magnetar).**Distance:** Various observations imply 3.2 kpc, optical extinction suggests 2.8 kpc.**References:**

- Hughes et al. 1981, ApJ, 246, L127. WSRT at 610 MHz ($1': S = 40 \pm 5$ Jy) shows bad CLEAN artefacts.
- Blair & Kirshner 1981, Nature, 291, 132. Optical spectra.
- Downes 1983, MNRAS, 203, 695. Effelsberg 100-m at 2.7 GHz ($4'4': S = 13.0 \pm 1.5$ Jy).
- Sofue et al. 1983, PASJ, 35, 447. NRO 45-m at 10.2 GHz ($2'7$).
- Hughes et al. 1984, ApJ, 283, 147. WSRT at 610 MHz ($20'': S = 26 \pm 3$ Jy) 1.4 GHz ($10''$), DRAO at 1.4 GHz ($1' \times 1'2: S = 16.8 \pm 2$ Jy) and Algonquin 46-m at 6.5 GHz ($4'5: S = 6.7 \pm 1$ Jy).
- Braun & Strom 1986, A&AS, 63, 345. WSRT H_i observations.
- Tatematsu et al. 1987, PASJ, 39, 755. NRO 45-m at 10 GHz ($2'7$), plus polarisation.
- Tatematsu et al. 1987, A&A, 184, 279. CO observations of the surroundings ($2'7$).
- Hanson et al. 1988, A&A, 195, 114. EXOSAT of pulsar. *see also:* Hanson et al. 1988, A&A, 207, 204. Erratum.
- Morini et al. 1988, ApJ, 333, 777. EXOSAT observations.
- Koyama et al. 1989, PASJ, 41, 461. X-ray observations of pulsar.
- Coe et al. 1989, MNRAS, 238, 649. IRAS observations of surroundings.
- Green 1989, MNRAS, 238, 737. OH observations.
- Tatematsu et al. 1990, ApJ, 351, 157. CO of surroundings, plus X-ray observations.
- Davies & Coe 1991, MNRAS, 249, 313. Optical and IR observations near pulsar.
- Fesen & Hurford 1995, AJ, 110, 747. Optical observations.
- Hurford & Fesen 1995, MNRAS, 277, 549. ROSAT imaging.
- Rho & Petre 1997, ApJ, 484, 828. ROSAT observations.
- Parmar et al. 1998, A&A, 330, 175. X-ray observations.
- Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
- Koralesky et al. 1998, AJ, 116, 1323. VLA search for OH emission.
- Patel et al. 2001, ApJ, 563, L45. Chandra observations of pulsar.
- Kothes et al. 2002, ApJ, 576, 169. CGPS at 1.4 GHz ($59'' \times 68''$), including H_i, plus CO observations.
- Sasaki et al. 2004, ApJ, 617, 322. XMM-Newton observations.
- Sasaki et al. 2006, ApJ, 642, L149. CO observations of surroundings, plus Chandra observations.
- Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3': S = 26 \pm 3$ Jy) and 1420 MHz ($\sim 1': S = 17.4 \pm 1.2$ Jy), including polarisation and review of flux densities.
- Tian et al. 2010, MNRAS, 404, L1. CGPS for H_i absorption.
- Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'5: S = 9.8 \pm 0.5$ Jy) including polarisation and review of flux densities.
- Kothes & Foster 2012, ApJ, 746, L4. H_i and CO observations of region.
- Castro et al. 2012, ApJ, 756, 88. Fermi observations.
- Sasaki et al. 2013, A&A, 552, A45. Chandra observations of NE.
- Tendulakar et al. 2013, ApJ, 772, 31. Pulsar proper motion study.
- Vogel et al. 2014, ApJ, 789, 75. NuSTAR observations of pulsar.
- Acero et al. 2016, ApJS, 224, 8. Fermi observations.
- Nakano et al. 2017, PASJ, 69, 40. Suzaku observations.
- Sánchez-Cruces et al. 2018, MNRAS, 473, 1705. Optical observations.
- Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.
- Millard et al. 2021, ApJS, 257, 36. ISO far-IR spectroscopy.

G111.7–2.1

Cassiopeia A, 3C461

RA: 23^h23^m26^s**1-GHz flux/Jy:** 2300**Size/arcmin:** 5**Dec:** +58°48′**Spectral index:** 0.77**Type:** S

Presumably the remnant of a late 17th century SN.

Radio: Bright shell with compact knots and extended plateau of emission; shows secular decline.

Optical: Fast knots and quasi-stationary flocculi, with many filaments at large radii, and NE ‘jet’.

X-ray: Incomplete shell, with hard spectral component.

Point sources: Central compact X-ray source.

Distance: Optical expansion gives 3.3 kpc.

References:

- Anderson & Rudnick 1995, ApJ, 441, 307. VLA at 1.4 GHz and 4.8 GHz, for proper motion studies.
- Kassim et al. 1995, ApJ, 455, L59. VLA at 74 (25'') and 332 MHz (6''), including spectral index comparisons.
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- Schwarz et al. 1997, A&AS, 123, 43. WSRT at 1.4 GHz (30'') for H I absorption.
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- Gotthelf et al. 2001, ApJ, 552, L39. Chandra observations, showing outer shock.
- Hwang et al. 2001, ApJ, 560, L175. Chandra observations of Doppler shifted lines.
- Fesen et al. 2001, AJ, 122, 2644. HST observations.
- Reynosio & Goss 2002, ApJ, 575, 871. VLA at 5 GHz (6'0×6'4) for H₂CO absorption studies.
- Krause et al. 2005, Science, 308, 1604. Spitzer light echoes from surroundings.
- Kang [1;5A& Koo 2007, ApJS, 173, 85. High velocity H I.
- Rho et al. 2008, ApJ, 673, 271. Spitzer observations.
- Rest et al. 2008, ApJ, 681, L81. SN light echo.
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- Sibthorpe et al. 2010, ApJ, 719, 1553. Akari and sub-mm observations of region.
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- Patnaude et al. 2011, ApJ, 729, L28. Chandra observations of fading.
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- Fesen et al. 2011, ApJ, 736, 109. HST variability studies.
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- Vogt et al. 2012, ApJ, 750, 155. Spitzer light echoes.
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- Yang et al. 2013, ApJ, 766, 44. Suzaku spectroscopy.
- Rutherford et al. 2013, ApJ, 769, 64. Chandra spectroscopy.
- Milisavljevic & Fesen 2013, ApJ, 772, 134. Optical spectroscopy for 3-D structure.
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- DeLaney et al. 2014, ApJ, 785, 7. VLA plus Pie Town at 74 MHz (9'') and comparison with higher frequencies.
- Arendt et al. 2014, ApJ, 786, 55. Spitzer and Herschel IR observations.
- Patnaude & Fesen 2014, ApJ, 789, 138. Multi-epoch optical and X-ray observations.
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- Rho et al. 2023, MNRAS, 522, 2279. SOFIA far-IR polarisation observations.

G113.0+0.2

RA: 23^h26^m50^s
Dec: +61°26′

1-GHz flux/Jy: 4
Spectral index: 0.5?

Size/arcmin: 40×17?
Type: ?

Radio: Elongated, extent not well defined.

Point sources: Contains old pulsar.

Distance: Association for H_I indicates 3.1 kpc.

References:

Kothes et al. 2005, A&A, 444, 871. CGPS at 408 MHz (2′8×3′1) and 1.4 GHz (49″×55″) including H_I.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz (~3′) and 1420 MHz (~1′).

Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5 : S = 1.9±0.5 Jy) including polarisation and review of flux densities.

G114.3+0.3

RA: 23^h37^m00^s
Dec: +61°55′

1-GHz flux/Jy: 5.5
Spectral index: 0.5

Size/arcmin: 90×55
Type: S

Radio: Shell, with H_{II} region S165 within the boundary of the remnant.

Optical: Faint emission in centre and to S.

Point sources: Pulsar near centre of remnant.

Distance: Association with H_I and other features implies 0.7 kpc.

References:

Reich & Braunsfurth 1981, A&A, 99, 17. Effelsberg 100-m at 2.7 GHz (4′4 : S = 3.6 Jy) and S_{1.4 GHz} = 4.4 Jy from 1.4 GHz survey data, plus H_I from Maryland–Green Bank survey.
 Kulkarni et al. 1993, Nature, 362, 135. Pulsar association.
 Fürst et al. 1993, A&A, 276, 470. Pulsar association.
 Becker et al. 1996, A&A, 306, 464. ROSAT of pulsar.
 Fesen et al. 1997, AJ, 113, 767. Optical observations.
 Reich 2002, in NSPS, p1. Effelsberg 100-m at 2.7 GHz.
 Mavromatakis et al. 2002, A&A, 383, 1011. Optical observations.

Yar-Uyaniker et al. 2004, ApJ, 616, 247. CGPS at 1.4 GHz (49″×55″), including H_I (1′0×1′1).
 Tian & Leahy 2006, ChJAA, 6, 543. CGPS at 408 MHz (3′4×3′9 : S = 12.0±6.0 Jy) and 1.4 GHz (1′0×1′1 : S = 9.8±0.8 Jy).
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 1420 MHz (~1′ : S = 5.4±0.8 Jy), including review of flux densities.
 Gao et al. 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′5 : S = 6.9±0.7 Jy), including polarisation and review of flux densities.

G116.5+1.1

RA: 23^h53^m40^s
Dec: +63°15′

1-GHz flux/Jy: 10
Spectral index: 0.5

Size/arcmin: 80×60
Type: S

Radio: Distinct shell, with high polarisation.

Optical: Detected.

Distance: Association with H_I features implies 1.6 kpc.

References:

Reich & Braunsfurth 1981, A&A, 99, 17. Effelsberg 100-m at 2.7 GHz (4′4 : S = 4.7±0.4 Jy) and S_{1.4 GHz} = 8.0±0.8 Jy from 1.4 GHz survey data, plus H_I from Maryland–Green Bank survey.
 Fesen et al. 1997, AJ, 113, 767. Optical observations.
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Yar-Uyaniker et al. 2004, ApJ, 616, 247. CGPS at 1.4 GHz (49″×55″), including H_I (1′0×1′1).
 Mavromatakis et al. 2005, A&A, 435, 141. Optical observations.

Tian & Leahy 2006, ChJAA, 6, 543. CGPS at 408 MHz (3′4×3′8 : S = 15.0±1.5 Jy) and 1.4 GHz (1′0×1′1 : S = 10.6±0. Jy).
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz (~3′ : S = 12.5±1.6 Jy) and 1420 MHz (~1′ : S = 10.3±0.70 Jy), including polarisation and review of flux densities.
 Gao et al. 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′5 : S = 5.7±0.6 Jy), including polarisation and review of flux densities.

G116.6–26.1

RA: 00^h23^m00^s
Dec: +36°30′

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 235
Type: S

Radio: Faint arcs.

Optical: Faint filaments.

X-ray: Limb-brightened shell.

References:

Churazov et al. 2021, MNRAS, 507, 971. eROSITA observations.
 Churazov et al. 2022, MNRAS, 513, L83. LOFAR at 144 MHz.
 Palaologou et al. 2022, MNRAS, 515, 339. Optical observations, including spectroscopy.

G116.9+0.2

RA: 23^h59^m10^s
Dec: +62°26′

1-GHz flux/Jy: 8
Spectral index: 0.57

CTB 1
Size/arcmin: 34
Type: S

Has been called G117.3+0.1 and G116.9+0.1.

Radio: Incomplete shell.

Optical: Filaments on sky survey.

X-ray: Centrally brightened, with NE ‘breakout’.

Point sources: Pulsar outside rim to E, with radio tail.

Distance: Association with H_I features implies 1.6 kpc, optical extinction suggests 4.3 kpc.

References:

Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz ($S' : S = 3.9 \pm 1.0$ Jy), and 37-m at 1.7 GHz ($S = 5.5 \pm 2.0$ Jy), plus review of flux densities.
 van den Bergh et al. 1973, ApJS, 26, 19. Optical observations.
 Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz ($S' : S = 4.2 \pm 0.2$ Jy).
 Angerhofer et al. 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz ($6'8'' : S = 3.0 \pm 0.3$ Jy).
 Dickel & Willis 1980, A&A, 85, 55. WSRT at 610 MHz ($56'' \times 64''$) and 1.4 GHz ($22'' \times 25''$).
 Reich & Braunsfurth 1981, A&A, 99, 17. Effelsberg 100-m at 2.7 GHz ($4'4'' : S = 4.8 \pm 0.4$ Jy) and $S_{1.4 \text{ GHz}} = 7.8 \pm 0.8$ Jy from 1.4 GHz survey data, plus H_I from Maryland–Green Bank survey.
 Lozinskaya 1981, SvAL, 7, 17. Mean optical velocity.
 Landecker et al. 1982, AJ, 87, 1379. DRAO at 1.42 GHz and H_I ($2'0'' \times 2'3'' : S = 8.3 \pm 0.5$ Jy), plus review of flux densities. see also: Landecker et al. 1983, AJ, 88, 877. Erratum.
 Fesen et al. 1985, ApJ, 292, 29. Optical spectra.
 Hailey & Craig 1994, ApJ, 434, 635. Optical spectroscopy.
 Hailey & Craig 1995, ApJ, 455, L151. ROSAT of nearby pulsar.
 Fesen et al. 1997, AJ, 113, 767. Optical observations.
 Craig et al. 1997, ApJ, 488, 307. ROSAT observations.
 Reich 2002, in NSPS, p1. Effelsberg 100-m at 10.6 GHz ($69''$), including polarisation.

Yar-Uyaniker et al. 2004, ApJ, 616, 247. CGPS at 1.4 GHz ($49'' \times 55''$), including H_I ($1'0'' \times 1'1''$).
 Lazendic & Slane 2006, ApJ, 647, 350. X-ray observations.
 Tian & Leahy 2006, ChJAA, 6, 543. CGPS at 408 MHz ($3'4'' \times 3'8'' : S = 15.0 \pm 1.5$ Jy) and 1.4 GHz ($1'0'' \times 1'1'' : S = 8.1 \pm 0.4$ Jy).
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 10.5 \pm 0.8$ Jy) and 1420 MHz ($\sim 1' : S = 7.0 \pm 0.8$ Jy), including review of flux densities.
 Pannuti et al. 2010, AJ, 140, 1787. ASCA and Chandra observations.
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'5'' : S = 3.6 \pm 0.4$ Jy) including polarisation and review of flux densities.
 Clark et al. 2017, ApJ, 834, 106. Fermi pulsar detection.
 Wu et al. 2018, ApJ, 854, 99. Radio detection of pulsar.
 Zyuzin et al. 2018, MNRAS, 476, 2177. X-ray observations of pulsar.
 Katsuragawa et al. 2018, PASJ, 70, 110. Suzaku observations.
 Schinzel et al. 2019, ApJ, 876, L17. VLA observations of pulsar tail, and Fermi timings of pulsar.
 Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.
 Sett et al. 2021, A&A, 647, A183. Pulsar radio search.
 Bruzewski et al. 2023, ApJ, 958, 163. Pulsar proper motion.

G119.5+10.2

CTA 1

RA: 00^h06^m40^s
Dec: +72°45′**1-GHz flux/Jy:** 36
Spectral index: 0.6**Size/arcmin:** 90?
Type: S

Has been called G119.5+10.3.

Radio: Incomplete shell, with ‘breakout’ to NW.**Optical:** Faint diffuse nebulosities.**X-ray:** Centrally brightened.**Point sources:** Central pulsar.**Distance:** Associated H I shell indicates 1.4 kpc.**References:**

- Sieber et al. 1979, A&A, 74, 361. Effelsberg 100-m at 2.7 GHz (4′4″: $S = 23.6 \pm 2.8$ Jy).
- Sieber et al. 1981, A&A, 103, 393. Effelsberg 100-m at 2.7 GHz and 1.7 GHz (7′6″: $S = 31.6 \pm 2.5$ Jy), and 151 MHz (4′: $S = 62.6 \pm 6$ Jy).
- Fesen et al. 1981, ApJ, 247, 148. Optical, including spectra.
- Fesen et al. 1983, ApJS, 51, 337. Deep [OIII] imagery.
- Seward 1990, ApJS, 73, 781. Einstein observations.
- Simonetti 1992, ApJ, 386, 170. VLA observations of background sources for rotation measure studies.
- Pineault et al. 1993, AJ, 105, 1060. DRAO at 1.4 GHz (1′: $S = 34 \pm 4$ Jy), plus H I and IRAS.
- Seward et al. 1995, ApJ, 453, 284. ROSAT observations.
- Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
- Slane et al. 1997, ApJ, 485, 221. ASCA and ROSAT observations.
- Pineault et al. 1997, A&A, 324, 1152. DRAO at 408 MHz (3′5″ and 1.4 GHz (1′0″).
- Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
- Brazier et al. 1998, MNRAS, 295, 819. Studies of central, compact γ -ray source.
- Mavromatakis et al. 2000, A&A, 353, 371. Optical imagery.
- Roberts et al. 2001, ApJS, 133, 451. ASCA observations.
- Reich 2002, in NSPS, p1. Effelsberg 100-m at 1.4 GHz (9′4″).
- Slane et al. 2004, ApJ, 601, 1045. XMM-Newton observations of central source.
- Halpern et al. 2004, ApJ, 612, 398. Chandra observations of central nebula, plus optical and radio limits for compact source.
- Casandjian & Grenier 2008, A&A, 489, 849. γ -ray observations.
- Abdo et al. 2008, Science, 322, 1218. Fermi detection of pulsar.
- Lin et al. 2010, ApJ, 725, L1. XMM-Newton observations of pulsar.
- Caraveo et al. 2010, ApJ, 725, L6. XMM-Newton observations of pulsar.
- Sun et al. 2011, A&A, 535, A64. Urumqi 25-m at 4.8 GHz (9′5″: $S = 11.6 \pm 1.2$ Jy) and Effelsberg 100-m at 2.6 GHz (4′4″: $S = 20.3 \pm 2.0$ Jy) including polarisation.
- Lin et al. 2012, MNRAS, 426, 2283. Suzaku observations.
- Mignani et al. 2013, MNRAS, 430, 1354. Optical limits for pulsar.
- Aliu et al. 2013, ApJ, 764, 38. γ -ray observations.
- Li et al. 2016, ApJ, 831, 19. Fermi observations of pulsar.
- Ackermann et al. 2018, ApJS, 237, 32. Fermi observations.

G120.1+1.4

RA: 00^h25^m18^s
Dec: +64°09′

1-GHz flux/Jy: 50
Spectral index: 0.58

Tycho, 3C10, SN1572

Size/arcmin: 8
Type: S

This is the remnant of the Tycho’s SN of AD1572.

Radio: Shell, brightest to the NE.

Optical: Faint filaments/knots to the NNW, NE and E.

X-ray: Shell, brighter to the NE.

Point sources: Faint radio source near centre of the remnant, thought to be extragalactic.

Distance: H_i observations suggest 2.3–3 kpc, optical proper motion and shock velocity gives 2.4 kpc.

References:

- Duin & Strom 1975, A&A, 39, 33. WSRT at 610 MHz (57″×64″) and 5 GHz (7″×8″).
- Klein et al. 1979, A&A, 76, 120. Effelsberg 100-m at 10.7 GHz (1′2″:S=13.1±0.8 Jy), plus review of flux densities.
- Strom et al. 1982, MNRAS, 200, 473. WSRT at 1415 MHz (27″×31″) from 1971 and 1979, for expansion.
- Dickel et al. 1982, ApJ, 257, 145. Comparison of radio, X-ray and optical observations.
- Seward et al. 1983, ApJ, 266, 287. Einstein observations.
- Tan & Gull 1985, MNRAS, 216, 949. Radio at 2.7 GHz (4″) from 1980 and 1983, and One-Mile Telescope at 1.4 GHz (23″) from 1965 and 1980, for expansion.
- Albinson et al. 1986, MNRAS, 219, 427. H_i observations.
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- Schwarz et al. 1995, A&A, 299, 193. WSRT and Effelsberg 100-m at 1.4 GHz (50″), and VLA at 1.4 GHz (13″), for neutral hydrogen studies.
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- Reynoso et al. 1997, ApJ, 491, 816. VLA at 1.4 GHz (1′4″×1′5″) from 1984 and 1994 for expansion studies.
- Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
- Reynoso et al. 1999, AJ, 117, 1827. VLA at 1.4 GHz (13″), for H_i studies.
- Katz-Stone et al. 2000, ApJ, 529, 453. VLA at 333 MHz and 1.4 GHz (7″7″×9″5″), for spectral index studies.
- Hughes 2000, ApJ, 545, L53. ROSAT X-ray expansion.
- Decourchelle et al. 2001, A&A, 365, L218. XMM-Newton observations.
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- Douviou et al. 2001, A&A, 373, 281. ISO observations.
- Lee et al. 2004, ApJ, 605, L113. Observations of molecular clouds in vicinity.
- Warren et al. 2005, ApJ, 634, 376. Chandra observations.
- Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz (~3′:S=86±5 Jy) and 1420 MHz (~1′:S=40.5±1.5 Jy), including polarisation and review of flux densities.
- Cassam-Chenaï et al. 2007, ApJ, 665, 315. Chandra observations.
- Rest et al. 2008, ApJ, 681, L81. SN light echo.
- Krause et al. 2008, Nature, 456, 617. SN light echo spectrum.
- Hurley-Walker et al. 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
- Raymond et al. 2010, ApJ, 712, 901. H α spectroscopy.
- Lee et al. 2010, ApJ, 715, L146. H α observations.
- Hayato et al. 2010, ApJ, 725, 894. Suzaku observations of expansion.
- Ishihara et al. 2010, A&A, 521, L61. Akari observations.
- Tian & Leahy 2011, ApJ, 729, L15. H_i and CO observations.
- Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5″:S=20.0±2.0 Jy) including polarisation and review of flux densities.
- Giordano et al. 2012, ApJ, 744, L2. Fermi observations.
- Gomez et al. 2012, MNRAS, 420, 3557. Herschel IR dust observations.
- Williams et al. 2013, ApJ, 770, 129. Spitzer observations.
- Wang & Li 2014, ApJ, 789, 123. INTEGRAL observations.
- Troja et al. 2014, ApJ, 797, L6. Swift observations.
- Miceli et al. 2015, ApJ, 805, 120. XMM-Newton observations.
- Lu et al. 2015, ApJ, 805, 142. Chandra observations.
- Katsuda et al. 2015, ApJ, 808, 49. Suzaku observations.
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- Archambault et al. 2017, ApJ, 836, 23. γ -ray observations.
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- Ferrazzoli et al. 2023, ApJ, 945, 52. IXPE polarisation observations.
- Ellien et al. 2023, ApJ, 951, 103. Chandra observations.

G126.2+1.6

RA: 01^h22^m00^s
Dec: +64°15′

1-GHz flux/Jy: 6
Spectral index: 0.5

Size/arcmin: 70
Type: S?

Radio: Poorly defined shell.

Optical: Filaments, mostly in W.

References:

Reich et al. 1979, A&A, 78, L13. Effelsberg 100-m at 1.4 GHz (9′ : $S=6.8\pm0.7$ Jy) and 2.7 GHz (4′4″ : $S=3.9\pm0.4$ Jy).
 Blair et al. 1980, ApJ, 242, 592. Optical detection and spectra.
 Rosado 1982, RMxAA, 5, 127. Optical spectra.
 Fesen et al. 1983, ApJS, 51, 337. Deep [OIII] imagery.
 Fürst et al. 1984, A&A, 133, 11. Effelsberg 100-m at 2.7 GHz (4′4″) and 4.8 GHz (2′6″).
 Joncas et al. 1989, A&A, 219, 303. DRAO at 408 MHz (3′5″×3′9″ : $S=12\pm2.5$ Jy) and part at 1.4 GHz (1′0″×1′1″), plus review of flux densities.
 Xilouris et al. 1993, A&A, 270, 393. Optical imaging.
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Reich et al. 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz (14′5″ : $S=6.1\pm1.6$ Jy).

Boumis et al. 2005, A&A, 443, 175. Optical observations.
 Tian & Leahy 2006, A&A, 447, 205. CGPS at 408 MHz (3′4″×3′8″ : $S=9.7\pm3.9$ Jy) and 1.4 GHz (1′0″×1′1″ : $S=6.7\pm2.1$ Jy), plus other observations for spectral index studies.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$: $S=5.7\pm0.7$ Jy) and 1420 MHz ($\sim 1'$: $S=6.4\pm1.1$ Jy), including review of flux densities.
 Sun et al. 2007, A&A, 463, 993. Urumqi 25-m at 5 GHz (9′5″ : $S=2.6\pm0.6$ Jy), including polarisation.
 see also: Sun et al. 2007, A&A, 469, 1003. Erratum.
 Chen et al. 2023, AJ, 165, 16. CO observations of region.

G127.1+0.5

R5

RA: 01^h28^m20^s
Dec: +63°10′

1-GHz flux/Jy: 12
Spectral index: 0.45

Size/arcmin: 45
Type: S

Has been called G127.3+0.7.

Radio: Distinct shell, with bright central source.

Optical: Detected.

Point sources: Flat radio spectrum (extragalactic) source at centre of remnant.

Distance: 1.2–1.3 kpc if associated with NGC 559.

References:

Caswell 1977, MNRAS, 181, 789. Half-Mile Telescope at 1.42 GHz (3′5″×3′9″), plus other observations of central source.
 Pauls 1977, A&A, 59, L13. Effelsberg 100-m at 1.4 GHz (9′ : $S=8\pm1$ Jy).
 Salter et al. 1978, A&A, 66, 77. Effelsberg 100-m at 2.7 GHz (4′4″), plus 5 and 8.7 GHz of the central source.
 Reich et al. 1979, A&A, 78, L13. Effelsberg 100-m at 1.4 GHz (9′ : $S=10.8\pm1.3$ Jy).
 Pauls et al. 1982, A&A, 112, 120. WSRT at 610 MHz (56″×62″) and HI absorption to the point source with the VLA.
 Geldzahler & Shaffer 1982, ApJ, 260, L69. Observations of central source.
 Fürst et al. 1984, A&A, 133, 11. Effelsberg 100-m at 2.7 GHz (4′4″) and 4.8 GHz (2′6″).
 Goss & van Gorkom 1984, JApA, 5, 425. WSRT HI absorption of central source.

Joncas et al. 1989, A&A, 219, 303. DRAO at 408 MHz (3′5″×3′9″ : $S=17.9\pm2.0$ Jy) and 1.4 GHz (1′0″×1′13″ : $S=10.1\pm0.8$ Jy), plus review of flux densities.
 Xilouris et al. 1993, A&A, 270, 393. Optical imaging.
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Reich et al. 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz (14′5″ : $S=14.6\pm0.8$ Jy).
 Kaplan et al. 2004, ApJS, 153, 269. Chandra limits for any compact sources.
 Leahy & Tian 2006, A&A, 451, 251. CGPS at 408 MHz (3′4″×3′8″ : $S=17.1\pm1.7$ Jy) and 1.4 GHz (1′0″×1′2″ : $S=10.0\pm0.8$ Jy).
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$: $S=15.9\pm1.0$ Jy) and 1420 MHz ($\sim 1'$: $S=9.7\pm0.6$ Jy), including polarisation and review of flux densities.
 Sun et al. 2007, A&A, 463, 993. Urumqi 25-m at 5 GHz (9′5″ : $S=6.3\pm0.7$ Jy), including polarisation.
 see also: Sun et al. 2007, A&A, 469, 1003. Erratum.
 Zhou et al. 2014, ApJ, 791, 109. CO observations.
 Chen et al. 2023, AJ, 165, 16. CO observations of region.

G130.7+3.1

RA: 02^h05^m41^s
Dec: +64°49′

1-GHz flux/Jy: 33
Spectral index: 0.07

3C58, SN1181

Size/arcmin: 9×5
Type: F

This is the remnant of the SN of AD1181.

Radio: Filled-centre, highly polarised, with high frequency turnover.

Optical: Faint filaments.

X-ray: Centrally brightened, with faint jet.

Point sources: Central pulsar.

Distance: H_i absorption indicates 2 kpc.

References:

- Green et al. 1975, A&A, 44, 187. Effelsberg 100-m at 15.0 GHz (58″ : $S = 26.7 \pm 0.5$ Jy).
- Wilson & Weiler 1976, A&A, 49, 357. WSRT at 610 MHz (58″×64″), 1.4 GHz (24″×27″) and 5 GHz (7″×8″).
- van den Bergh 1978, ApJ, 220, L9. Optical observations.
- Becker et al. 1982, ApJ, 255, 557. X-ray observations.
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- Reynolds & Aller 1985, AJ, 90, 2312. VLA at 1.4 GHz (2′), for limits of shell.
- Davelaar et al. 1986, ApJ, 300, L59. EXOSAT spectrum.
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- Green 1987, MNRAS, 225, 11P. Flux density increase at 408 MHz.
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- Salter et al. 1989, ApJ, 338, 171. NRAO 12-m at 84.2 GHz (90″ : $S = 15.0 \pm 2.0$ Jy), plus review of flux densities.
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- Green & Scheuer 1992, MNRAS, 258, 833. IRAS upper limits.
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- Torii et al. 2000, PASJ, 52, 875. ASCA observations.
- Bietenholz et al. 2001, ApJ, 560, 772. VLA at 74 MHz (26″ : $S = 33.6$ Jy) and 327 MHz (8″2 : $S = 33.9$ Jy), for spectral index and expansion studies.
- Bocchino et al. 2001, A&A, 369, 1078. XMM-Newton observations.
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- Camilo et al. 2002, ApJ, 571, L41. Pulsar detection in radio.
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- Bietenholz 2006, ApJ, 645, 1180. VLA at 1.4 GHz (1″36) for expansion studies.
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- Gotthelf et al. 2007, ApJ, 654, 267. XMM-Newton observations.
- Slane et al. 2008, ApJ, 676, L33. Spitzer and other IR observations.
- Fesen et al. 2008, ApJS, 174, 379. Optical observations for proper motion studies.
- Shearer & Neustroev 2008, MNRAS, 390, 235. Optical observations of pulsar nebula.
- Shibanov et al. 2008, A&A, 486, 273. Optical observations of pulsar nebula.
- Abdo et al. 2009, ApJ, 699, L102. Fermi observations of pulsar.
- Livingstone et al. 2009, ApJ, 706, 1163. Pulsar observations.
- Hurley-Walker et al. 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
- Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5″ : $S = 31.7 \pm 3.0$ Jy) including polarisation and review of flux densities.
- Bietenholz et al. 2013, MNRAS, 431, 2590. Proper motion study of pulsar.
- Kothes et al. 2013, A&A, 560, A18. CGPS H_i observations for distance.
- Aleksić et al. 2014, A&A, 567, L8. γ -ray detection.
- Planck Collaboration: Arnaud et al. 2016, A&A, 586, A134. Planck flux densities at 7 frequencies between 30 and 353 GHz.
- Guest & Safi-Harb 2020, MNRAS, 498, 821. Chandra observations.
- Castelletti et al. 2021, A&A, 653, A62. VLA 74-MHz survey flux density.
- Millard et al. 2021, ApJS, 257, 36. ISO far-IR spectroscopy.

G132.7+1.3

HB3

RA: 02^h17^m40^s
Dec: +62°45′

1-GHz flux/Jy: 45
Spectral index: 0.6

Size/arcmin: 80
Type: S

Has been called G132.4+2.2.

Radio: Faint shell, adjacent to W3/4/5 complex.

Optical: Complete, filamentary shell, shock excited spectra.

X-ray: Partial shell.

Point sources: Pulsar nearby.

Distance: Interaction with surroundings gives 2 kpc.

References:

van den Bergh et al. 1973, ApJS, 26, 19. Optical observations.
 Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz ($5' : S = 33.8 \pm 7.0$ Jy).
 D'Odorico & Sabbadin 1977, A&AS, 28, 439. Optical spectra.
 Read 1981, MNRAS, 194, 863. Radio at 151 MHz (4'4) and 1.4 GHz (2') showing H_I shell.
 Lozinskaya 1981, SvAL, 7, 17. Mean optical velocity.
 Fesen & Gull 1983, PASP, 95, 196. Optical image.
 Leahy et al. 1985, ApJ, 294, 183. Einstein observations.
 Landecker et al. 1987, AJ, 94, 111. DRAO at 408 MHz ($3'5 \times 4' : S = 75 \pm 15$ Jy), plus review of flux densities.
 Routledge et al. 1991, A&A, 247, 529. DRAO at 1.4 GHz ($1'0 \times 1'1$) for H_I, plus CO observations.
 Fesen et al. 1995, AJ, 110, 2876. Optical imaging and spectroscopy, DRAO at 408 MHz ($3'5 \times 4'$) and 1.4 GHz ($1'0 \times 1'1$).
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Koralesky et al. 1998, AJ, 116, 1323. VLA detection of compact OH emission.
 Reich et al. 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz ($14'5 : S = 51.5 \pm 3.5$ Jy).

Tian & Leahy 2005, A&A, 436, 187. CGPS at 408 MHz ($3'4 \times 3'8 :$) and 1.4 GHz ($1'0 \times 1'1$), for spectral index studies. *see also:* Tian & Leahy 2006, A&A, 451, 991. Erratum.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 61 \pm 9$ Jy) and 1420 MHz ($\sim 1' : S = 29.4 \pm 2.7$ Jy), including review of flux densities.
 Lazendic & Slane 2006, ApJ, 647, 350. X-ray observations.
 Green 2007, BASI, 35, 77. Review of radio spectrum.
 Shi et al. 2008, A&A, 487, 601. Urumqi 25-m at 4.8 GHz (9'5), plus other survey observations for spectral studies.
 Casandjian & Grenier 2008, A&A, 489, 849. γ -ray observations.
 Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Katagiri et al. 2016, ApJ, 818, 114. Fermi observations.
 Zhou et al. 2016, ApJ, 833, 4. CO observations of region.
 Rho et al. 2021, ApJ, 917, 47. Spitzer and WISE H₂ plus CO observations.
 Boumis et al. 2022, MNRAS, 512, 1658. Optical observations, including spectroscopy.

G150.3+4.5

RA: 04^h27^m00^s
Dec: +55°28′

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 180×150
Type: S

Radio: Faint radio shell.

References:

Gao & Han 2014, A&A, 567, A59. Radio surveys at 1.4, 2.7 and 5 GHz (9'4, 4'3, 9'5).
 Tung et al. 2017, AJ, 154, 156. CGPS at 408 MHz (2'8×3'5).
 Ackermann et al. 2017, ApJ, 843, 139. Fermi observations.

Ackermann et al. 2018, ApJS, 237, 32. Fermi observations.
 Devin et al. 2020, A&A, 643, A28. Fermi observations and ROSAT limit.

G152.4–2.1

RA: 04^h07^m50^s
Dec: +49°11′

1-GHz flux/Jy: 3.5?
Spectral index: 0.7?

Size/arcmin: 100×95
Type: S

Has been called G152.5–2.21.

Radio: Bilateral shell.

Distance: Optical extinction suggests 0.6 kpc.

References:

Foster et al. 2013, A&A, 549, A107. Effelsberg 100-m at 2.7 GHz, including polarisation, plus various radio survey observations.
 Tung et al. 2017, AJ, 154, 156. CGPS at 408 MHz (2'8×3'5).
 Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.

G156.2+5.7

RA: 04^h58^m40^s
Dec: +51°50′

1-GHz flux/Jy: 5
Spectral index: 0.5

Size/arcmin: 110
Type: S

Radio: Faint shell, brighter in E and W.

Optical: Filamentary ring and smaller patchy ring.

X-ray: Faint shell.

Distance: Optical/X-ray observations imply >1.7 kpc, optical extinction suggests 0.7 kpc.

References:

Pfeffermann et al. 1991, A&A, 246, L28. ROSAT detection.
 Reich et al. 1992, A&A, 256, 214. Effelsberg 100-m at 1.4 (9′ :
 $S=4.2\pm1.0$ Jy) and 2.7 GHz (4′3″ : $S=3.0\pm1.0$ Jy), plus Hi and
 IRAS.
 Yamauchi et al. 1993, PASJ, 45, 795. Hard X-ray observations.
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Yamauchi et al. 1999, PASJ, 51, 13. ASCA observations of some
 regions.
 Reich 2002, in NSPS, p1. Effelsberg 100-m at 2.7 GHz, includ-
 ing polarisation.
 Pannuti & Allen 2004, AdSpR, 33, 434. ASCA and RXTE ob-
 servations.
 Kaplan et al. 2006, ApJS, 163, 344. X-ray upper limit on com-
 pact sources.

Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$:
 $S=8.1\pm1.3$ Jy), including review of flux densities.
 Xu et al. 2007, A&A, 470, 969. Urumqi 25-m at 4.8 GHz (9′5″ :
 $S=2.5\pm0.5$ Jy), including polarisation.
 Gerardy & Fesen 2007, MNRAS, 376, 929. Optical observa-
 tions.
 Katsuda et al. 2009, PASJ, 61, S155. Suzaku observations.
 Uchida et al. 2012, PASJ, 64, 61. Suzaku observations.
 Katsuda et al. 2016, ApJ, 826, 108. Multi-epoch H α observations
 for expansion.
 Tung et al. 2017, AJ, 154, 156. CGPS at 408 MHz (2′8″×3′5″).
 Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.
 Sett et al. 2021, A&A, 647, A183. Pulsar radio search.

G159.6+7.3

RA: 05^h20^m00^s
Dec: +50°00′

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 240×180?
Type: S

Radio: Not detected.

Optical: Large, faint shell.

X-ray: Possible emission.

References:

Fesen & Milisavljevic 2010, AJ, 140, 1163. H α and ROSAT ob-
 servations.

G160.9+2.6

HB9

RA: 05^h01^m00^s
Dec: +46°40′**1-GHz flux/Jy:** 110
Spectral index: 0.64**Size/arcmin:** 140×120
Type: S

Has been called G160.5+2.8 and G160.4+2.8.

Radio: Large, filamentary shell.**Optical:** Incomplete shell.**X-ray:** Centrally brightened.**Point sources:** Pulsar within boundary of the remnant, plus several nearby compact radio sources.**Distance:** Various observations suggests less than 4 kpc, optical extinction suggests 0.5 kpc.**References:**

D’Odorico & Sabbadin 1977, A&AS, 28, 439. Optical spectra.
 Damashek et al. 1978, ApJ, 225, L31. Pulsar.
 Lozinskaya 1981, SvAL, 7, 17. Mean optical velocity.
 Dwarakanath et al. 1982, JApA, 3, 207. Radio observations at 34.5 MHz (26′×40′ : $S = 750 \pm 150$ Jy), plus review of flux densities.
 van Gorkom et al. 1982, MNRAS, 198, 757. WSRT H α absorption to nearby point source.
 Seaquist & Gilmore 1982, AJ, 87, 378. VLA observations of nearby source.
 Leahy 1987, ApJ, 322, 917. Einstein observations.
 Leahy & Roger 1991, AJ, 101, 1033. DRAO at 408 MHz (3′5″×4′8″) and 1.4 GHz (1′0″×1′4″), including H α and discussion of distance.
 Yamauchi & Koyama 1993, PASJ, 45, 545. Hard X-ray observations.
 Leahy & Aschenbach 1995, A&A, 293, 853. ROSAT observations.
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
 Leahy et al. 1998, A&A, 339, 601. 232 MHz (3′8″×5′2″), 151 MHz (4′2″×5′8″) and Effelsberg 100-m at 4.7 GHz (2′5″) for spectral index studies.
 Roger et al. 1999, A&AS, 137, 7. 22 MHz flux density ($S = 1130 \pm 340$ Jy).

Reich et al. 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz (14′5″ : $S = 91 \pm 3$ Jy).
 Fürst & Reich 2004, in MIM, p141. Effelsberg 100-m at 1.4 and 2.7 GHz (9′3″), including polarisation.
 Kaplan et al. 2006, ApJS, 163, 344. X-ray upper limit on compact sources.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$: $S = 102 \pm 7$ Jy) and 1420 MHz ($\sim 1'$: $S = 54.0 \pm 2.9$ Jy), including polarisation and review of flux densities.
 Leahy & Tian 2007, A&A, 461, 1013. CGPS at 408 MHz (2′8″×3′9″ : $S = 117.8 \pm 5.3$ Jy) and 1.4 GHz (58″×80″ : $S = 65.9 \pm 3.4$ Jy).
 Gao et al. 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′5″ : $S = 34 \pm 3$ Jy), including polarisation and review of flux densities.
 Gosachinskii 2013, AstL, 39, 179. H α observations of region.
 Araya et al. 2014, MNRAS, 444, 860. Fermi detection.
 Tung et al. 2017, AJ, 154, 156. CGPS at 408 MHz (2′8″×3′5″).
 Sezer et al. 2019, MNRAS, 489, 4300. Suzaku observations.
 Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.
 Saito et al. 2020, PASJ, 72, 65. Suzaku observations.
 Oka & Ishizaki 2022, PASJ, 74, 625. Fermi observations.
 Jing et al. 2023, MNRAS, 523, 4949. FAST observations of pulsar, for distance.

G166.0+4.3

VRO 42.05.01

RA: 05^h26^m30^s
Dec: +42°56′**1-GHz flux/Jy:** 7
Spectral index: 0.37**Size/arcmin:** 55×35
Type: S**Radio:** Two arcs of strikingly different radii.**Optical:** Nearly complete ring.**X-ray:** Predominantly in SW.**Distance:** H α indicates 4.5 kpc, optical extinction suggests 3.2 kpc.**References:**

van den Bergh et al. 1973, ApJS, 26, 19. Optical observations.
 Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz (5′ : $S = 5.2 \pm 1.0$ Jy).
 Lozinskaya 1979, AuJPh, 32, 113. H α interferometry.
 Landecker et al. 1982, ApJ, 261, L41. DRAO at 1.4 GHz (1′0″×1′4″), plus review of flux densities.
 Fesen et al. 1983, ApJS, 51, 337. Deep [OIII] imagery.
 Pineault et al. 1985, A&A, 151, 52. VLA at 1.4 GHz (16″×20″) of part of remnant, and optical observations.
 Fesen et al. 1985, ApJ, 292, 29. Optical spectra.
 Braun & Strom 1986, A&AS, 63, 345. WSRT H α Observations.
 Pineault et al. 1987, ApJ, 315, 580. DRAO and VLA combined at 1.4 GHz (20″).
 Landecker et al. 1989, MNRAS, 237, 277. DRAO at 1.4 GHz (1′0″×1′4″), including H α .
 Burrows & Guo 1994, ApJ, 421, L19. ROSAT images and spectra.
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
 Guo & Burrows 1997, ApJ, 480, L51. ASCA observations.
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.

Leahy & Tian 2005, A&A, 440, 929. CGPS at 408 MHz (3′4″×5′0″) and 1.4 GHz (1′0″×1′4″), for spectral index studies. see also: Tian & Leahy 2006, A&A, 451, 991. Erratum.
 Kothes et al. 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3'$: $S = 8.1 \pm 0.9$ Jy) and 1420 MHz ($\sim 1'$: $S = 5.1 \pm 0.4$ Jy), including polarisation and review of flux densities.
 Bocchino et al. 2009, A&A, 498, 139. XMM-Newton observations.
 Gao et al. 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′5″ : $S = 3.3 \pm 0.3$ Jy), including polarisation and review of flux densities.
 Araya 2013, MNRAS, 434, 2202. Fermi observations.
 Matsumura et al. 2017, PASJ, 69, 30. Suzaku observations.
 Arias et al. 2019, A&A, 622, A6. LOFAR at 143 MHz (2′5″).
 Arias et al. 2019, A&A, 627, A75. CO observations of region.
 Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.
 Xiao et al. 2023, ApJ, 952, 94. FAST at 1240 MHz (4′), including polarisation.

G178.2–4.2

RA: 05^h25^m05^s
Dec: +28°11′

1-GHz flux/Jy: 2
Spectral index: 0.5

Size/arcmin: 72×62
Type: S

Radio: Faint shell, brighter in NE.

References:

Gao et al. 2011, A&A, 532, A144. Urumqi 25-m at 5 GHz (9′5 : S=1.0±0.1 Jy), plus other observations.

G179.0+2.6

RA: 05^h53^m40^s
Dec: +31°05′

1-GHz flux/Jy: 7
Spectral index: 0.4

Size/arcmin: 70
Type: S?

Radio: Thick shell, with background extragalactic sources near centre.

Optical: Nearly complete shell.

Point sources: Pulsar near centre.

References:

Fürst & Reich 1986, A&A, 154, 303. Effelsberg 100-m at 1.4 (9′4), 2.7 (4′3) and 4.75 GHz (2′4).
 Fürst et al. 1989, A&A, 223, 66. Observations of central, extragalactic source.
 Lorimer et al. 1998, A&A, 331, 1002. Pulsar search.
 Reich 2002, in NSPS, p1. Effelsberg 100-m at 2.7 GHz.

Gao et al. 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′5 : S = 3.2±0.3 Jy), including polarisation and review of flux densities.
 Jeong et al. 2012, Ap&SS, 342, 389. CO observations of region.
 Pletsch et al. 2013, ApJ, 779, L11. Pulsar detection.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 How et al. 2018, MNRAS, 478, 1987. Optical observations.

G180.0–1.7

S147

RA: 05^h39^m00^s
Dec: +27°50′

1-GHz flux/Jy: 65
Spectral index: varies

Size/arcmin: 180
Type: S

Radio: Large faint shell, with spectral break.

Optical: Wispy ring.

X-ray: Possible detection.

Point sources: Pulsar within boundary, with faint wind nebula.

Distance: Various observations suggest about 1.2 kpc.

References:

van den Bergh et al. 1973, ApJS, 26, 19. Optical observations.
 Sofue et al. 1980, PASJ, 32, 1. Effelsberg 100-m at 5 GHz (2′6) of parts.
 Kundu et al. 1980, A&A, 92, 225. Effelsberg 100-m at 2.7 GHz (5′5 : S=34.9±4 Jy) and 1.6 GHz (10′ : S=60.2±6 Jy).
 Angerhofer & Kundu 1981, AJ, 86, 1003. Arecibo at 430 MHz (9′ : S=97±20 Jy).
 Fürst et al. 1982, A&A, 115, 428. Observations of compact radio sources near the remnant.
 Fesen et al. 1985, ApJ, 292, 29. Optical spectra.
 Fürst & Reich 1986, A&A, 163, 185. Effelsberg 100-m at 1.4, 2.7 and 4.7/5.0 GHz (9′4, 4′3 and 2′4/2′6).
 Sauvageot et al. 1990, A&A, 227, 183. EXOSAT possible detection.
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
 Anderson et al. 1996, ApJ, 468, L55. Pulsar detection.
 Reich 2002, in NSPS, p1. Effelsberg 100-m at 2.7 GHz.
 Reich et al. 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz (14′5 : S=77±10 Jy).
 Romani & Ng 2003, ApJ, 585, L41. Chandra of pulsar.
 Kramer et al. 2003, ApJ, 593, L31. Pulsar observations.

Sallmen & Welsh 2004, A&A, 426, 555. Optical absorption towards background stars.
 Drew et al. 2005, MNRAS, 362, 753. H α imaging.
 Ng et al. 2007, ApJ, 654, 487. Pulsar and wind nebula observations.
 Xiao et al. 2008, A&A, 482, 783. Urumqi 25-m at 4.8 GHz (9′5 : S = 15.4±3.0 Jy) and Effelsberg 100-m at 2.6 GHz (4′4 : S=34.6±4.0 Jy).
 Jeong et al. 2012, Ap&SS, 342, 389. CO observations of region.
 Katsuta et al. 2012, ApJ, 752, 135. Fermi observations.
 Dinçel et al. 2015, MNRAS, 448, 3196. Identification of OB runaway star near centre.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Boubert et al. 2017, A&A, 606, A14. Gaia search for runaway progenitor companion.
 Chen et al. 2017, MNRAS, 472, 3924. Optical and IR observations, including distance.
 Ren et al. 2018, RAA, 18, 111. Optical spectroscopy.
 Greimel et al. 2021, A&A, 655, A49. H α image.
 Yao et al. 2021, NatAs, 5, 788. FAST observations for pulsar motion.

G181.1+9.5

RA: 06^h26^m40^s
Dec: +32°30′

1-GHz flux/Jy: 0.4?
Spectral index: 0.4?

Size/arcmin: 74
Type: S

Radio: Faint shell.

X-ray: Detected.

Distance: H_I observations suggest 0.5–2.5 kpc.

References:

Kothes et al. 2017, A&A, 597, A116. DRAO at 1.4 GHz (50″×90″) including H_I and Effelsberg 100-m at 4850 MHz (2′45) including polarisation, plus ROSAT survey observations.

G182.4+4.3

RA: 06^h08^m10^s
Dec: +29°00′

1-GHz flux/Jy: 0.5
Spectral index: 0.4

Size/arcmin: 50
Type: S

Radio: Incomplete shell.

Optical: Brighter in S and NW.

X-ray: Diffuse emission.

Distance: Optical extinction suggests 1.1 kpc.

References:

Kothes et al. 1998, A&A, 331, 661. Effelsberg 100-m at 1.4, 2.7, 4.9 and 10.5 GHz (9′4 : $S = 0.36 \pm 0.08$ Jy, 4′4 : $S = 0.25 \pm 0.04$ Jy, 2′5 : $S = 0.20 \pm 0.02$ Jy and 1′2 : $S = 0.15 \pm 0.03$ Jy), plus X-ray upper limit.
 Reich 2002, in NSPS, p1. Effelsberg 100-m at 2.7 GHz and 4.9 GHz (3′).
 Sun et al. 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5 : $S = 0.26 \pm 0.5$ Jy) including polarisation and review of flux densities.

Sezer et al. 2012, MNRAS, 427, 1168. Optical and XMM-Newton observations.
 Jeong et al. 2012, Ap&SS, 342, 389. CO observations of region.
 Fesen et al. 2019, MNRAS, 486, 4701. Optical observations.
 Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.

G184.6–5.8

RA: 05^h34^m31^s
Dec: +22°01′

1-GHz flux/Jy: 900
Spectral index: 0.30

Crab Nebula, 3C144, SN1054

Size/arcmin: 7×5
Type: F

This is the remnant of the SN of AD1054.

Radio: Filled-centre, central pulsar, with faint ‘jet’ (or tube) extending from the N edge; shows secular decline.

Optical: Strongly polarised filaments, diffuse synchrotron emission, with ‘jet’ faintly visible.

X-ray: Central ‘torus’ around the pulsar.

Point sources: Pulsar powering the remnant.

Distance: Pulsar parallax gives 1.9 kpc.

References:

- Velusamy 1984, *Nature*, 308, 251. VLA at 1.4 GHz, radio detection of ‘jet’.
- Velusamy 1985, *MNRAS*, 212, 359. VLA at 1.4 GHz (15’’).
- Aller & Reynolds 1985, *ApJ*, 293, L73. Radio flux density decrease.
- Fesen & Gull 1986, *ApJ*, 306, 259. Deep [OIII] imagery of ‘jet’.
- Marcelin et al. 1990, *A&A*, 228, 471. Optical of ‘jet’.
- Bietenholz & Kronberg 1990, *ApJ*, 357, L13. VLA at 1.4 GHz (1’’).
- Hester et al. 1990, *ApJ*, 357, 539. Optical and IR images.
- Hickson & van den Bergh 1990, *ApJ*, 365, 224. Optical polarisation.
- Bietenholz & Kronberg 1992, *ApJ*, 393, 206. VLA at 1.5 and 5 GHz (1’’8) and 1.5 and 14 GHz (6’’5) for spectral studies.
- Fesen & Staker 1993, *MNRAS*, 263, 69. [OIII] imaging of ‘jet’, and proper motion studies.
- Kassim et al. 1993, *AJ*, 106, 2218. VLA at 74 MHz (20’’).
- Véron-Cetty & Woltjer 1993, *A&A*, 270, 370. Continuum and [OIII] photometry.
- Wallace et al. 1994, *A&A*, 286, 565. H α of surroundings.
- Frail et al. 1995, *ApJ*, 454, L129. VLA at 333 MHz (20’’) for limits on shell.
- Bietenholz et al. 1997, *ApJ*, 490, 291. Comparison of VLA observations at 74 MHz, 327 MHz, 1.5 GHz and 5 GHz for spectral index studies.
- Blair et al. 1997, *ApJS*, 109, 473. HST imaging.
- Fesen et al. 1997, *AJ*, 113, 354. Limits on H α halo.
- Nugent 1998, *PASP*, 110, 831. Optical expansion.
- Sankrit et al. 1998, *ApJ*, 504, 344. HST images.
- Wallace et al. 1999, *ApJS*, 124, 181. DRAO at 1.4 GHz (1’0×2’8), plus Effelsberg 100-m, for H α studies.
- Greiveldinger & Aschenbach 1999, *ApJ*, 510, 305. X-ray variability of torus.
- Weisskopf et al. 2000, *ApJ*, 536, L81. Chandra observations.
- Sollerman et al. 2000, *ApJ*, 537, 861. HST observations.
- Aharonian et al. 2000, *ApJ*, 539, 317. H.E.S.S. observations.
- Willingale et al. 2001, *A&A*, 365, L212. XMM-Newton observations.
- Douvion et al. 2001, *A&A*, 373, 281. ISO observations.
- Bietenholz et al. 2001, *ApJ*, 560, 254. Multi-epoch VLA observations, showing variations near the pulsar.
- Bandiera et al. 2002, *A&A*, 386, 1044. 1.3 mm observations.
- Hester et al. 2002, *ApJ*, 577, L49. HST and Chandra multi-epoch observations.
- Atkins et al. 2003, *ApJ*, 595, 803. γ -ray observations.
- Green et al. 2004, *MNRAS*, 355, 1315. Sub-mm and ISO observations.
- Mori et al. 2004, *ApJ*, 609, 186. Chandra observations.
- Čadež et al. 2004, *ApJ*, 609, 797. Optical observations.
- Bietenholz et al. 2004, *ApJ*, 615, 794. VLA at 5 GHz (1’’4) and HST multi-epoch observation for proper motion studies.
- Melatos et al. 2005, *ApJ*, 633, 931. Multi-epoch near-IR observations central region.
- Seward et al. 2006, *ApJ*, 636, 873. Chandra observations of scattering halo.
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- see also: Temim et al. 2009, *AJ*, 137, 5155. Erratum.
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- Ritacco et al. 2018, *A&A*, 616, A35. Observations 150 GHz (18’’), including polarisation.
- de Gasperin et al. 2020, *A&A*, 635, A150. LOFAR at 30 to 77 MHz (8’’×11’’).
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G189.1+3.0

RA: 06^h17^m00^s
Dec: +22°34′

1-GHz flux/Jy: 165
Spectral index: 0.36

IC443, 3C157

Size/arcmin: 45
Type: C

Overlaps G189.6+3.3.

Radio: Limb-brightened to NE, with faint extension to the E.

Optical: Brightest to the NE, with faint filaments outside the NE boundary.

X-ray: Shell, brightest to the NE, plus compact source with nebula.

Point sources: X-ray source and nebula in S.

Distance: Optical observations imply 1.9 kpc, optical extinction suggests 1.8 kpc.

References:

- Fesen 1984, ApJ, 281, 658. Optical of filament to far NE.
 Erickson & Mahoney 1985, ApJ, 290, 596. TPT at 4 frequencies between 31 and 74 MHz (11′×13′ to 4′7×5′4), plus review of flux densities.
 Braun & Strom 1986, A&A, 164, 193. WSRT at 327 MHz (72″×185″) and 1.4 GHz (17″×43″), plus H_i and IRAS.
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 Hewitt et al. 2006, ApJ, 652, 1288. GBT at 1.6 and 1.7 GHz (7′2) for OH, and VLA at 330 MHz (64″×74″).
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 Albert et al. 2007, ApJ, 664, L87. γ -ray observations.
 Troja et al. 2008, A&A, 485, 777. XMM-Newton observations.
 Casandjian & Grenier 2008, A&A, 489, 849. γ -ray observations.
 Bykov et al. 2008, ApJ, 676, 1050. XMM-Newton, Chandra and Spitzer observations.
 Hewitt et al. 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
 Lee et al. 2008, AJ, 135, 796. VLA at 1.4 GHz (39″×42″) including H_i.
 Bocchino et al. 2008, AdSpR, 41, 396. INTEGRAL observations.
 Bocchino et al. 2009, A&A, 498, 139. XMM-Newton observations.
 Acciari et al. 2009, ApJ, 698, L133. γ -ray observations.
 Yamaguchi et al. 2009, ApJ, 705, L6. Suzaku observations.
 Koo et al. 2010, AJ, 140, 262. H_i Zeeman splitting observations.
 Gao et al. 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′5″:S=85±9 Jy), including polarisation and review of flux densities.
 Castelletti et al. 2011, A&A, 534, A21. VLA at 74 MHz (35″ : S=470±51 Jy) and 330 MHz (17″ : S=248±15 Jy), plus review of flux densities.
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 Taylor et al. 2012, ApJ, 750, L15. Optical absorption of background stars.
 Yuan et al. 2012, ApJ, 753, 126. Spitzer spectroscopy.
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 Kokusho et al. 2013, ApJ, 768, L8. IR observations of [FeII], plus Akari and Spitzer observations.
 Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.
 Ohnishi et al. 2014, ApJ, 784, 74. Suzaku observations.
 Yamaguchi et al. 2014, ApJ, 785, L27. Suzaku observations.
 Su et al. 2014, ApJ, 788, 122. CO observations.
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 Kokusho et al. 2015, P&SS, 116, 92. IR [FeII] observations.
 Planck Collaboration: Arnaud et al. 2016, A&A, 586, A134. Planck flux densities at 9 frequencies between 30 and 857 GHz.
 Kilpatrick et al. 2016, ApJ, 816, 1. CO observations, including broad lines.
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 McEwen et al. 2016, ApJ, 826, 189. NH₃ and CH₃OH observations.
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 Nobukawa et al. 2019, PASJ, 71, 115. Suzaku observations of FeI emission.
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 Dell’Ova et al. 2020, A&A, 644, A64. CO observations of part.
 Kokusho et al. 2020, ApJ, 899, 49. [FeII] and H₂ IR observations.
 Okon et al. 2021, ApJ, 921, 99. XMM-Newton spectroscopy.
 Millard et al. 2021, ApJS, 257, 36. ISO far-IR spectroscopy.
 Cosentino et al. 2022, MNRAS, 511, 953. Molecular line observations.
 Li et al. 2022, ApJ, 927, 226. Spitzer, WISE, IRAS, Akari and Planck observations of dust.
 Camilloni & Becker 2023, A&A, 680, A83. eROSITA observations.
 Deng et al. 2023, MNRAS, 518, 2320. IR observations of SE.
 Tramonte et al. 2023, MNRAS, 519, 3432. Radio observations, and review of radio spectrum.

G189.6+3.3

RA: 06^h19^m40^s
Dec: +22°00′

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 90?
Type: S

Overlaps G189.1+3.0 (=IC443).

Radio: Faint emission, not well defined.

Optical: Possible optical filaments.

X-ray: Faint, diffuse ring.

Distance: Association with optical filaments suggests 1.5 kpc.

References:

Fesen 1984, ApJ, 281, 658. Optical filaments in region.
 Braun & Strom 1986, A&A, 164, 193. WSRT at 327 MHz
 (72″×185″) and 1.4 GHz (17″×43″), plus Hi and IRAS.
 Asaoka & Aschenbach 1994, A&A, 284, 573. ROSAT observa-
 tions.
 Leahy 2004, AJ, 127, 2277. DRAO observations.
 Troja et al. 2006, ApJ, 649, 258. XMM observations.
 Lee et al. 2008, AJ, 135, 796. VLA and Arecibo at 1.4 GHz.

Castelletti et al. 2011, A&A, 534, A21. VLA at 74 and 330
 MHz.
 Hurley-Walker et al. 2019, PASA, 36, e048. MWA at 72 to 231
 MHz (~2′).
 Yamauchi et al. 2020, PASJ, 72, 81. Suzaku observations.
 Camilloni & Becker 2023, A&A, 680, A83. eROSITA observa-
 tions.

G190.9–2.2

RA: 06^h01^m55^s
Dec: +18°24′

1-GHz flux/Jy: 1.3?
Spectral index: 0.7?

Size/arcmin: 70×60
Type: S

Radio: Incomplete shell.

Distance: Association with dust and optical extinction suggest about 1 kpc.

References:

Foster et al. 2013, A&A, 549, A107. Various radio survey obser-
 vations.
 Yu et al. 2019, MNRAS, 488, 3129. Study of nearby dust.
 Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.

G203.1+6.6

RA: 06^h57^m00^s
Dec: +11°40′

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 150
Type: S

Radio: Faint incomplete shell.

References:

Reich 2002, NSPS, conf. 1. Effelsberg 100-m at 1.4 GHz.
 Soberski et al. 2005, ASPC, 343, 286. Effelsberg 100-m at
 1.4 GHz.
 Gao et al. 2022, SCPMA, 65, 129705. FAST at 1.0 to 1.5 GHz
 (4′), plus polarisation at 1.4 GHz (5′).

G205.5+0.5

RA: 06^h39^m00^s
Dec: +06°30′

1-GHz flux/Jy: 140
Spectral index: 0.4

Monoceros Nebula

Size/arcmin: 220
Type: S

Radio: In complex region, parts may be H_{II} regions.

Optical: Large ring, near Rosette nebula.

X-ray: Possibly detected.

Distance: Association with molecular cloud suggests 1.6 to 2.0 kpc, association with dust or and optical extinction suggests about 1.1 kpc.

References:

Milne & Dickel 1974, *AJPh*, 27, 549. Parkes 64-m at 2.7 GHz (9').
 Velusamy & Kundu 1974, *A&A*, 32, 375. NRAO 300-ft at 2.7 GHz (5'), part only.
 Dickel & DeNoyer 1975, *AJ*, 80, 437. Arecibo at 111 MHz (1' : $S=462\pm180$ Jy) and S_{610} MHz = 245 Jy.
 Davies et al. 1978, *A&AS*, 31, 271. Deep optical plates.
 Lozinskaya 1981, *SvAL*, 7, 17. Mean optical velocity.
 Graham et al. 1982, *A&A*, 109, 145. Effelsberg 100-m at 2.7 GHz (4.4 : $S=97.6\pm12.5$ Jy), plus review of flux densities.
 Fesen et al. 1985, *ApJ*, 292, 29. Optical spectra.
 Leahy et al. 1986, *MNRAS*, 220, 501. Einstein observations.
 Odegard 1986, *ApJ*, 301, 813. TPT at 20.6, 25.6 and 30.9 MHz (24', 19' and 16').
 Esposito et al. 1996, *ApJ*, 461, 820. Possible associated γ -ray emission.
 Biggs & Lyne 1996, *MNRAS*, 282, 691. Pulsar search.
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Jaffe et al. 1997, *ApJ*, 484, L129. γ -ray detection.
 Aharonian et al. 2004, *A&A*, 417, 973. H.E.S.S. limit.
 Kaplan et al. 2006, *ApJS*, 163, 344. X-ray upper limit on compact sources.
 Casandjian & Grenier 2008, *A&A*, 489, 849. γ -ray observations.
 Xiao & Zhu 2012, *A&A*, 545, A86. Review of radio, H_I and H α observations.
 Dirks & Meyer 2016, *ApJ*, 819, 45. Time variation of optical line absorption.
 Katagiri et al. 2016, *ApJ*, 831, 106. Fermi observations.
 Acero et al. 2016, *ApJS*, 224, 8. Fermi observations.
 Boubert et al. 2017, *A&A*, 606, A14. Gaia search for runaway progenitor companion.
 Su et al. 2017, *ApJ*, 836, 211. CO observations.
 Zhao et al. 2018, *ApJ*, 855, 12. IR observations.
 Yu et al. 2019, *MNRAS*, 488, 3129. Study of nearby dust.
 Zhao et al. 2020, *ApJ*, 891, 137. Optical extinction for distance.
 Sofue et al. 2021, *ApJS*, 253, 17. Nobeyama 45-m CO observations (20'') of region.

G206.7+5.9

RA: 07^h01^m00^s
Dec: +08°10′

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 210
Type: S

Radio: Faint incomplete shell.

Distance: Possible association with H_I suggests 440 pc.

References:

Reich 2002, *NSPS*, conf. 1. Effelsberg 100-m at 1.4 GHz.
 Soberski et al. 2005, *ASPC*, 343, 286. Effelsberg 100-m at 1.4 GHz.
 Gao et al. 2022, *SCPMA*, 65, 129705. FAST at 1.0 to 1.5 GHz (4'), plus polarisation at 1.4 GHz (5'), and H_I observations.

G206.9+2.3

RA: 06^h48^m40^s
Dec: +06°26′

1-GHz flux/Jy: 6
Spectral index: 0.5

PKS 0646+06

Size/arcmin: 60×40
Type: S?

Radio: Diffuse source near the Monoceros Nebula.

Optical: Filaments detected.

X-ray: Possibly detected.

Distance: Optical extinction suggests about 0.9 kpc.

References:

Davies & Meaburn 1978, *A&A*, 69, 443. Optical observations.
 Nousek et al. 1981, *ApJ*, 248, 152. HEAO-1 X-ray limit.
 Graham et al. 1982, *A&A*, 109, 145. Effelsberg 100-m at 2.7 GHz (4.4 : $S=4.1\pm0.6$ Jy), plus review of flux densities.
 Rosado 1982, *RMxAA*, 5, 127. Optical observations.
 Fesen et al. 1985, *ApJ*, 292, 29. Optical spectra.
 Leahy 1986, *A&A*, 156, 191. Einstein observations.
 Odegard 1986, *ApJ*, 301, 813. TPT at 20.6, 25.6 and 30.9 MHz (24', 19' and 16').

Biggs & Lyne 1996, *MNRAS*, 282, 691. Pulsar search.
 Gao et al. 2011, *A&A*, 529, A159. Urumqi 25-m at 5 GHz (9.5 : $S=2.9\pm0.3$ Jy), including polarisation and review of flux densities.
 Ambrocio-Cruz et al. 2014, *RMxAA*, 50, 323. [Sn] spectroscopy.
 Su et al. 2017, *ApJ*, 836, 211. CO observations.
 Zhao et al. 2020, *ApJ*, 891, 137. Optical extinction for distance.

G213.0–0.6**RA:** 06^h50^m50^s**Dec:** –00°30′**1-GHz flux/Jy:** 21**Spectral index:** 0.4**Size/arcmin:** 160×140?**Type:** S

Has also been called G213.3–0.4.

Radio: Large, faint shell.

Optical: Filamentary shell.

Point sources: Central X-ray source.

Distance: Association with molecular cloud or dust and optical extinction suggest about 1 kpc.

References:

Reich et al. 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz
(14′.5: $S=22.0\pm3.7$ Jy).

Stupar & Parker 2012, MNRAS, 419, 1413. H α , radio survey
and other observations.

Su et al. 2017, ApJ, 836, 211. CO observations.

Yu et al. 2019, MNRAS, 488, 3129. Study of nearby dust.

Zhao et al. 2020, ApJ, 891, 137. Optical extinction for distance.

Sofue et al. 2021, ApJS, 253, 17. Nobeyama 45-m CO observa-
tions (20′′) of region.

G249.5+24.5**RA:** 09^h34^m00^s**Dec:** –17°00′**1-GHz flux/Jy:** 27**Spectral index:** 0.7**Size/arcmin:** 260**Type:** S

Hoinga

Radio: Faint limb-brightened shell.

X-ray: Extended emission.

References:

Becker et al. 2021, A&A, 648, A30. eROSITA detection, and
various survey observations.

G260.4–3.4

RA: 08^h22^m10^s
Dec: –43°00′

1-GHz flux/Jy: 130
Spectral index: 0.5

Puppis A, MSH 08–44

Size/arcmin: 60×50
Type: S

This remnant overlaps the Vela SNR (G263.9–3.3).

Radio: Angular shell, brightest to the E, poorly defined to the W.

Optical: Nebulosity and wisps.

X-ray: Brightest to the E.

Point sources: Central possible pulsating X-ray source.

Distance: Association with H_I implies 1.3 kpc.

References:

- Green 1971, *AuJPh*, 24, 773. Molonglo at 408 MHz (3′ : $S = 198 \pm 20$ Jy).
- Goudis & Meaburn 1978, *A&A*, 62, 283. H α + [NII] optical image.
- Petre et al. 1982, *ApJ*, 258, 22. Einstein observations.
- Milne et al. 1983, *MNRAS*, 204, 237. FIRST at 1415 MHz (50′′), large scale emission missing.
- Teske & Petre 1987, *ApJ*, 318, 370. Coronal optical line emission.
- Dubner & Arnal 1988, *A&AS*, 75, 363. H_I and CO observations of surroundings.
- Arendt et al. 1990, *ApJ*, 350, 266. MOST at 843 MHz (44′′×65′′), with large scale emission added, plus IR, optical and X-ray observations.
- Dubner et al. 1991, *AJ*, 101, 1466. VLA at 327 MHz (43′′×73′′) and 1.5 GHz (43′′×77′′).
- Arendt et al. 1991, *ApJ*, 368, 474. IR observations.
- Milne et al. 1993, *MNRAS*, 261, 366. Parkes 64-m at 4.75 (4′5 : $S = 59 \pm 5$ Jy) and 8.4 GHz (3′ : $S = 38 \pm 4$ Jy), plus polarisation.
- Berthiaume et al. 1994, *ApJ*, 425, 132. X-ray spectroscopy.
- Sutherland & Dopita 1995, *ApJ*, 439, 365. Spectrophotometry.
- Reynoso et al. 1995, *AJ*, 110, 318. VLA at 1.4 GHz (90′′) including neutral hydrogen.
- Blair et al. 1995, *ApJ*, 454, L35. Far UV spectroscopy.
- Petre et al. 1996, *ApJ*, 465, L43. ROSAT of central source.
- Bock et al. 1998, *AJ*, 116, 1886. MOST at 843 MHz (43′′×60′′).
- Pavlov et al. 1999, *ApJ*, 511, L45. Possible pulsation detection from central X-ray source.
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- Bocchino et al. 2000, *A&A*, 359, 316. Optical studies of selected filaments in N.
- Woermann et al. 2000, *MNRAS*, 317, 421. OH observations.
- Gaensler et al. 2000, *ApJ*, 537, L35. Radio limit for nebula around possible pulsar.
- Reynoso et al. 2003, *MNRAS*, 345, 671. ATCA at 1.4 GHz (90′′) for H_I near central X-ray source.
- Hwang et al. 2005, *ApJ*, 635, 355. Chandra observations of E edge.
- Hui & Becker 2006, *A&A*, 454, 543. XMM-Newton and Chandra observations.
- Hui & Becker 2006, *A&A*, 457, L33. Chandra proper motion study of central source.
- Castelletti et al. 2006, *A&A*, 459, 535. VLA at 1.4 GHz (16′′×34′′ : $S = 114 \pm 8$ Jy) and 327 MHz (45′′×90′′ : $S = 263 \pm 20$ Jy).
- Winkler & Petre 2007, *ApJ*, 670, 635. Chandra proper motion study of central source.
- Paron et al. 2008, *A&A*, 480, 439. CO observations of E.
- Hwang et al. 2008, *ApJ*, 676, 378. Suzaku observations.
- Katsuda et al. 2008, *ApJ*, 678, 297. XMM-Newton observations.
- Mignani et al. 2009, *A&A*, 500, 1211. Optical limits for compact X-ray source.
- Katsuda et al. 2010, *ApJ*, 714, 1725. Chandra and XMM-Newton observations.
- Arendt et al. 2010, *ApJ*, 725, 585. Spitzer observations.
- Becker et al. 2012, *ApJ*, 755, 141. Chandra proper motion study of central X-ray source.
- Katsuda et al. 2012, *ApJ*, 756, 49. XMM-Newton spectroscopy.
- Hewitt et al. 2012, *ApJ*, 759, 89. Fermi and WMAP 23 to 90 GHz observations.
- Dubner et al. 2013, *A&A*, 555, A9. XMM-Newton and Chandra observations.
- Katsuda et al. 2013, *ApJ*, 768, 182. XMM-Newton observations.
- H.E.S.S. Collaboration: Abramowski et al. 2015, *A&A*, 575, A81. H.E.S.S. limit.
- Reynoso & Walsh 2015, *MNRAS*, 451, 3044. ATCA at 1.4 GHz (51′′×82′′) and 1.7 GHz for spectral index study.
- Planck Collaboration: Arnaud et al. 2016, *A&A*, 586, A134. Planck flux densities at 4 frequencies between 30 and 100 GHz.
- Luna et al. 2016, *A&A*, 590, A70. XMM-Newton and Chandra observations.
- Koo et al. 2016, *ApJ*, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
- Acero et al. 2016, *ApJS*, 224, 8. Fermi observations.
- Reynoso et al. 2017, *MNRAS*, 464, 3029. ATCA at 1.4 GHz including H_I.
- García et al. 2017, *A&A*, 604, L5. XMM-Newton observations of SW.
- Slane et al. 2018, *ApJ*, 865, 86. XMM-Newton and Chandra observations of Vela X.
- Reynoso et al. 2018, *MNRAS*, 477, 2087. ATCA at 1.3 to 2.6 GHz, including polarisation.
- Mayer et al. 2020, *ApJ*, 899, 138. Proper motion study of compact source.
- Mayer & Becker 2021, *A&A*, 651, A40. Multi-epoch Chandra observations for proper motion of compact source.
- Mayer et al. 2022, *A&A*, 661, A31. eROSITA observations.
- Krivonos et al. 2022, *MNRAS*, 510, 3113. X-ray observations.
- Aruga et al. 2022, *ApJ*, 938, 94. CO and H_I observations.

G261.9+5.5		
RA: 09 ^h 04 ^m 20 ^s	1-GHz flux/Jy: 10?	Size/arcmin: 40×30
Dec: −38°42′	Spectral index: 0.4?	Type: S
Radio: Faint shell with little limb brightening.		
References:		
Hill 1967, AuJPh, 20, 297. Parkes 64-m at 2650 MHz (7.5 : S = 7 Jy) also $S_{1410\text{ MHz}}=8\text{ Jy}$, $S_{81.5\text{ MHz}}=25\text{ Jy}$.		
Colomb & Dubner 1980, A&A, 82, 244. Argentine 30-m dish at 1.4 GHz, for H I possibly associated with remnant.		
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×71″).		
Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.		

G263.9–3.3

RA: 08^h34^m00^s
Dec: –45°50′

1-GHz flux/Jy: 1750
Spectral index: varies

Vela (XYZ)

Size/arcmin: 255
Type: C

This refers to the whole Vela XYZ complex, of which X has at times been classified as a separate (filled-centre) remnant. This remnant is overlapped by G260.4–3.4 and G266.2–1.2.

Radio: Large shell, with flatter spectrum component (Vela X), and pulsar nebula.

Optical: Filaments.

X-ray: Patchy shell, with extensions, central nebula and pulsar.

Point sources: Pulsar within Vela X, with one-sided ‘jet’.

Distance: Vela pulsar parallax gives 0.3 kpc, optical spectra and H_i studies suggest 0.25 kpc.

References:

- Milne 1968, *AuJPh*, 21, 201. Parkes 64-m at various frequencies, including 408 MHz (48′ : $S = 2300 \pm 300$ Jy), 635 MHz (31′ : $S = 2360 \pm 300$ Jy), 1410 MHz (14′ : $S = 1640 \pm 300$ Jy) and 2650 MHz (7.5′ : $S = 1400 \pm 250$ Jy), plus discussion of the distance.
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- Kameswara Rao et al. 2020, *MNRAS*, 493, 497. Time variation of optical absorption to background stars.
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- Mayer et al. 2023, *A&A*, 676, A68. eROSITA observations.
- Indriolo 2023, *ApJ*, 950, 64. IR absorption observations.
- Ritchey 2023, *ApJ*, 959, 29. HST UV absorption observations.

G266.2–1.2

RA: 08^h52^m00^s
Dec: –46°20′

1-GHz flux/Jy: 50?
Spectral index: 0.3?

RX J0852.0–4622

Size/arcmin: 120
Type: S

This remnant overlaps the Vela SNR (G263.9–3.3).

Radio: Incomplete shell, confused by the Vela SNR.

Optical: Nebulosity offset to NE.

X-ray: Non-thermal shell, confused by the Vela SNR, with central source, and possible associated pulsar.

Point sources: Central X-ray source, with optical nebula, and possible associated pulsar.

Distance: X-ray data suggest an upper limit of 1 kpc.

References:

Aschenbach 1998, *Nature*, 396, 141. ROSAT identification.
 Iyudin et al. 1998, *Nature*, 396, 142. γ -ray observations.
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 Tsunemi et al. 2000, *PASJ*, 52, 887. ASCA spectral observations.
 Slane et al. 2001, *ApJ*, 548, 814. ASCA observations.
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 Pavlov et al. 2001, *ApJ*, 559, L131. Chandra of central X-ray source.
 Moriguchi et al. 2001, *PASJ*, 53, 1025. CO observations.
 Pellizzoni et al. 2002, *A&A*, 393, L65. Optical observations of central source.
 Redman et al. 2002, *MNRAS*, 336, 1093. Optical nebulosity to NE.
 Kargaltsev et al. 2002, *ApJ*, 580, 1060. Chandra observations of central source.
 Sankrit et al. 2003, *ApJ*, 589, 242. Optical nebulosity to NE.
 Redman & Meaburn 2005, *MNRAS*, 356, 969. Possible pulsar association.
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 Reynoso et al. 2006, *A&A*, 449, 243. ATCA at 1.38 GHz (32′′×37′′).
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 Aharonian et al. 2007, *ApJ*, 661, 236. H.E.S.S. observations.
 Katsuda et al. 2008, *ApJ*, 678, L35. XMM-Newton proper motion study.
 Pannuti et al. 2010, *ApJ*, 721, 1492. Chandra observations of NW.
 Allen et al. 2015, *ApJ*, 798, 82. Two epoch Chandra observations for expansion.
 Acero et al. 2016, *ApJS*, 224, 8. Fermi observations.
 Takeda et al. 2016, *PASJ*, 68, S10. Suzaku observations.
 Fukui et al. 2017, *ApJ*, 850, 71. CO and H_I observations.
 Maxted et al. 2018, *ApJ*, 866, 76. ATCA at 1.4 to 2.9 GHz, plus other observations.
 H.E.S.S. Collaboration: Abdalla et al. 2018, *A&A*, 612, A7. H.E.S.S. observations.
 Mignani et al. 2019, *MNRAS*, 486, 5716. Near IR observations of central source.
 Weinberger et al. 2020, *A&A*, 638, A83. INTEGRAL observations.
 Camilloni et al. 2023, *A&A*, 673, A45. eROSITA observations.

G272.2–3.2

RA: 09^h06^m50^s
Dec: –52°07′

1-GHz flux/Jy: 0.4
Spectral index: 0.6

Size/arcmin: 15?
Type: S?

Radio: Diffuse shell.

Optical: Detected.

X-ray: Centrally brightened.

References:

Greiner et al. 1994, *A&A*, 286, L35. ROSAT observations, plus optical observations.
 Duncan et al. 1997, *MNRAS*, 289, 97. Parkes 64-m at 1.4 GHz (18′ : $S = 0.38 \pm 0.09$ Jy) 2.4 GHz (10′6 : $S = 0.25 \pm 0.04$ Jy) and 4.8 GHz (5′7 : $S = 0.17 \pm 0.02$ Jy), MOST at 843 MHz (45′′×70′′ : $S = 0.45 \pm 0.10$ Jy), and ATCA at 2.4 GHz (37′′×52′′), plus ROSAT observations.

Harrus et al. 2001, *ApJ*, 552, 614. ASCA and ROSAT observations, plus review of earlier observations.
 Kamitsukasa et al. 2016, *PASJ*, 68, S7. Suzaku observations.
 Xiang & Jiang 2021, *ApJ*, 918, 24. Fermi observations.
 Ruiz-Lapuente et al. 2023, *ApJ*, 947, 90. Gaia of possible progenitor companion.

G279.0+1.1

RA: 09^h57^m40^s
Dec: −53°15′

1-GHz flux/Jy: 30?
Spectral index: 0.6?

Size/arcmin: 95
Type: S

Radio: Faint, incomplete shell.

Optical: Detected.

Point sources: Pulsar nearby.

Distance: Optical extinction suggests about 2.7 kpc.

References:

Woermann & Jonas 1988, MNRAS, 234, 971. Hartesbeesthoek 26-m at 1.6 (30′ : $S = 25.2 \pm 4$ Jy) and 2.3 GHz (20′ : $S = 20.7 \pm 3$ Jy).
Duncan et al. 1995, MNRAS, 277, 319. Parkes 64-m at 1.4 (18′ : $S = 28 \pm 3$ Jy) and 2.4 GHz (11′ : $S = 20 \pm 2$ Jy), including polarisation.

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″ × 53″) of part.
Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.
Shan et al. 2019, RAA, 19, 92. Optical extinction for distance.
Araya 2020, MNRAS, 492, 5980. Fermi observations.

G284.3–1.8

RA: 10^h18^m15^s
Dec: −59°00′

1-GHz flux/Jy: 11?
Spectral index: 0.3?

MSH 10–53
Size/arcmin: 24?
Type: S

Has been called G284.2–1.8.

Radio: Incomplete, poorly defined shell.

Optical: Faint filament near edge.

X-ray: Diffuse emission, brighter in N and W.

Point sources: Central X-/ γ -ray source, not thought to be related.

Distance: Optical extinction suggests about 5.5 kpc.

References:

Ruiz & May 1986, ApJ, 309, 667. CO and optical observations.
Milne et al. 1989, PASA, 8, 187. MOST at 843 MHz (43″ × 50″) and Parkes 64-m at 8.4 GHz (3′ : $S = 5.4 \pm 0.8$ Jy) including polarisation, plus earlier flux densities.
Green et al. 1997, AJ, 114, 2058. Parkes 64-m and ATCA OH observations.
Camilo et al. 2001, ApJ, 557, L51. Observations of nearby pulsar.

Camilo et al. 2004, ApJ, 616, 1118. Chandra observations of pulsar and nebula.
H.E.S.S. Collaboration: Abramowski et al. 2012, A&A, 541, A5. H.E.S.S. observations.
Williams et al. 2015, ApJ, 808, L19. Chandra and XMM-Newton observations.
Marcote et al. 2018, A&A, 619, A26. Observations of central source.
Shan et al. 2019, RAA, 19, 92. Optical extinction for distance.

G286.5–1.2

RA: 10^h35^m40^s
Dec: −59°42′

1-GHz flux/Jy: 1.4?
Spectral index: ?

Size/arcmin: 26 × 6
Type: S?

Radio: Double, elongated arc.

Optical: Detected.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″ × 50″ : $S = 1.6$ Jy).
Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.

G288.8–6.3

RA: $10^{\text{h}}30^{\text{m}}20^{\text{s}}$
Dec: $-65^{\circ}15'$

1-GHz flux/Jy: 11
Spectral index: 0.41

Size/arcmin: 108×96
Type: S

Radio: Faint shell, brighter to W.

Optical: Some faint H α filaments.

References:

Duncan et al. 1997, MNRAS, 287, 722. Radio observations.
 Filipović et al. 2023, AJ, 166, 149. ASKAP at 943 MHz ($15''$ and smoothed), plus other radio survey observations.

G289.7–0.3

RA: $11^{\text{h}}01^{\text{m}}15^{\text{s}}$
Dec: $-60^{\circ}18'$

1-GHz flux/Jy: 6.2
Spectral index: 0.2?

Size/arcmin: 18×14
Type: S

Radio: Incomplete shell.

Point sources: Compact radio source near centre.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 50''$: $S = 6.4 \pm 0.5$ Jy), plus Parkes 64-m at 4.5 GHz ($S = 7.5 \pm 2.5$ Jy) and 8.55 GHz ($S = 3.6 \pm 0.9$ Jy).

G290.1–0.8

RA: $11^{\text{h}}03^{\text{m}}05^{\text{s}}$
Dec: $-60^{\circ}56'$

1-GHz flux/Jy: 42
Spectral index: 0.4

MSH 11–61A
Size/arcmin: 19×14
Type: S

Radio: Elongated, clumpy shell.

Optical: Filaments detected.

X-ray: Centrally brightened.

Point sources: Pulsar nearby, with PWN and extended ‘jet’ in X-rays.

Distance: H I absorption indicates 7 ± 1 kpc.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz ($3'$) and Parkes 64-m at 5 GHz ($4'$).
 Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz (4.4 : $S = 20.2$ Jy).
 Elliott & Malin 1979, MNRAS, 186, 45P. Optical image and spectra.
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 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz ($44'' \times 50''$).
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 Rosado et al. 1996, A&A, 315, 243. Optical kinematics.
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Gotthelf & Kaspi 1998, ApJ, 497, L29. ASCA observations of pulsar.
 Slane et al. 2002, ApJ, 564, 284. ASCA observations.
 Filipović et al. 2005, SerAJ, 170, 47. ATCA at 1.4 GHz ($21''$), plus other observations, including CO of surroundings.
 Reynoso et al. 2006, MNRAS, 369, 416. ATCA at 1.4 GHz ($22.5'' \times 25.0''$) including H I.
 Pavan et al. 2014, A&A, 562, A122. Chandra and ATCA observations at 2 GHz ($4.1'' \times 5.2''$) of PWN.
 Halpern et al. 2014, ApJ, 795, L27. XMM-Newton observations of PWN.
 Auchettl et al. 2015, ApJ, 810, 43. Fermi and Suzaku observations.
 Kamatsukasa et al. 2015, PASJ, 67, 16. Suzaku observations.
 Pavan et al. 2016, A&A, 591, A91. Chandra observations, including PWN and ‘jet’.

G291.0–0.1

(MSH 11–62)

RA: 11^h11^m54^s
Dec: –60°38′**1-GHz flux/Jy:** 16
Spectral index: 0.29**Size/arcmin:** 15×13
Type: C**Radio:** Centrally brightened core, with surrounding arcs.**Optical:** Detected.**X-ray:** Centrally brightened.**Point sources:** Central compact X-ray source.**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Roger et al. 1986, MNRAS, 219, 815. MOST at 843 MHz (43″×50″ : $S = 17.2 \pm 1.0$ Jy), and Parkes 64-m at 5 and 8.4 GHz (4′6 and 3′ : $S = 10.4 \pm 0.4$ Jy and 9.1 ± 0.2), with polarisation.
 Wilson 1986, ApJ, 302, 718. Einstein observations.

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×49″ : $S = 12.7$ Jy).
 Harrus et al. 1998, ApJ, 499, 273. ASCA observations.
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.
 Slane et al. 2012, ApJ, 749, 131. Chandra, XMM-Newton and Fermi observations.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.

G292.0+1.8

MSH 11–54

RA: 11^h24^m36^s
Dec: –59°16′**1-GHz flux/Jy:** 15
Spectral index: 0.4**Size/arcmin:** 12×8
Type: C**Radio:** Centrally brightened source surrounded by a plateau of faint emission.**Optical:** Oxygen rich.**X-ray:** Ring of emission, with diffuse central nebula and pulsar.**Point sources:** Central pulsar.**Distance:** H α absorption implies 6.0 kpc.**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Lockhart et al. 1977, MNRAS, 179, 147. Fleurs at 1415 MHz (50″ : $S = 13.0$ Jy).
 Goss et al. 1979, MNRAS, 188, 357. Optical spectra.
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 Camilo et al. 2002, ApJ, 567, L71. Pulsar detection.
 Gonzalez & Safi-Harb 2003, ApJ, 583, L91. Chandra observations.
 Hughes et al. 2003, ApJ, 591, L139. Chandra observations of pulsar.
 Gaensler & Wallace 2003, ApJ, 594, 326. ATCA at 1.4, 2.3 and 5.2 GHz (8″0×9″6, 6″2×7″2 and 4″8×5″5 : $S = 11.9 \pm 0.1, 11.4 \pm 0.1$ and 8.8 ± 0.1), plus H α observations.
 Park et al. 2004, ApJ, 602, L33. Chandra observations.
 Vink et al. 2004, NuPhS, 132, 62. XMM-Newton observations.

Ghavamian et al. 2005, ApJ, 635, 365. Optical imaging spectroscopy.
 Winkler & Long 2006, AJ, 132, 360. Optical observations.
 Park et al. 2007, ApJ, 670, L121. Chandra observations.
 Zharikov et al. 2008, A&A, 492, 805. Possible optical counterpart to pulsar and nebula.
 Winkler et al. 2009, ApJ, 692, 1489. Optical proper motion studies.
 Ghavamian et al. 2009, ApJ, 696, 1307. Spitzer spectroscopy.
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 Ghavamian et al. 2012, ApJ, 750, 39. Spitzer observations.
 Zharikov et al. 2013, A&A, 554, A120. IR of pulsar wind nebula.
 Yamaguchi et al. 2014, ApJ, 785, L27. Suzaku observations.
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 Bhalerao et al. 2015, ApJ, 800, 65. Chandra observations.
 Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
 Ghavamian & Williams 2016, ApJ, 831, 188. Spitzer observations.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Bhalerao et al. 2019, ApJ, 872, 31. Chandra observations.
 Millard et al. 2021, ApJS, 257, 36. ISO far-IR spectroscopy.
 Long et al. 2022, ApJ, 932, 117. Chandra proper motion of pulsar.

G292.2–0.5

RA: 11^h19^m20^s
Dec: –61°28′

1-GHz flux/Jy: 7
Spectral index: 0.5

Size/arcmin: 20×15
Type: S

Radio: Shell.

X-ray: Shell, brighter to W, with central nebula.

Point sources: Central, young pulsar.

Distance: H_I absorption indicates 8.4 kpc.

References:

Camilo et al. 2000, ApJ, 541, 367. Pulsar detection.
 Crawford et al. 2001, ApJ, 554, 152. ATCA at 1.4 GHz
 (25″×29″: $S=5.6\pm0.3$ Jy) and 2.5 GHz (20″×21″).
 Pivovarov et al. 2001, ApJ, 554, 161. ROSAT and ASCA obser-
 vations.
 Gonzalez & Safi-Harb 2003, ApJ, 591, L143. Chandra observa-
 tions of pulsar.
 Caswell et al. 2004, MNRAS, 352, 1405. ATCA at 5 GHz
 (1′: $S=2.8$ Jy), including polarisation, and 1.4 GHz for H_I
 absorption.

Gonzalez & Safi-Harb 2005, ApJ, 619, 856. Chandra observa-
 tions.
 Gonzalez et al. 2005, ApJ, 630, 489. XMM-Newton observations
 of pulsar.
 Safi-Harb & Kumar 2008, ApJ, 684, 532. Chandra observations
 of pulsar and nebula.
 Kumar et al. 2012, ApJ, 754, 96. Chandra and XMM-Newton
 observations.
 Ng et al. 2012, ApJ, 761, 65. XMM-Newton observations.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.

G293.8+0.6

RA: 11^h35^m00^s
Dec: –60°54′

1-GHz flux/Jy: 5?
Spectral index: 0.6?

Size/arcmin: 20
Type: C

Radio: Central source, with faint extended plateau.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′: $S=$
 9.0 Jy) and Parkes 64-m at 5 GHz (4′: $S=2.1$ Jy).
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz
 (44″×51″).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz
 (43″×49″: $S=2.6$ Jy).

G294.1–0.0

RA: 11^h36^m10^s
Dec: –61°38′

1-GHz flux/Jy: >2?
Spectral index: ?

Size/arcmin: 40
Type: S

Radio: Faint shell.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz
 (43″×49″: $S>2$).

G296.1–0.5

RA: $11^{\text{h}}51^{\text{m}}10^{\text{s}}$
Dec: $-62^{\circ}34'$

1-GHz flux/Jy: 8?
Spectral index: 0.6?

Size/arcmin: 37×25
Type: S

Incorporates the previously catalogued remnant G296.1–0.7. Has been called G296.05–0.50.

Radio: Irregular shell, with nearby HII regions.

Optical: Detected.

X-ray: Irregular, incomplete shell.

Distance: Optical extinction suggests about 4.3 or 3.8 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3' : S = 6.9$ Jy) and Parkes 64-m at 5 GHz ($4' : S > 0.74$).
 Longmore et al. 1977, MNRAS, 181, 541. Optical spectra.
 van den Bergh 1978, ApJS, 38, 119. Optical observations.
 Markert et al. 1981, ApJ, 248, L17. Einstein observations.
 Caswell & Barnes 1983, ApJ, 271, L55. Molonglo at 408 MHz ($3' : S = 12.4$ Jy).
 Bignami et al. 1986, ApJ, 302, 606. EXOSAT and Einstein observations.
 Hwang & Markert 1994, ApJ, 431, 819. ROSAT observations.

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 48'' : S > 2.4$).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Castro et al. 2011, ApJ, 734, 86. XMM-Newton observations.
 Gök & Sezer 2012, MNRAS, 419, 1603. Suzaku observations.
 Shan et al. 2019, RAA, 19, 92. Optical extinction for distance.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Tanaka et al. 2022, ApJ, 933, 101. Chandra, CO and HI observations.

G296.5+10.0

RA: $12^{\text{h}}09^{\text{m}}40^{\text{s}}$
Dec: $-52^{\circ}25'$

1-GHz flux/Jy: 48
Spectral index: 0.5

PKS 1209–51/52
Size/arcmin: 90×65
Type: S

Has been called G296.5+9.7, and erroneously G295.5+9.7.

Radio: Shell with two bright limbs.

Optical: Detected.

X-ray: Incomplete shell, with central pulsar.

Point sources: Central pulsar.

References:

Irvine & Irvine 1974, ApJ, 192, L111. Optical observations.
 Danziger & Dennefeld 1976, PASP, 88, 44. Optical spectra.
 Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz ($8'4$) and 5 GHz ($4'4$).
 Tuohy et al. 1979, ApJ, 230, L27. X-ray detection with HEAO-1 A2 experiment.
 Ruiz 1983, AJ, 88, 1210. Optical spectra.
 Dubner et al. 1986, AJ, 91, 343. Argentine 30-m dish at 1.4 GHz ($34'$), plus HI.
 Kellett et al. 1987, MNRAS, 225, 199. EXOSAT of the W of the remnant, including the compact source.
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz ($44'' \times 56''$).
 Matsui et al. 1988, ApJ, 329, 838. Einstein observations, including compact source.
 Roger et al. 1988, ApJ, 332, 940. MOST at 843 MHz ($44'' \times 56''$).
 Bignami et al. 1992, ApJ, 389, L67. Optical in vicinity of X-ray source.
 Milne & Haynes 1994, MNRAS, 270, 106. Parkes 64-m at 2.4 GHz ($8'3 : S = 33 \pm 3$ Jy), 4.8 GHz ($4'5 : S = 23.3 \pm 3$ Jy) and 8.4 GHz ($3'0 : 18.8 \pm 3$), including polarisation and review of flux densities.
 Mereghetti et al. 1996, ApJ, 464, 842. Radio, optical and X-ray observations of central source.

Green et al. 1997, AJ, 114, 2058. Parkes 64-m and ATCA OH observations.
 Vasisht et al. 1997, ApJ, 476, L43. ASCA observations of neutron star.
 Zavlin et al. 1998, A&A, 331, 821. ROSAT and ASCA observations of neutron star.
 Giacani et al. 2000, AJ, 119, 281. ATCA at 1.4 GHz ($2'7 \times 4'0$) for HI studies.
 Zavlin et al. 2000, ApJ, 540, L25. Chandra observations of central pulsar.
 Gotthelf & Halpern 2007, ApJ, 664, L35. X-ray timing observations of pulsar.
 Harvey-Smith et al. 2010, ApJ, 712, 1157. ATCA at 1.4 GHz ($1'8 \times 3'3$), including polarisation.
 Araya 2013, MNRAS, 434, 2202. Fermi observations.
 Halpern & Gotthelf 2015, ApJ, 812, 61. Two epoch Chandra observations for pulsar proper motion.
 Planck Collaboration: Arnaud et al. 2016, A&A, 586, A134. Planck flux densities at 4 frequencies between 30 and 100 GHz.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Ackermann et al. 2018, ApJS, 237, 32. Fermi observations.
 Eppens et al. 2022, BAAA, 63, 152. XMM-Newton observations.

G296.7–0.9

RA: $11^{\text{h}}55^{\text{m}}30^{\text{s}}$
Dec: $-63^{\circ}08'$

1-GHz flux/Jy: 3
Spectral index: 0.5

Size/arcmin: 15×8
Type: S

Radio: Bilateral shell.

X-ray: Brighter to SE.

References:

Schaudel et al. 2002, ASPC, 271, 391. ROSAT observations.
 Robbins et al. 2012, MNRAS, 419, 2623. ATCA at 1.4 GHz
 ($33'' \times 45''$: $S = 2.5 \pm 0.2$ Jy), plus MOST at 843 MHz
 ($43'' \times 49''$), plus other observations.

Prinz & Becker 2013, A&A, 550, A33. XMM-Newton observa-
 tions.
 Green et al. 2014, PASA, 31, 42. Radio observations at
 843 MHz ($45'' \times 50''$).

G296.8–0.3

1156–62

RA: $11^{\text{h}}58^{\text{m}}30^{\text{s}}$
Dec: $-62^{\circ}35'$

1-GHz flux/Jy: 9
Spectral index: 0.6

Size/arcmin: 20×14
Type: S

Radio: Shell, brighter to the NW.

X-ray: Faint extended emission.

Distance: CO and H_I observations given 10 kpc.

References:

Caswell et al. 1975, AuJPA, 37, 39. Molonglo at 408 MHz ($3'$:
 $S = 15.0$ Jy) and Parkes 64-m at 5 GHz ($4'$: $S = 3.2$ Jy).
 Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier
 Parkes 64-m maps at 2.7 GHz ($8.4'$) and 5 GHz ($4.4'$).
 Hwang & Markert 1994, ApJ, 431, 819. ROSAT observations.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz
 ($43'' \times 48''$: $S = 9.2$ Jy).

Gaensler et al. 1998, MNRAS, 296, 813. ATCA at 1.3 GHz
 ($22'' \times 24''$: $S = 7.0 \pm 0.3$ Jy), including polarisation and H_I ob-
 servations, plus review of flux densities.
 Sánchez-Ayaso et al. 2012, Ap&SS, 337, 573. XMM-Newton
 and IR observations.
 Yeung et al. 2023, PASJ, 75, 384. Fermi, Chandra, CO and H_I
 observations.

G298.5–0.3

RA: $12^{\text{h}}12^{\text{m}}40^{\text{s}}$
Dec: $-62^{\circ}52'$

1-GHz flux/Jy: 5?
Spectral index: 0.4?

Size/arcmin: 5?
Type: ?

Radio: Not well resolved, may be part of a larger ring?

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz
 ($3'$) and Parkes 64-m at 5 GHz ($4'$).
 Hwang & Markert 1994, ApJ, 431, 819. ROSAT upper limit.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz
 ($43'' \times 48''$: $S = 1.8$ Jy).
 Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.

G298.6–0.0

RA: $12^{\text{h}}13^{\text{m}}41^{\text{s}}$
Dec: $-62^{\circ}37'$

1-GHz flux/Jy: 5?
Spectral index: 0.3

Size/arcmin: 12×9
Type: S

Has been called G298.6–0.1.

Radio: Incomplete shell, in complex region.

X-ray: Centrally brightened.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz
 ($3'$) and Parkes 64-m at 5 GHz ($4'$).
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz
 ($44'' \times 50''$).
 Hwang & Markert 1994, ApJ, 431, 819. ROSAT upper limit.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz
 ($43'' \times 48''$: $S = 7.4$ Jy).

Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Bamba et al. 2016, PASJ, 68, S5. Suzaku observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observa-
 tions.

G299.2–2.9

RA: $12^{\text{h}}15^{\text{m}}13^{\text{s}}$
Dec: $-65^{\circ}30'$

1-GHz flux/Jy: 0.5?
Spectral index: ?

Size/arcmin: 18×11
Type: S

Radio: Faint source.

Optical: Filaments in W.

X-ray: Centrally brightened with shell at higher energies.

Distance: H I column density suggests about 2.8 kpc.

References:

Busser et al. 1996, A&A, 310, L1. ROSAT detection, plus optical studies.
 Slane et al. 1996, ApJ, 465, 840. Einstein, IRAS and radio observations.

Bai & Wang 2000, ApJ, 539, 760. ASCA observations.
 Park et al. 2007, ApJ, 665, 1173. Chandra observations.
 Post et al. 2014, ApJ, 792, L20. Chandra observations.
 Shan et al. 2019, RAA, 19, 92. H I column density for distance.

G299.6–0.5

RA: $12^{\text{h}}21^{\text{m}}45^{\text{s}}$
Dec: $-63^{\circ}09'$

1-GHz flux/Jy: 1.0?
Spectral index: ?

Size/arcmin: 13
Type: S

Radio: Faint shell, brightest to E.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 48''$: $S=1.1$ Jy).

G301.4–1.0

RA: $12^{\text{h}}37^{\text{m}}55^{\text{s}}$
Dec: $-63^{\circ}49'$

1-GHz flux/Jy: 2.1?
Spectral index: ?

Size/arcmin: 37×23
Type: S

Radio: Faint, incomplete shell, with possible extension to SW.

Distance: Optical extinction suggests 2.7 kpc.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 48''$: $S=2.3$ Jy).

G302.3+0.7

RA: $12^{\text{h}}45^{\text{m}}55^{\text{s}}$
Dec: $-62^{\circ}08'$

1-GHz flux/Jy: 5?
Spectral index: 0.4?

Size/arcmin: 17
Type: S

Radio: Distorted shell, in complex region, with possibly associated filament.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3'$: $S=7.5$ Jy) and Parkes 64-m at 5 GHz ($4'$: $S=3.0$ Jy).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 49''$: $S=3.2$ Jy).
 Frail et al. 1996, AJ, 111, 1651. OH emission near remnant.

G304.6+0.1

Kes 17

RA: 13^h05^m59^s
Dec: –62°42′**1-GHz flux/Jy:** 14
Spectral index: 0.5**Size/arcmin:** 8
Type: S**Radio:** Incomplete shell.**X-ray:** Detected.**Distance:** Possible limit of > 9.7 kpc from H I absorption.**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz (4′4″:S=6.9 Jy).
 Caswell et al. 1975, A&A, 45, 239. Parkes H I absorption.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×48″:S=18 Jy).
 Frail et al. 1996, AJ, 111, 1651. OH emission near remnant.
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Hewitt et al. 2009, ApJ, 694, 1266. Spitzer spectroscopy.
 Combi et al. 2010, A&A, 523, A76. XMM-Newton observations.
 Lee et al. 2011, ApJ, 740, 31. Akari and Spitzer observations.
 Wu et al. 2011, ApJ, 740, L12. Fermi observations.

Andersen et al. 2011, ApJ, 742, 7. Spitzer observations.
 Gök & Sezer 2012, MNRAS, 423, 1215. Suzaku observations.
 Gelfand et al. 2013, ApJ, 777, 148. ATCA at 1.4 GHz (8″×23″:S=10.9±0.4 Jy), plus other observations.
 Pannuti et al. 2014, AJ, 147, 55. ASCA and XMM-Newton observations.
 Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Washino et al. 2016, PASJ, 68, S4. Suzaku observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Supán et al. 2023, A&A, 679, A22. CO observations, and review of radio spectrum.

G306.3–0.9**RA:** 13^h21^m50^s
Dec: –63°34′**1-GHz flux/Jy:** 0.16?
Spectral index: 0.5?**Size/arcmin:** 4
Type: S?**Radio:** Diffuse emission.**X-ray:** Partial shell.**References:**

Reynolds et al. 2013, ApJ, 766, 112. Chandra observations, and ATCA at 5.5 GHz (23″×26″), and 9 GHz.
 Combi et al. 2016, A&A, 592, A125. XMM-Newton and Chandra observations.
 Sezar et al. 2017, MNRAS, 466, 3434. Suzaku and Fermi observations.

Sawada et al. 2019, PASJ, 71, 61. Suzaku observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Weng et al. 2022, ApJ, 924, 119. XMM-Newton and Chandra observations.

G308.1–0.7**RA:** 13^h37^m37^s
Dec: –63°04′**1-GHz flux/Jy:** 1.2?
Spectral index: ?**Size/arcmin:** 13
Type: S**Radio:** Faint shell.**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×48″:S=1.3 Jy).

G308.4–1.4

RA: $13^{\text{h}}41^{\text{m}}30^{\text{s}}$
Dec: $-63^{\circ}44'$

1-GHz flux/Jy: 0.4?
Spectral index: ?

Size/arcmin: $12 \times 6?$
Type: S?

W part has been called G308.3–1.4.

Radio: Complex structure, with multiple arcs.

X-ray: Limb brightened partial shell in W.

Distance: H I column density suggests about 3.1 kpc.

References:

Schaudel et al. 2002, ASPC, 271, 391. ROSAT observations.
 Prinz & Becker 2012, A&A, 544, A7. ATCA at 1.4 GHz
 ($53'' \times 64''$: $S = 0.33$ Jy) and 2.5 GHz ($29'' \times 35''$: $S = 0.24$ Jy),
 plus Chandra and other observations.
 Hui et al. 2012, ApJ, 750, 7. XMM-Newton and other observa-
 tions.
 De Horta et al. 2013, MNRAS, 428, 1980. ATCA at 1.4 GHz
 ($54'' \times 65''$) and 2.5 GHz ($29'' \times 35''$), plus other observations.

Green et al. 2014, PASA, 31, 42. Radio observations at
 843 MHz ($45'' \times 50''$).
 Shan et al. 2019, RAA, 19, 92. H I column density for distance.
 Eppens & Reynoso 2021, BAAA, 62, 131. ATCA at 2.3 GHz
 ($9''6 \times 9''8$).

G308.8–0.1

RA: $13^{\text{h}}42^{\text{m}}30^{\text{s}}$
Dec: $-62^{\circ}23'$

1-GHz flux/Jy: 15?
Spectral index: 0.4?

Size/arcmin: $30 \times 20?$
Type: C?

Incorporates previous catalogued remnant G308.7+0.0.

Radio: Bright ridge in N, and arc to S.

Point sources: Pulsar near centre of remnant.

Distance: Optical extinction suggests 3.9 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3'$: $S =$
 16.7 Jy) and Parkes 64-m at 5 GHz ($4'$: $S = 7.0$ Jy).
 Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz
 ($4'4$: $S = 6.5$ Jy).
 Caswell et al. 1981, MNRAS, 195, 89. FIRST at 1415 MHz
 ($50''$).
 Wilson 1986, ApJ, 302, 718. Einstein upper limit.

Caswell et al. 1992, ApJ, 399, L151. MOST at 843 MHz
 ($43'' \times 49''$).
 Kaspi et al. 1992, ApJ, 399, L155. Pulsar observations.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for dis-
 tance.

G309.2–0.6

RA: $13^{\text{h}}46^{\text{m}}31^{\text{s}}$
Dec: $-62^{\circ}54'$

1-GHz flux/Jy: 7?
Spectral index: 0.4?

Size/arcmin: 15×12
Type: S

Has been called G309.2–0.7.

Radio: Distorted shell.

X-ray: Extended emission, with unrelated central source.

Distance: H I column density suggests about 2.8 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3'$: $S =$
 10.0 Jy) and Parkes 64-m at 5 GHz ($4'$: $S = 3.9$ Jy).
 Caswell et al. 1981, MNRAS, 195, 89. FIRST at 1415 MHz
 ($1'5$).
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz
 ($44'' \times 50''$).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz
 ($43'' \times 48''$: $S = 6$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.

Gaensler et al. 1998, MNRAS, 299, 812. ATCA at 1.3 GHz
 ($23'' \times 24''$: $S = 5.2 \pm 0.2$ Jy).
 Rakowski et al. 2001, ApJ, 548, 258. ASCA and ROSAT obser-
 vations.
 Rakowski et al. 2006, ApJ, 649, L111. Observations of central
 source.
 Safi-Harb et al. 2007, ApJ, 659, 407. Observations of central
 source.
 Shan et al. 2019, RAA, 19, 92. H I column density for distance.

G309.8+0.0

RA: $13^{\text{h}}50^{\text{m}}30^{\text{s}}$
Dec: $-62^{\circ}05'$

1-GHz flux/Jy: 17
Spectral index: 0.5

Size/arcmin: 25×19
Type: S

Radio: Distorted shell.

Point sources: Steep radio spectrum source near the centre of the remnant.

Distance: Optical extinction suggests 3.1 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3' : S = 26.4$ Jy) and Parkes 64-m at 5 GHz ($4' : S = 7.4$ Jy).
 Caswell et al. 1980, MNRAS, 190, 881. FIRST at 1415 MHz ($1'$).

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 49'' : S > 8.8$).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G310.6–1.6

RA: $14^{\text{h}}00^{\text{m}}45^{\text{s}}$
Dec: $-63^{\circ}26'$

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 2.5
Type: C?

Radio: Not detected.

X-ray: Bright central nebula, with faint shell.

Point sources: X-ray pulsar, and extended emission.

References:

Tomsick et al. 2009, ApJ, 701, 811. Chandra observations.
 Renaud et al. 2010, ApJ, 716, 663. Chandra and other observations.
 Reynolds & Borkowski 2019, ApJ, 887, 233. Chandra observations.

G310.6–0.3

RA: $13^{\text{h}}58^{\text{m}}00^{\text{s}}$
Dec: $-62^{\circ}09'$

1-GHz flux/Jy: 5?
Spectral index: ?

Kes 20B
Size/arcmin: 8
Type: S

Has been called G310.65–0.29.

Radio: Asymmetric shell.

References:

Whiteoak et al. 1994, MNRAS, 269, 294. MOST at 843 MHz.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 49'' : S = 5.4$ Jy).
 Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.

G310.8–0.4

RA: $14^{\text{h}}00^{\text{m}}00^{\text{s}}$
Dec: $-62^{\circ}17'$

1-GHz flux/Jy: 6?
Spectral index: ?

Kes 20A
Size/arcmin: 12
Type: S

Has been called G310.80–0.41.

Radio: Arc in E, in complex region.

References:

Whiteoak et al. 1994, MNRAS, 269, 294. MOST at 843 MHz.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 49'' : S = 6.9$ Jy).
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.

Andersen et al. 2011, ApJ, 742, 7. Spitzer observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.

G311.5–0.3

RA: $14^{\text{h}}05^{\text{m}}38^{\text{s}}$
Dec: $-61^{\circ}58'$

1-GHz flux/Jy: 3?
Spectral index: 0.5

Size/arcmin: 5
Type: S

Has been called G311.52–0.37.

Radio: Shell, not well resolved.

X-ray: Detected.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3') and Parkes 64-m at 5 GHz (4').
 Caswell & Barnes 1985, MNRAS, 216, 753. Molonglo at 408 MHz (3').
 Whiteoak et al. 1994, MNRAS, 269, 294. MOST at 843 MHz.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 49''$; $S=2.9$ Jy).

Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Andersen et al. 2011, ApJ, 742, 7. Spitzer observations.
 Pannuti et al. 2014, AJ, 147, 55. ASCA observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.

G312.4–0.4

RA: $14^{\text{h}}13^{\text{m}}00^{\text{s}}$
Dec: $-61^{\circ}44'$

1-GHz flux/Jy: 45
Spectral index: 0.36

Size/arcmin: 38
Type: S

Has been called G312.44–0.36.

Radio: Irregular, incomplete shell.

X-ray: Weak emission in W.

Point sources: Nearby γ -ray sources and pulsars.

Distance: H α absorption suggests > 6 kpc and possibly > 14 kpc, optical extinction suggests 4.4 kpc.

References:

Caswell & Barnes 1985, MNRAS, 216, 753. Molonglo at 408 MHz (3'; $S=56$ Jy).
 Whiteoak et al. 1994, MNRAS, 269, 294. MOST at 843 MHz.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 49''$; $S > 19$), plus Parkes 64-m at 4.5 GHz ($S=30 \pm 2$ Jy) and 8.55 GHz ($S=17 \pm 4$ Jy).
 Frail et al. 1996, AJ, 111, 1651. OH emission near remnant.
 Roberts et al. 1999, ApJ, 515, 712. MOST at 843 MHz ($43'' \times 49''$).

Case & Bhattacharya 1999, ApJ, 521, 246. Nearby γ -ray sources.
 Doherty et al. 2003, MNRAS, 339, 1048. ATCA at 1.4 GHz (25'') plus H α absorption, and Chandra observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Chambery et al. 2023, ApJ, 959, 97. Fermi observations.

G312.5–3.0

RA: $14^{\text{h}}21^{\text{m}}00^{\text{s}}$
Dec: $-64^{\circ}12'$

1-GHz flux/Jy: 3.5?
Spectral index: ?

Size/arcmin: 20×18
Type: S

Radio: Distorted shell.

References:

Duncan et al. 1995, MNRAS, 277, 36. Parkes 64-m at 2.4-GHz (10'.4).
 Duncan et al. 1997, MNRAS, 287, 722. Parkes 64-m at 2.4 GHz (11'; $S=1.9 \pm 0.2$ Jy).
 Kane & Vaughan 2003, MNRAS, 344, 625. ATCA at 1.4 GHz ($116'' \times 129''$) and 2.4 GHz ($67'' \times 75''$).

G315.1+2.7

RA: 14^h24^m30^s
Dec: –57°50′

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 190×150
Type: S

Radio: Poorly defined shell.

Optical: Filaments, brighter in NE.

References:

Duncan et al. 1997, MNRAS, 287, 722. Parkes 64-m at 2.4 GHz (11′:S=19±3 Jy).
 Combi et al. 1998, A&A, 333, 298. Radio survey observations.
 Stupar et al. 2007, MNRAS, 374, 1441. Optical and various radio observations.
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.

G315.4–2.3

RA: 14^h43^m00^s
Dec: –62°30′

1-GHz flux/Jy: 49
Spectral index: 0.6

RCW 86, MSH 14–63

Size/arcmin: 42
Type: S

Possibly the remnant of the SN of AD185?

Radio: Shell, brightest to the SW.

Optical: Bright, radiative filaments, with some faint Balmer dominated filaments.

X-ray: Partial shell, with thermal and non-thermal emission.

Point sources: Several X-ray sources.

Distance: Optical observations imply 2.3 kpc, optical extinction suggest <2 kpc.

References:

van den Bergh et al. 1973, ApJS, 26, 19. Optical observations.
 Caswell et al. 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′:S=86 Jy) and Parkes 64-m at 5 GHz (4′:S=18.2 Jy).
 Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′4) and 5 GHz (4′4).
 Winkler 1978, ApJ, 221, 220. X-ray detection.
 Leibowitz & Danziger 1983, MNRAS, 204, 273. Optical spectra.
 Pisarski et al. 1984, ApJ, 277, 710. Einstein observations.
 Nugent et al. 1984, ApJ, 284, 612. X-ray spectrum.
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×50″).
 Long & Blair 1990, ApJ, 358, L13. Balmer dominated optical filaments.
 Greidanus & Strom 1990, A&A, 240, 385. IRAS observations.
 Kaastra et al. 1992, A&A, 264, 654. Ginga X-ray spectra.
 Strom 1994, MNRAS, 268, L5. Historical association
 Chin & Huang 1994, Nature, 371, 398. Questioning of historical association.
 Schaefer 1995, AJ, 110, 1793. Questioning of historical association.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×48″:S>22).
 Rosado et al. 1996, A&A, 315, 243. Optical kinematics.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Smith et al. 1997, AJ, 114, 2664. Observations of Balmer dominated filaments.
 Vink et al. 1997, A&A, 328, 628. ASCA spectroscopy.
 Bocchino et al. 2000, A&A, 360, 671. BeppoSAX observations of N and SW.
 Bamba et al. 2000, PASJ, 52, 1157. ASCA observations.
 Dickel et al. 2001, ApJ, 546, 447. ATCA at 1.34 GHz (8″), including polarisation.
 Ghavamian et al. 2001, ApJ, 547, 995. Optical spectroscopy.
 Borkowski et al. 2001, ApJ, 550, 334. ASCA observations.
 Rho et al. 2002, ApJ, 581, 1116. Chandra observations.
 Gvaramadze & Vikhlinin 2003, A&A, 401, 625. Chandra point source search.
 Sollerman et al. 2003, A&A, 407, 249. Optical spectroscopy.

Kaplan et al. 2004, ApJS, 153, 269. Chandra limits for any compact source.
 Bamba et al. 2005, ApJ, 621, 793. Chandra observations of rim.
 Vink et al. 2006, ApJ, 648, L33. Chandra and XMM-Newton observations.
 Ueno et al. 2007, PASJ, 59, S171. Suzaku observations.
 Aharonian et al. 2009, ApJ, 692, 1500. H.E.S.S. observations.
 Yamaguchi et al. 2011, PASJ, 63, S837. Suzaku observations.
 Helder et al. 2011, ApJ, 737, 85. XMM-Newton and optical observations.
 Williams et al. 2011, ApJ, 741, 96. Spitzer observations.
 Mignani et al. 2012, MNRAS, 425, 2309. X-ray and optical observations of compact X-ray sources.
 Lemoine-Goumard et al. 2012, A&A, 545, A28. Fermi observations.
 Helder et al. 2013, MNRAS, 435, 910. Optical proper motion studies.
 Castro et al. 2013, ApJ, 779, 49. Chandra of NW.
 Yuan et al. 2014, ApJ, 785, L22. Fermi observations.
 Tsubone et al. 2014, in EFXU, p72. Suzaku observations.
 Broersen et al. 2014, MNRAS, 441, 3040. XMM-Newton observations.
 Planck Collaboration: Arnaud et al. 2016, A&A, 586, A134. Planck flux densities at 30, 44 and 70 GHz.
 Ajello et al. 2016, ApJ, 819, 98. Fermi observations, and ATCA H α of surroundings.
 Yamaguchi et al. 2016, ApJ, 820, L3. Chandra observations of NE.
 Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
 Tsubone et al. 2017, ApJ, 835, 34. Suzaku observations.
 Sano et al. 2017, JHEAp, 15, 1. CO and H α observations.
 H.E.S.S. Collaboration: Abramowski et al. 2018, A&A, 612, A4. H.E.S.S. observations.
 Shan et al. 2019, RAA, 19, 92. Optical extinction for distance.
 Suzuki et al. 2022, ApJ, 938, 59. Multi-epoch Chandra observations.
 Bama et al. 2023, PASJ, 75, 1344. XMM-Newton observations of SE.

G315.4–0.3

RA: 14^h35^m55^s
Dec: –60°36′

1-GHz flux/Jy: 8
Spectral index: 0.4

Size/arcmin: 24×13
Type: ?

Radio: Irregular non-thermal emission, with HII region superposed in E.

Optical: Detected.

Distance: Optical extinction suggests 3.3 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S=15.9$ Jy) and Parkes 64-m at 5 GHz (4′ : $S=4.9$ Jy).
 Caswell et al. 1981, MNRAS, 195, 89. FIRST at 1415 MHz (50′′ : $S=6.25$ Jy), re-assessment of earlier flux densities.

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43′′×49′′ : $S=3.1$ Jy).
 Frail et al. 1996, AJ, 111, 1651. OH emission near remnant.
 Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.

G315.9–0.0

RA: 14^h38^m25^s
Dec: –60°11′

1-GHz flux/Jy: 0.8?
Spectral index: ?

Size/arcmin: 25×14
Type: S

Has been called G315.8–0.0 and G315.9+0.0.

Radio: Faint, distorted shell, with elongated trail to pulsar.

Point sources: Pulsar at end of radio trail.

Distance: Optical extinction suggests 3.7 kpc.

References:

Kesteven et al. 1987, AuJPh, 40, 855. MOST at 843 MHz (44′′×50′′).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43′′×50′′ : $S=0.9$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m and ATCA OH observations.

Camilo et al. 2009, ApJ, 703, L55. Pulsar detection.
 Ng et al. 2012, ApJ, 746, 105. ATCA at 1.4, 2.5, 5 and 9 GHz, including polarisation, of pulsar trail.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G316.3–0.0

RA: 14^h41^m30^s
Dec: –60°00′

1-GHz flux/Jy: 20?
Spectral index: 0.4

Size/arcmin: 29×14
Type: S

(MSH 14–57)

Has been called G316.3+0.0.

Radio: Distorted shell, with possible ‘blowout’.

X-ray: Detected.

Distance: H I absorption data suggests > 7.2 kpc, optical extinction suggests 3.8 kpc.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Caswell et al. 1975, A&A, 45, 239. Parkes H I absorption.
 Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz (4′4 : $S=16.7$ Jy).
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44′′×51′′).

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43′′×50′′ : $S=20$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G317.3–0.2

RA: 14^h49^m40^s
Dec: –59°46′

1-GHz flux/Jy: 4.7?
Spectral index: ?

Size/arcmin: 11
Type: S

Radio: Incomplete shell.

Optical: Detected.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43′′×50′′ : $S=5.2$ Jy).
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.
 Xiang et al. 2021, ApJ, 911, 49. Fermi observations.

G318.2+0.1

RA: $14^{\text{h}}54^{\text{m}}50^{\text{s}}$
Dec: $-59^{\circ}04'$

1-GHz flux/Jy: $>3.9?$
Spectral index: ?

Size/arcmin: 40×35
Type: S

Radio: Faint shell, with central HII region.

X-ray: Sources within remnant.

Distance: Optical extinction suggests 3.3 kpc.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 50'' : S > 4.3$).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Bocchino et al. 2001, A&A, 367, 629. BeppoSAX and ROSAT observations.

Onako et al. 2016, ApJ, 829, 106. Akari observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G318.9+0.4

RA: $14^{\text{h}}58^{\text{m}}30^{\text{s}}$
Dec: $-58^{\circ}29'$

1-GHz flux/Jy: 4?
Spectral index: 0.2?

Size/arcmin: 30×14
Type: C

May not be a SNR?

Radio: Complex arcs, with off-centre core.

Distance: Optical extinction suggests 3.5 kpc.

References:

Whiteoak 1990, Nature, 347, 157. MOST at 843 MHz ($43'' \times 51''$).
 Whiteoak 1993, ApJ, 415, 701. MOST at 843 MHz ($43'' \times 51'' : S = 4.8 \pm 0.6$ Jy), Parkes 64-m at 4.5 GHz ($4.7' : S = 3.7 \pm 0.2$ Jy) and 8.4 GHz ($2.8' : S = 3.0 \pm 0.4$ Jy) including polarisation, and ATCA at 1.4 GHz and 4.8 GHz ($11'' \times 13''$) of core.

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 50'' : S = 4.8$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G320.4–1.2

RA: 15^h14^m30^s
Dec: –59°08′

1-GHz flux/Jy: 60?
Spectral index: 0.4

MSH 15–52, RCW 89

Size/arcmin: 35
Type: C

Has been suggested as the remnant of the SN of AD185?

Radio: Ragged shell.

Optical: RCW 89 is the H α emitting region to the NW.

X-ray: Partial shell, central nebula and pulsar and ‘jet’.

Point sources: Radio and X-ray pulsar, with wind nebula.

Distance: H α absorption indicates 5.2 kpc, optical extinction suggests 3.0 kpc.

References:

Caswell et al. 1975, A&A, 45, 239. Parkes H α absorption.
 Dickel & Milne 1976, A&A, 29, 435. Comparison of earlier
 Parkes 64-m maps at 2.7 GHz (8′4) and 5 GHz (4′4).
 Dopita et al. 1977, ApJ, 214, 179. Optical spectra.
 Caswell et al. 1981, MNRAS, 195, 89. FIRST at 1415 MHz
 (50′′).
 Seward & Harnden 1982, ApJ, 256, L45. X-ray observations of
 pulsar.
 Manchester et al. 1982, ApJ, 262, L31. Radio observations of
 pulsar.
 Seward et al. 1983, ApJ, 267, 698. X-ray, Optical and IR.
 van den Bergh & Kamper 1984, ApJ, 280, L51. Optical expan-
 sion.
 Seward et al. 1984, ApJ, 281, 650. X-ray observations of pulsar
 and nebulosity.
 Lortet et al. 1987, A&A, 180, 65. Optical observations.
 Trussoni et al. 1990, A&A, 234, 403. EXOSAT observations.
 Asaoka & Koyama 1990, PASJ, 42, 625. Ginga X-ray spectrum.
 Arendt 1991, AJ, 101, 2160. IRAS observations, including com-
 pact source.
 Milne et al. 1993, MNRAS, 264, 853. Parkes 64-m at 4.8 GHz
 (4′5: $S=37\pm7$ Jy) and 8.4 GHz (3′0: $S=24\pm4$ Jy), including
 polarisation and review of flux densities.
 Strom 1994, MNRAS, 268, L5. Historical association.
 Chin & Huang 1994, Nature, 371, 398. Questioning of historical
 association.
 Matz et al. 1994, ApJ, 434, 288. X-ray observations of pulsar.
 Schaefer 1995, AJ, 110, 1793. Questioning of historical associa-
 tion.
 Du Plessis et al. 1995, ApJ, 453, 746. Hartesbeesthoek 26-m at
 2.3, 5 and 8.5 GHz ($S=42, 35.6$ and 14.5 Jy).
 Greiveldinger et al. 1995, ApJ, 454, 855. ROSAT observations.
 Trussoni et al. 1996, A&A, 306, 581. ROSAT observations.
 Tamura et al. 1996, PASJ, 48, L33. ASCA observations.

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz
 (43′′ $\times$ 50′′: $S=62$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Marsden et al. 1997, ApJ, 491, L39. X-ray spectroscopy.
 Brazier & Becker 1997, MNRAS, 284, 335. ROSAT observa-
 tions.
 Gaensler et al. 1999, MNRAS, 305, 724. ATCA at 1.4 GHz
 (21′′ $\times$ 24′′), plus H α observations, and 5.3 GHz (10′′ $\times$ 15′′).
 Sako et al. 2000, ApJ, 537, 422. Possible γ -ray detection of pul-
 sar.
 Mineo et al. 2001, A&A, 380, 695. BeppoSAX observations.
 Gaensler et al. 2002, ApJ, 569, 878. Chandra observations of
 pulsar and nebula.
 Dubner et al. 2002, AJ, 123, 337. ATCA at 1.4 GHz (2′7 $\times$ 4′0),
 plus H α observations.
 Aharonian et al. 2005, A&A, 435, L17. H.E.S.S. detection.
 Yatsu et al. 2005, ApJ, 631, 312. Chandra observations of pulsar
 and jet.
 DeLaney et al. 2006, ApJ, 640, 929. Chandra and ROSAT multi-
 epoch observations of pulsar wind nebula.
 Kaplan & Moon 2006, ApJ, 644, 1056. Possible IR detection of
 pulsar.
 Forot et al. 2006, ApJ, 651, L45. X-ray observations of pulsar
 and nebula.
 Nakamori et al. 2008, ApJ, 677, 297. γ -ray observations.
 Yatsu et al. 2009, PASJ, 61, 129. Chandra observations of pulsar
 wind nebula.
 Koo et al. 2011, ApJ, 732, 6. Akari and Spitzer observations.
 An et al. 2014, ApJ, 793, 90. NuSTAR observations of PWN.
 H.E.S.S. Collaboration: Abdalla et al. 2018, A&A, 612, A1.
 H.E.S.S. observations.
 Borkowski et al. 2020, ApJ, 895, L32. Chandra observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for dis-
 tance.
 Millard et al. 2021, ApJS, 257, 36. ISO far-IR spectroscopy.

G320.6–1.6

RA: 15^h17^m50^s
Dec: –59°16′

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 60 $\times$ 30
Type: S

Radio: Faint shell, overlapping G320.4–1.2 in W.

Optical: Detected.

Distance: Optical extinction suggests 3.2 kpc.

References:

Milne et al. 1993, MNRAS, 264, 853. Parkes 64-m at 4.8 GHz
 (4′5) and 8.4 GHz (3′0), including polarisation.
 Duncan et al. 1995, MNRAS, 277, 36. Parkes 64-m at 2.4-GHz
 (10′4).

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz
 (43′′ $\times$ 50′′: $S>9.3$).
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for dis-
 tance.

G321.9–1.1

RA: $15^{\text{h}}23^{\text{m}}45^{\text{s}}$
Dec: $-58^{\circ}13'$

1-GHz flux/Jy: $>3.4?$
Spectral index: ?

Size/arcmin: 28
Type: S

Radio: Faint shell.

Distance: Optical extinction suggests 3.3 kpc.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 51'' : S > 3.8$).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G321.9–0.3

RA: $15^{\text{h}}20^{\text{m}}40^{\text{s}}$
Dec: $-57^{\circ}34'$

1-GHz flux/Jy: 13
Spectral index: 0.3

Size/arcmin: 31×23
Type: S

Radio: Shell brighter to the W, with Cir X-1 to N.

Point sources: Pulsar near E edge.

Distance: Optical extinction suggests 5.5 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3' : S = 18.3$ Jy) and Parkes 64-m at 5 GHz ($4' : S = 7.8$ Jy).
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz ($44'' \times 52''$).
 Stewart et al. 1993, MNRAS, 261, 593. ATCA at 1.5 GHz ($21''$).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 51'' : S > 8.3$).

Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Mignani et al. 2002, A&A, 386, 487. HST proper motion study of Cir X-1.
 Tudose et al. 2006, MNRAS, 372, 417. MOST at 843 MHz.
 Pletsch et al. 2013, ApJ, 779, L11. Pulsar detection.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G322.1+0.0

RA: $15^{\text{h}}20^{\text{m}}49^{\text{s}}$
Dec: $-57^{\circ}10'$

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: $8 \times 4.5?$
Type: S?

Radio: Circular shell, with extension to S.

X-ray: Diffuse emission.

Point sources: Cir X-1 HMXB at centre.

References:

Heinz et al. 2013, ApJ, 779, 171. Chandra observations and ATCA at 1.1–3.1 GHz ($4''0 \times 4''9$).
 Coriat et al. 2019, MNRAS, 484, 1672. ATCA at 2.1, 5.5, 9.0, 33 and 35 GHz, mostly of Cir X-1 jet.

G322.5–0.1

RA: $15^{\text{h}}23^{\text{m}}23^{\text{s}}$
Dec: $-57^{\circ}06'$

1-GHz flux/Jy: 1.5
Spectral index: 0.4

Size/arcmin: 15
Type: C

Radio: Shell with central extended source.

Point sources: PN Pe 2-8 within boundary.

References:

Whiteoak 1992, MNRAS, 256, 121. MOST at 843 MHz ($43'' \times 51'' : S = 2.0 \pm 0.3$ Jy).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 51'' : S = 1.7$ Jy), plus Parkes 64-m at 4.5 GHz ($= 0.89 \pm 0.13$).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.

G323.5+0.1

RA: 15^h28^m42^s
Dec: –56°21′

1-GHz flux/Jy: 3?
Spectral index: 0.4?

Size/arcmin: 13
Type: S

Radio: Distorted shell, confused with thermal emission.

Point sources: Compact, probably thermal source near centre.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′: $S=4.2$ Jy) and Parkes 64-m at 5 GHz (4′: $S=1.5$ Jy).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×52″: $S=4.2$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.

G323.7–1.0

RA: 15^h34^m30^s
Dec: –57°12′

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 51×38
Type: S

Has been suggested is not a single remnant.

Radio: Faint shell.

X-ray: Faint diffuse emission.

Distance: CO and H_I observations suggest 3.5 kpc.

References:

Green et al. 2014, PASA, 31, 42. MGPS at 843 MHz (43″×51″).
 Araya et al. 2017, ApJ, 843, 12. Fermi observations.
 H.E.S.S. Collaboration: Abdalla et al. 2018, A&A, 612, A8. H.E.S.S. observations.
 Maxted et al. 2018, MNRAS, 480, 134. CO and H_I observations.

Saji et al. 2018, PASJ, 70, 23. Suzaku observations.
 Ball et al. 2023, MNRAS, 524, 1396. ASKAP at 933 MHz (18″).
 Nguyen-Dang et al. 2023, A&A, 679, A48. XMM-Newton observations.

G326.3–1.8

RA: 15^h53^m00^s
Dec: –56°10′

1-GHz flux/Jy: 145
Spectral index: varies

MSH 15–56
Size/arcmin: 38
Type: C

Has been called G326.2–1.7.

Radio: Shell, with elongated, flat-spectrum core.

Optical: Emission around the shell.

X-ray: Shell, with central extended emission.

Point sources: Compact X-ray source.

References:

Clark et al. 1975, AuJPA, 37, 75. Molonglo at 408 MHz (3′: $S=180$ Jy).
 Caswell et al. 1975, A&A, 45, 239. Parkes H_I absorption.
 Milne et al. 1979, MNRAS, 188, 437. FIRST at 1415 MHz (0′8: $S>95$) and Parkes 64-m at 14.7 GHz (2′2: $S=69\pm8$ Jy).
 van den Bergh 1979, ApJ, 227, 497. Optical observations.
 Zealey et al. 1979, A&AS, 38, 39. Optical observations.
 Dennefeld 1980, PASP, 92, 603. Optical spectra.
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×53″).
 Milne et al. 1989, PASA, 8, 187. MOST at 843 MHz (43″×52″: $S=153\pm40$ Jy), and Parkes 64-m at 8.4 GHz (3′: $S=68\pm5$ Jy), including polarisation.
 Seward 1990, ApJS, 73, 781. Einstein observations.
 Kassim et al. 1993, ApJ, 419, 733. ROSAT image.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×52″: $S>130$).
 Rosado et al. 1996, A&A, 315, 243. Optical kinematics.

Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Dickel et al. 2000, ApJ, 543, 840. ATCA at 1.34 GHz (6′4×8′5: $S>60$ Jy), 4.80 GHz (3′8: $S=25$ Jy for core only) and 8.64 GHz (3′2: $S=15$ Jy for core only).
 Temim et al. 2013, ApJ, 768, 61. XMM-Newton and Chandra observations.
 Yatsu et al. 2013, ApJ, 773, 25. XMM-Newton and Chandra observations.
 Planck Collaboration: Arnaud et al. 2016, A&A, 586, A134. Planck flux densities at 5 frequencies between 30 and 143 GHz.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Temim et al. 2017, ApJ, 851, 128. Chandra proper motion study of central source.
 Devin et al. 2018, A&A, 617, A5. Fermi observations.
 Cesur et al. 2019, AdSpR, 64, 759. Suzaku observations.
 Ball et al. 2023, MNRAS, 524, 1396. ASKAP at 933 MHz (18″: $S=148\pm3$ Jy).

G327.1–1.1

RA: 15^h54^m25^s
Dec: –55°09′

1-GHz flux/Jy: 7
Spectral index: ?

Size/arcmin: 18
Type: C

Radio: Shell, with off-centre core.

X-ray: Diffuse, with core.

Distance: Optical extinction suggests 4.5 kpc.

References:

Milne & Dickel 1974, AuJPh, 27, 549. Parkes 64-m at 2.7 GHz (8′4″: $S=10\pm15\%$ Jy).
 Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′: $S=10.6$ Jy) and Parkes 64-m at 5 GHz (4′: $S=4.3$ Jy).
 Lamb & Markert 1981, ApJ, 244, 94. Einstein observations.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×52″: $S=7.6$ Jy).
 Seward et al. 1996, ApJ, 471, 887. ROSAT observations.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Sun et al. 1999, ApJ, 511, 274. ASCA and ROSAT observations.
 Bocchino & Bandiera 2003, A&A, 398, 195. BeppoSAX observations.

Temim et al. 2009, ApJ, 691, 895. Chandra and XMM-Newton observations.
 Temim et al. 2015, ApJ, 808, 100. Chandra observations.
 Ma et al. 2016, ApJ, 820, 100. ATCA at 1.4 (19″×23″), 2.3 (11″×16″), 4.8 (13″×15″) and 8.6 GHz (8″×10″) of core, including polarisation.
 H.E.S.S. Collaboration: Abdalla et al. 2018, A&A, 612, A1. H.E.S.S. observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Xiang et al. 2021, ApJ, 912, 117. Fermi observations.
 Eagle et al. 2022, ApJ, 940, 143. Fermi observations.
 Ball et al. 2023, MNRAS, 524, 1396. ASKAP at 933 MHz (18″: $S=7.3\pm0.2$ Jy).

G327.2–0.1

RA: 15^h50^m55^s
Dec: –54°18′

1-GHz flux/Jy: 0.5
Spectral index: ?

Size/arcmin: 5
Type: S

Has been called G327.24–0.13.

Radio: Shell, possibly with central emission.

Point sources: Central pulsar (magnetar).

References:

Camilo et al. 2007, ApJ, 666, L93. Pulsar observations.
 Gelfand & Gaensler 2007, ApJ, 667, 1111. Chandra and XMM-Newton observations of magnetar, and 843 GHz (43″×53″: $S=0.5\pm0.1$ Jy) and SGPS at 1.4 GHz ($S=0.3\pm0.1$ Jy).
 Ball et al. 2023, MNRAS, 524, 1396. ASKAP at 933 MHz (18″: $S=0.50\pm0.05$ Jy).

G327.4+0.4

RA: 15^h48^m20^s
Dec: –53°49′

1-GHz flux/Jy: 26
Spectral index: 0.6

Size/arcmin: 21
Type: S

Kes 27

Has been called G327.3+0.4 and G327.3+0.5.

Radio: Incomplete, multi-arc shell, brightest to the SE.

X-ray: Diffuse, brighter in E.

Distance: H_I absorption indicates 4.3 to 5.4 kpc, optical extinction suggests 2.8 kpc.

References:

Caswell et al. 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′: $S=58$ Jy) and Parkes 64-m at 5 GHz (4′: $S=12.4$ Jy).
 Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′4″) and 5 GHz (4′4″).
 Lamb & Markert 1981, ApJ, 244, 94. Einstein observations.
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×55″).
 Milne et al. 1989, PASA, 8, 187. MOST at 843 MHz (43″×53″: $S=32.2\pm6$ Jy), and Parkes 64-m at 8.4 GHz (3′: $S=9.4\pm0.8$ Jy), including polarisation.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×53″: $S=25$ Jy).
 Seward et al. 1996, ApJ, 471, 887. ROSAT observations.

Green et al. 1997, AJ, 114, 2058. Parkes 64-m and ATCA OH observations.
 McClure-Griffiths et al. 2001, ApJ, 551, 394. ATCA and Parkes 64-m at 1.4 GHz (1′8″×2′0″), plus H_I.
 Enoguchi et al. 2002, PASJ, 54, 229. ASCA observations.
 Kawasaki et al. 2005, ApJ, 631, 935. ASCA observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.
 Chen et al. 2008, ApJ, 676, 1040. Chandra observations.
 Minami et al. 2014, in EFXU, p48. Suzaku observations.
 Xing et al. 2015, ApJ, 805, 19. Fermi observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Ball et al. 2023, MNRAS, 524, 1396. ASKAP at 933 MHz (18″: $S=26.1\pm0.4$ Jy).

G327.4+1.0		
RA: 15 ^h 46 ^m 48 ^s	1-GHz flux/Jy: 1.9	Size/arcmin: 14
Dec: −53°20′	Spectral index: ?	Type: S
Radio: Asymmetric shell.		
References:		
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×54″: $S=2.1$ Jy).		McClure-Griffiths et al. 2001, ApJ, 551, 394. ATCA and Parkes 64-m at 1.4 GHz (1′8×2′0), plus HI.
Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.		Ball et al. 2023, MNRAS, 524, 1396. ASKAP at 933 MHz (18″: $S=1.92\pm0.07$ Jy).

G327.6+14.6

RA: 15^h02^m50^s
Dec: −41°56′

1-GHz flux/Jy: 19
Spectral index: 0.6

SN1006, PKS 1459–41

Size/arcmin: 30
Type: S

This is the remnant of the SN of AD1006.

Radio: Shell, with two bright arcs.

Optical: Filaments to the NW, with broad H α component.

X-ray: Thermal shell, with non-thermal limb-brightened arcs.

Point sources: The background Schweizer–Middleditch star is near the middle of the remnant.

Distance: Optical spectra and proper motion indicate 1.85 kpc.

References:

- van den Bergh 1976, ApJ, 208, L17. Optical observations.
 Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8'4) and 5 GHz (4'4).
 Schweizer & Middleditch 1980, ApJ, 241, 1039. Possible stellar remnant.
 Caswell et al. 1983, MNRAS, 204, 921. FIRST at 1415 MHz (77'').
 Reynolds & Gilmore 1986, AJ, 92, 1138. VLA at 1.37 and 1.67 GHz (16'' $\times$ 20'').
 Kirshner et al. 1987, ApJ, 315, L135. Broad H α optical component.
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44'' $\times$ 66'').
 Fesen et al. 1988, ApJ, 327, 164. UV absorption spectra of the Schweizer–Middleditch star.
 Roger et al. 1988, ApJ, 332, 940. MOST at 843 MHz (44'' $\times$ 66'': $S=17.5\pm1.5$ Jy).
 Long et al. 1988, ApJ, 333, 749. Optical proper motion for distance.
 Wu et al. 1993, ApJ, 416, 247. UV spectra.
 Reynolds & Gilmore 1993, AJ, 106, 272. VLA at 1.37 and 1.67 GHz (24''), including polarisation.
 Moffett et al. 1993, AJ, 106, 1566. VLA at 1.37 and 1.67 GHz (10'' $\times$ 14''), for proper motion studies.
 Ozaki et al. 1994, PASJ, 46, 367. X-ray observations.
 Raymond et al. 1995, ApJ, 454, L31. Far UV spectroscopy.
 Koyama et al. 1995, Nature, 378, 255. ASCA observations.
 Willingale et al. 1996, MNRAS, 278, 749. ROSAT observations.
 Blair et al. 1996, ApJ, 468, 871. Optical absorption studies.
 Laming et al. 1996, ApJ, 472, 267. Modelling of optical spectra, including distance.
 Wu et al. 1997, ApJ, 477, L53. Far UV absorption spectra of the Schweizer–Middleditch star.
 Winkler & Long 1997, ApJ, 486, L137. UV absorption spectra of background quasar.
 Winkler & Long 1997, ApJ, 491, 829. ROSAT and optical images.
 Vink et al. 2000, A&A, 354, 931. X-ray spectroscopy.
 Burleigh et al. 2000, A&A, 356, 585. Optical spectroscopy of the Schweizer–Middleditch star.
 Allen et al. 2001, ApJ, 558, 739. ASCA, ROSAT and other X-ray observations.
 Dubner et al. 2002, A&A, 387, 1047. ATCA at 1.4 GHz (3'0 $\times$ 4'7) for H I , plus CO observations.
 Ghavamian et al. 2002, ApJ, 572, 888. Optical of filaments in NW.
 Sollerman et al. 2003, A&A, 407, 249. Optical spectroscopy.
 Winkler et al. 2003, ApJ, 585, 324. Optical proper motion studies.
 Vink et al. 2003, ApJ, 587, L31. XMM-Newton observations.
 Bamba et al. 2003, ApJ, 589, 827. Chandra observations of NE.
 Winkler et al. 2005, ApJ, 624, 189. HST absorption towards background sources.
 Kalemci et al. 2006, ApJ, 644, 274. INTEGRAL observations.
 Acero et al. 2007, A&A, 475, 883. XMM-Newton observations.
 Raymond et al. 2007, ApJ, 659, 1257. HST H α observations.
 Hamilton et al. 2007, MNRAS, 381, 771. UV spectroscopy of the Schweizer–Middleditch star.
 Bamba et al. 2008, AdSpR, 41, 411. Suzaku observations.
 Cassam-Chenaï et al. 2008, ApJ, 680, 1180. ATCA and VLA at 1.5 GHz (6'' $\times$ 9'') plus Chandra observations.
 Yamaguchi et al. 2008, PASJ, 60, S141. Suzaku observations.
 Dyer et al. 2009, AJ, 137, 2956. GBT and VLA at 1.4 GHz.
 Winkler et al. 2011, ApJ, 742, 80. Multi-epoch UV spectroscopy of the Schweizer–Middleditch star.
 Broersen et al. 2013, A&A, 552, A9. XMM-Newton observations of NW knot.
 Miceli et al. 2013, A&A, 556, A80. XMM-Newton observations.
 Katsuda et al. 2013, ApJ, 763, 85. Chandra proper motion study of NW.
 Winkler et al. 2013, ApJ, 764, 156. Spitzer observations.
 Uchida et al. 2013, ApJ, 771, 56. Suzaku observations.
 Reynoso et al. 2013, AJ, 145, 104. VLA and ATCA at 1.4 GHz (10''), including polarisation.
 Nikolić et al. 2013, Science, 340, 45. Optical spectroscopy.
 Winkler et al. 2014, ApJ, 781, 65. Chandra observations and H α spectroscopy.
 Miceli et al. 2014, ApJ, 782, L33. XMM-Newton observations of SW.
 Acero et al. 2015, A&A, 580, A74. Fermi limit.
 Sparls et al. 2015, ApJ, 815, L9. Polarised optical line observations.
 Li et al. 2015, MNRAS, 453, 3953. XMM-Newton observations. see also: Li et al. 2020, MNRAS, 499, 5679. Erratum.
 Planck Collaboration: Arnaud et al. 2016, A&A, 586, A134. Planck flux densities at 4 frequencies between 30 and 100 GHz.
 Li et al. 2016, MNRAS, 462, 158. XMM-Newton observations.
 Raymond et al. 2017, ApJ, 851, 12. UV and optical spectra, for proper motions and distance.
 Condon et al. 2017, ApJ, 851, 100. Fermi observations.
 Kerzendorf et al. 2018, MNRAS, 479, 192. Optical search for progenitor companion.
 Li et al. 2018, ApJ, 864, 85. NuSTAR observations of NE and SW limbs.
 Xing et al. 2019, PASJ, 71, 77. Fermi observations.
 Sano et al. 2022, ApJ, 933, 157. ATCA and Parkes 64-m at 1.4 GHz for H I (1'4 $\times$ 5'5).
 Zhao et al. 2023, ApJ, 957, 55. IXPE polarisation observations.

G328.4+0.2

(MSH 15–57)

RA: 15^h55^m30^s**1-GHz flux/Jy:** 15**Size/arcmin:** 5**Dec:** –53°17′**Spectral index:** 0.0**Type:** F**Radio:** Amorphous emission, with central bar.**X-ray:** Detected at high energies.**Distance:** H I absorption indicates > 17.4 kpc.**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Caswell et al. 1980, MNRAS, 190, 881. FIRST at 1415 MHz (50′′).
 Wilson 1986, ApJ, 302, 718. Lack of detection with Einstein.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43′′×54′′: $S=15$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Gaensler et al. 2000, ApJ, 542, 380. ATCA at 1.4 GHz (16′′5×19′′5: $S=14.3\pm0.1$ Jy) and 4.5 GHz (1′′5×2′′0: $S=12.5\pm0.2$ Jy).

Hughes et al. 2000, ApJ, 542, 386. ASCA observations.
 McClure-Griffiths et al. 2001, ApJ, 551, 394. ATCA and Parkes 64-m at 1.4 GHz (1′8×2′0), plus H I.
 Johnston et al. 2004, MNRAS, 348, L19. ATCA at 19 GHz (6′′1×7′′7), including polarisation.
 Gelfand et al. 2007, ApJ, 663, 468. ATCA at 1.4 GHz (5′′8×7′′0: $S=13.8\pm0.4$ Jy), plus XMM-Newton observations.
 Ball et al. 2023, MNRAS, 524, 1396. ASKAP at 933 MHz (18′′: $S=15.3\pm0.3$ Jy).

G329.7+0.4**RA:** 16^h01^m20^s**1-GHz flux/Jy:** >34?**Size/arcmin:** 40×33**Dec:** –52°18′**Spectral index:** ?**Type:** S**Radio:** Diffuse shell, in complex region.**Distance:** Optical extinction suggests 2.8 kpc.**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43′′×53′′: $S>38$).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 McClure-Griffiths et al. 2001, ApJ, 551, 394. ATCA and Parkes 64-m at 1.4 GHz (1′8×2′0), plus H I.

Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G330.0+15.0

Lupus Loop

RA: 15^h10^m00^s**1-GHz flux/Jy:** 350?**Size/arcmin:** 180?**Dec:** –40°00′**Spectral index:** 0.5?**Type:** S**Radio:** Low surface brightness loop with H I shell.**X-ray:** Detected, with central source.**Point sources:** Central, possibly pulsating, X-ray source.**References:**

Milne 1971, AuJPh, 24, 757. Parkes 64-m at 408 MHz (48′), 635 MHz (31′) and 1410 MHz (15′).
 Milne & Dickel 1974, AuJPh, 27, 549. Parkes 64-m at 2.7 GHz (8′4: $S=120\pm30\%$ Jy).
 Toor 1980, A&A, 85, 184. X-ray image and spectrum.
 Colomb & Dubner 1982, A&A, 112, 141. Argentine 30-m dish at 1.42 GHz (30′), H I observations.

Leahy et al. 1991, ApJ, 374, 218. HEAO-1 X-ray spectra.
 Ozaki et al. 1994, PASJ, 46, 367. X-ray observations.
 Kaplan et al. 2006, ApJS, 163, 344. X-ray upper limit on compact sources.
 Shinn et al. 2006, ApJ, 644, L189. Far UV observations.

G330.2+1.0

RA: 16^h01^m06^s
Dec: −51°34′

1-GHz flux/Jy: 5?
Spectral index: 0.3

Size/arcmin: 11
Type: S?

Radio: Clumpy non-thermal emission, possibly a distorted shell.

X-ray: Shell.

Point sources: Central compact X-ray source.

Distance: H_I absorption indicates > 4.9 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S = 8.6$ Jy) and Parkes 64-m at 5 GHz (4′ : $S = 4.0$ Jy).
 Caswell et al. 1983, MNRAS, 204, 915. FIRST at 1415 MHz (47″ × 52″), and MOST at 843 MHz (43″ × 55″).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″ × 55″ : $S = 4.7$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 McClure-Griffiths et al. 2001, ApJ, 551, 394. ATCA and Parkes 64-m at 1.4 GHz (1′8 × 2′0), plus H_I.
 Torii et al. 2006, PASJ, 58, L11. ASCA detection.
 Park et al. 2009, ApJ, 695, 431. XMM-Newton and Chandra observations.

H.E.S.S. Collaboration: Abramowski et al. 2014, MNRAS, 441, 790. H.E.S.S. upper limit.
 Doroshenko et al. 2018, A&A, 618, A76. XMM-Newton observations of central source.
 Williams et al. 2018, ApJ, 855, 118. XMM-Newton observations.
 Borkowski et al. 2018, ApJ, 868, L21. Chandra observations for expansion study.
 Mayer & Becker 2021, A&A, 651, A40. Multi-epoch Chandra observations for proper motion of compact source.

G332.0+0.2

RA: 16^h13^m17^s
Dec: −50°53′

1-GHz flux/Jy: 8?
Spectral index: 0.5

Size/arcmin: 12
Type: S

Radio: Incomplete shell.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″ × 57″).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″ × 55″ : $S = 8.9$ Jy).

Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 McClure-Griffiths et al. 2001, ApJ, 551, 394. ATCA and Parkes 64-m at 1.4 GHz (1′8 × 2′0), plus H_I.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.

G332.4–0.4

RA: 16^h17^m33^s
Dec: –51°02′

1-GHz flux/Jy: 28
Spectral index: 0.5

RCW 103

Size/arcmin: 10
Type: S

Radio: Shell, brightest to the S.

Optical: Filaments correspond well to the radio shell, brightest in SE.

X-ray: Brightest to NW, with point source near centre.

Point sources: Central, variable X-ray source, and nearby pulsar.

Distance: H_I absorption indicates 3.1 kpc, optical extinction suggests about 3 kpc.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Caswell et al. 1975, A&A, 45, 239. Parkes H_I absorption.
 Tuohy & Garmire 1980, ApJ, 239, L107. Einstein detection of X-ray point source.
 Caswell et al. 1980, MNRAS, 190, 881. FIRST at 1415 MHz (50′′).
 Lamb & Markert 1981, ApJ, 244, 94. Einstein observations.
 Ruiz 1983, AJ, 88, 1210. Optical spectra.
 Tuohy et al. 1983, ApJ, 268, 778. X-ray observations.
 Leibowitz & Danziger 1983, MNRAS, 204, 273. Optical spectra.
 Nugent et al. 1984, ApJ, 284, 612. X-ray spectrum (and Einstein image from Tuohy, private communication).
 Meaburn & Allan 1986, MNRAS, 222, 593. Optical spectra.
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44′′×57′′).
 Oliva et al. 1990, A&A, 240, 453. IR spectroscopy.
 Dickel et al. 1996, AJ, 111, 340. ATCA at 1.36 (8′′) and 2.37 GHz (4′.5′′), including polarisation.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43′′×55′′: S=34 Jy).
 Frail et al. 1996, AJ, 111, 1651. OH emission near remnant.
 Gotthelf et al. 1997, ApJ, 487, L175. ASCA observations of compact X-ray source.
 Carter et al. 1997, PASP, 109, 990. Optical expansion.
 Torii et al. 1998, ApJ, 494, L207. ASCA detection of nearby pulsar.
 Kaspi et al. 1998, ApJ, 503, L161. Pulsar observations.
 Gotthelf et al. 1999, ApJ, 514, L107. X-ray variability of central source.
 Oliva et al. 1999, A&A, 343, 943. ISO spectroscopy.
 Torii et al. 2000, ApJ, 534, L71. X-ray timing on pulsar, including glitch.

Reynoso et al. 2004, PASA, 21, 82. ATCA at 1.4 GHz (50′′), including H_I absorption to central source.
 Russeil et al. 2005, A&A, 429, 497. H α observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Paron 2006, PASA, 23, 69. CO and HCO⁺ observations of surroundings.
 De Luca 2006, Science, 313, 814. XMM-Newton observations of central source.
 De Luca 2007, Ap&SS, 308, 231. XMM-Newton observation of periodicity of central source.
 Matsumoto et al. 2007, PASJ, 59, S199. Suzaku observations.
 De Luca 2008, ApJ, 682, 1185. IR observations of central source.
 Andersen et al. 2011, ApJ, 742, 7. Spitzer observations.
 Xing et al. 2014, ApJ, 781, 64. Fermi observations.
 Frank et al. 2015, ApJ, 810, 113. Chandra observations.
 Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
 Rea et al. 2016, ApJ, 828, L13. Chandra, NuSTAR and Swift observations.
 Borghese et al. 2018, MNRAS, 478, 741. NuSTAR and Swift observations of central source.
 Shan et al. 2019, RAA, 19, 92. Optical extinction for distance.
 Esposito et al. 2019, A&A, 626, A19. XMM-Newton and optical observations of central source flare.
 Braun et al. 2019, MNRAS, 489, 4444. Chandra and XMM-Newton observations of central source.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Millard et al. 2021, ApJS, 257, 36. ISO far-IR spectroscopy.
 Narita et al. 2023, ApJ, 950, 137. XMM-Newton spectroscopy.
 Suzuki et al. 2023, ApJ, 958, 30. Multi-epoch Chandra observations, for proper motion.

G332.4+0.1

RA: 16^h15^m20^s
Dec: –50°42′

1-GHz flux/Jy: 26
Spectral index: 0.5

MSH 16–51, Kes 32

Size/arcmin: 15
Type: S

Has been called G332.4+0.2.

Radio: Distorted shell, with thermal jet and plume adjacent.

Optical: Detected.

X-ray: Shell, brightest to NW.

Point sources: Pulsar nearby.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Roger et al. 1985, Nature, 316, 44. MOST at 843 MHz (44′′×57′′).
 Caraveo 1993, ApJ, 415, L111. Nearby pulsar.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43′′×56′′: S=29 Jy).

Frail et al. 1996, AJ, 111, 1651. OH emission near remnant.
 Brinkmann et al. 1999, A&A, 346, 599. ROSAT image of remnant and nearby pulsar.
 Vink et al. 2004, ApJ, 604, 693. Chandra observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.

G332.5–5.6

RA: $16^{\text{h}}43^{\text{m}}20^{\text{s}}$
Dec: $-54^{\circ}30'$

1-GHz flux/Jy: 2?
Spectral index: 0.7?

Size/arcmin: 35
Type: S

Radio: Bipolar shell, with central emission also.

Optical: Patchy filaments.

X-ray: Emission from centre.

Distance: Optical extinction suggests 3 kpc.

References:

Duncan et al. 1997, MNRAS, 287, 722. Parkes 64-m at 2.4 GHz.
 Reynoso & Green 2007, MNRAS, 375, 92. ATCA at 1.4 GHz ($40'' : S = 1.90 \pm 0.15$ Jy) and 2.4 GHz ($90'' : S = 1.3 \pm 0.2$ Jy) including polarisation, and 843 MHz ($43'' \times 53''$) plus ROSAT observations.
 Stupar et al. 2007, MNRAS, 381, 377. Optical observations, plus ATCA at 1.4 GHz ($58''$) and 2.4 GHz ($95''$) including polarisation, and other observations.

Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.
 Zhu et al. 2015, MNRAS, 452, 3470. Suzaku observations, and distance estimate.
 Suárez et al. 2015, A&A, 583, A84. XMM-Newton observations of central region.
 Ackermann et al. 2018, ApJS, 237, 32. Fermi observations.

G335.2+0.1

RA: $16^{\text{h}}27^{\text{m}}45^{\text{s}}$
Dec: $-48^{\circ}47'$

1-GHz flux/Jy: 16
Spectral index: 0.5

Size/arcmin: 21
Type: S

Radio: Well defined shell.

Point sources: Old pulsar within remnant boundary.

Distance: Optical extinction suggests 3.9 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3' : S = 27.1$ Jy) and Parkes 64-m at 5 GHz ($4' : S = 8.6$ Jy).
 Kaspi et al. 1996, AJ, 111, 2028. Pulsar observations.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 57'' : S = 16$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.

Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.
 de Wilt et al. 2017, MNRAS, 468, 2093. Molecular line observations of region.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G336.7+0.5

RA: $16^{\text{h}}32^{\text{m}}11^{\text{s}}$
Dec: $-47^{\circ}19'$

1-GHz flux/Jy: 6
Spectral index: 0.5

Size/arcmin: 14×10
Type: S

Radio: Irregular shell.

Optical: Detected.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz ($3'$) and Parkes 64-m at 5 GHz ($4'$).
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz ($44'' \times 60''$).

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 58'' : S = 6.1$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.

G337.0–0.1

(CTB 33)

RA: 16^h35^m57^s**1-GHz flux/Jy:** 1.5**Size/arcmin:** 1.5**Dec:** –47°36′**Spectral index:** 0.6?**Type:** S

This entry refers to a small (1′5) SNR, not the larger previously catalogued G337.0–0.1. Has erroneously been called G337.7–0.1.

Radio: Shell, in a complex region.

Point sources: Associated with a soft gamma repeater.

Distance: Association with CTB 33 gives 11 kpc.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×58″: $S=21$ Jy).
 Frail et al. 1996, AJ, 111, 1651. OH emission near remnant, including masers.
 Sarma et al. 1997, ApJ, 483, 335. ATCA at 1.4 GHz (12″) including H_I, and 8.9 GHz (13″×15″) for recombination lines, clarifying extent of the remnant.

Woods et al. 1999, ApJ, 519, L139. Soft gamma repeater observations.
 Hurley et al. 2000, ApJ, 528, L21. ASCA observations of soft gamma repeater.
 Brogan et al. 2000, ApJ, 537, 875. VLA at 1.7 GHz for OH Zeeman splitting.
 Castro et al. 2013, ApJ, 774, 36. Fermi observations.

G337.2–0.7**RA:** 16^h39^m28^s**1-GHz flux/Jy:** 1.5**Size/arcmin:** 6**Dec:** –47°51′**Spectral index:** 0.4**Type:** S

Radio: Shell, brighter in S.

X-ray: Extended emission.

Distance: H_I absorption suggests 2.0 to 9.3 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′: $S=3.8$ Jy) and Parkes 64-m at 5 GHz (4′: $S=0.70$ Jy).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×58″: $S=2.0$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Rakowski et al. 2001, ApJ, 548, 258. ASCA and ROSAT observations.

Rakowski et al. 2006, ApJ, 646, 982. ATCA at 1.3 GHz (15″: $S=1.55\pm0.05$ Jy) and 5 GHz (15″: $S=0.93\pm0.02$ Jy), plus H_I and Chandra observations.
 Yamaguchi et al. 2014, ApJ, 785, L27. Suzaku observations.
 Takata et al. 2016, PASJ, 68, S3. Suzaku observations.

G337.2+0.1**RA:** 16^h35^m55^s**1-GHz flux/Jy:** 1.5?**Size/arcmin:** 3×2**Dec:** –47°20′**Spectral index:** ?**Type:** ?

Radio: Not well defined.

X-ray: Detected.

Distance: Association with H_I hole gives 14 kpc.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×59″: $S=1.6$ Jy).
 Combi et al. 2005, A&A, 431, L9. ASCA and other observations.

Aharonian et al. 2006, ApJ, 636, 777. H.E.S.S. observations of nearby source.
 Combi et al. 2006, ApJ, 653, L41. XMM-Newton observations.

G337.3+1.0

Kes 40

RA: 16^h32^m39^s
Dec: –46°36′**1-GHz flux/Jy:** 16
Spectral index: 0.55**Size/arcmin:** 15×12
Type: S**Radio:** Nearly complete shell.**References:**

Caswell et al. 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′ : $S=24.6$ Jy) and Parkes 64-m at 5 GHz (4′ : $S=7.2$ Jy).
 Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′4) and 5 GHz (4′4).
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×61″).

Milne et al. 1989, PASA, 8, 187. MOST at 843 MHz (43″×59″ : $S = 14.8 \pm 3.0$ Jy), and Parkes 64-m at 8.4 GHz (3′ : $S = 5.1 \pm 0.6$ Jy), including polarisation.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×59″ : $S=20$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.

G337.8–0.1

Kes 41

RA: 16^h39^m01^s
Dec: –46°59′**1-GHz flux/Jy:** 15
Spectral index: 0.5**Size/arcmin:** 9×6
Type: S**Radio:** Distorted shell.**X-ray:** Centrally brightened.**Distance:** H I absorption suggests 11 kpc.**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Caswell et al. 1975, A&A, 45, 239. Parkes H I absorption.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×59″ : $S=18$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Koralesky et al. 1998, AJ, 116, 1323. VLA detection of compact OH emission.
 Caswell 2004, MNRAS, 349, 99. ATCA at 1.7 GHz, for associated OH masers.
 Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.
 Kothes & Dougherty 2007, A&A, 468, 993. SGPS at 1.4 GHz including H I.

Combi et al. 2008, A&A, 488, L25. XMM-Newton observations.
 Zhang et al. 2015, ApJ, 799, 103. XMM-Newton, Chandra and CO observations.
 Liu et al. 2015, ApJ, 809, 102. Fermi observations.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Qiao et al. 2016, ApJS, 227, 26. OH maser observations.
 Supan et al. 2018, A&A, 619, A108. CO, H I and Spitzer observations.
 Supan et al. 2018, A&A, 619, A109. Fermi observations and review of radio flux densities.
 Ogbodo et al. 2020, MNRAS, 493, 199. OH maser observations.

G338.1+0.4**RA:** 16^h37^m59^s
Dec: –46°24′**1-GHz flux/Jy:** 4?
Spectral index: 0.4**Size/arcmin:** 15?
Type: S**Radio:** Arc in NE, merging with thermal emission in S.**Optical:** Detected.**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Zealey et al. 1979, A&AS, 38, 39. Optical detection.
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×59″ : $S=3.8$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.

G338.3–0.0

RA: 16^h41^m00^s
Dec: –46°34′

1-GHz flux/Jy: 7?
Spectral index: ?

Size/arcmin: 8
Type: C?

Radio: Irregular shell, in complex region.

X-ray: Central X-ray source and nebula.

Point sources: Central pulsar.

Distance: H I observations suggest 8 to 13 kpc.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×59″: $S=7.4$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Aharonian et al. 2005, Science, 307, 1938. H.E.S.S. detection.
 Aharonian et al. 2006, ApJ, 636, 777. H.E.S.S. observations.
 Landi et al. 2006, ApJ, 651, 190. X-ray observations.
 Funk et al. 2007, ApJ, 662, 517. XMM-Newton observations.
 Lemi re et al. 2009, ApJ, 706, 1269. Chandra observations of central source and nebula.
 Slane et al. 2010, ApJ, 720, 266. Fermi observations.
 Castelletti et al. 2011, A&A, 536, A98. GMRT at 235 MHz (10″×26″), 610 MHz (5″0×12″6) and 1280 MHz (5″0×6″4), plus ATCA at 2.3 GHz (4″3×4″8).
 Gotthelf et al. 2014, ApJ, 788, 155. NuSTAR observations.

Lemoine-Goumard et al. 2014, ApJ, 794, L16. Fermi observations.
 Abramowski et al. 2014, MNRAS, 439, 2828. H.E.S.S. observations.
 see also: H.E.S.S. Collaboration: Abramowski et al. 2014, MNRAS, 441, 3640. Erratum.
 Supan et al. 2016, A&A, 589, A51. SGPS H I and other observations.
 Lau et al. 2017, MNRAS, 464, 3757. CO and other molecular line observations, plus H I observations.
 de Wilt et al. 2017, MNRAS, 468, 2093. Molecular line observations of region.
 Xin et al. 2018, ApJ, 867, 55. Fermi observations.
 Mares et al. 2021, ApJ, 912, 158. Fermi observations.
 Abdelmaguid et al. 2023, ApJ, 946, 40. NuSTAR observations of pulsar and nebula.

G338.5+0.1

RA: 16^h41^m09^s
Dec: –46°19′

1-GHz flux/Jy: 12?
Spectral index: ?

Size/arcmin: 9
Type: ?

Radio: Circle of non-thermal emission in complex region, not well defined.

Distance: H I absorption suggests 11 kpc.

References:

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×59″: $S=13$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Kothes & Dougherty 2007, A&A, 468, 993. SGPS at 1.4 GHz including H I.

Abramowski et al. 2014, ApJ, 794, L1. H.E.S.S. observations.
 Lau et al. 2017, MNRAS, 464, 3757. CO and other molecular line observations, plus H I observations.
 de Wilt et al. 2017, MNRAS, 468, 2093. Molecular line observations of region.
 Mares et al. 2021, ApJ, 912, 158. Fermi observations.

G340.4+0.4

RA: 16^h46^m31^s
Dec: –44°39′

1-GHz flux/Jy: 5
Spectral index: 0.4

Size/arcmin: 10×7
Type: S

Radio: Distorted shell, elongated east–west.

Optical: Detected.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′: $S=8.2$ Jy) and Parkes 64-m at 5 GHz (4′: $S=2.9$ Jy).
 Caswell et al. 1983, MNRAS, 203, 595. FIRST at 1415 MHz (50″).
 Dubner et al. 1996, AJ, 111, 1304. VLA at 330 MHz (48″×75″: $S=9.8\pm0.9$ Jy) and 1.4 GHz (9″×27″: $S=3.6\pm0.1$ Jy).

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×61″: $S=5.9$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.

G340.6+0.3

RA: 16^h47^m41^s
Dec: −44°34′

1-GHz flux/Jy: 5?
Spectral index: 0.4?

Size/arcmin: 6
Type: S

Radio: Incomplete shell.

Optical: Possible associated filaments.

Distance: H_i absorption suggests 15 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S = 7.0$ Jy) and Parkes 64-m at 5 GHz (4′ : $S = 2.8$ Jy).
 Zealey et al. 1979, A&AS, 38, 39. Optical observations.
 Caswell et al. 1983, MNRAS, 203, 595. FIRST at 1415 MHz (50′′).
 Dubner et al. 1996, AJ, 111, 1304. VLA at 330 MHz (48′′ × 75′′ : $S = 9.2 \pm 0.9$ Jy) and 1.4 GHz (9′′ × 27′′ : $S = 5.8 \pm 0.1$ Jy).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43′′ × 61′′ : $S = 4.5$ Jy).

Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Koralesky et al. 1998, AJ, 116, 1323. VLA search for OH emission.
 Reach et al. 2006, AJ, 131, 1479. Spitzer possible detection.
 Kothes & Dougherty 2007, A&A, 468, 993. SGPS at 1.4 GHz including H_i.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.

G341.2+0.9

RA: 16^h47^m35^s
Dec: −43°47′

1-GHz flux/Jy: 1.5?
Spectral index: 0.6?

Size/arcmin: 22 × 16
Type: C

Radio: Incomplete shell, with extension to SW.

Point sources: Pulsar in W, with wind nebula.

Distance: Optical extinction suggests 4.3 kpc.

References:

Frail et al. 1994, ApJ, 437, 781. VLA at 330 MHz (54′′ × 116′′ : $S = 3.0 \pm 0.1$ Jy) and 1.4 GHz (21′′ × 25′′ : $S = 12.5 \pm 0.05$ Jy).
 Giacani et al. 2001, AJ, 121, 3133. VLA at 1.4 and 4.9 GHz (25′′) of pulsar wind nebula.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G341.9−0.3

RA: 16^h55^m01^s
Dec: −44°01′

1-GHz flux/Jy: 2.5
Spectral index: 0.5

Size/arcmin: 7
Type: S

Radio: Incomplete shell, brightest to NE.

References:

Caswell et al. 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′ : $S = 7.4$ Jy) and Parkes 64-m at 5 GHz (4′ : $S = 1.7$ Jy).
 Caswell et al. 1983, MNRAS, 203, 595. FIRST at 1415 MHz (50′′), revision of previous flux densities.
 Dubner et al. 1996, AJ, 111, 1304. VLA at 1.4 GHz (11′′ × 35′′ : $S = 2.2 \pm 0.1$ Jy).

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43′′ × 62′′ : $S = 2.7$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Koralesky et al. 1998, AJ, 116, 1323. VLA search for OH emission.

G342.0−0.2

RA: 16^h54^m50^s
Dec: −43°53′

1-GHz flux/Jy: 3.5?
Spectral index: 0.4?

Size/arcmin: 12 × 9
Type: S

Radio: Distorted shell.

References:

Caswell et al. 1983, MNRAS, 203, 595. FIRST at 1415 MHz (50′′), estimate $S_{408 \text{ MHz}} = 5$ Jy, $S_{5 \text{ GHz}} = 2$ Jy from previous maps.
 Dubner et al. 1996, AJ, 111, 1304. VLA at 1.4 GHz (11′′ × 35′′).

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43′′ × 62′′ : $S = 3.5$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Koralesky et al. 1998, AJ, 116, 1323. VLA search for OH emission.

G342.1+0.9

RA: 16^h50^m43^s
Dec: −43°04′

1-GHz flux/Jy: 0.5?
Spectral index: ?

Size/arcmin: 10×9
Type: S

Radio: Incomplete shell.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz
 (43″×63″: $S=0.6$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.

G343.0−6.0

RA: 17^h25^m00^s
Dec: −46°30′

1-GHz flux/Jy: ?
Spectral index: ?

RCW 114
Size/arcmin: 250
Type: S

Radio: Faint, poorly defined.

Optical: Filamentary shell.

Point sources: Pulsar near edge.

References:

Duncan et al. 1997, MNRAS, 287, 722. Parkes 64-m at 2.4 GHz
 (11′).
 Walker & Zealey 2001, MNRAS, 325, 287. Optical observations,
 and review of earlier observations.

Welsh et al. 2003, A&A, 403, 605. Optical spectroscopy.
 Casandjian & Grenier 2008, A&A, 489, 849. γ -ray observations.
 Kim et al. 2010, ApJ, 709, 823. UV observations.
 Shternin et al. 2019, ApJ, 877, 78. Pulsar proper motion.

G343.1−2.3

RA: 17^h08^m00^s
Dec: −44°16′

1-GHz flux/Jy: 8?
Spectral index: 0.5?

Size/arcmin: 32?
Type: C?

Radio: Incomplete shell?

X-ray: Pulsar wind nebula.

Point sources: Pulsar near edge, with wind nebula.

Distance: Optical extinction suggests 3.1 kpc.

References:

McAdam et al. 1993, Nature, 361, 516. MOST at 843 MHz
 (smoothed to 2′).
 Frail et al. 1994, ApJ, 437, 781. VLA at 330 MHz (56″×111″:
 $S=10.6$ Jy) and 1.4 GHz (22″×27″) near pulsar.
 Becker et al. 1995, A&A, 298, 528. ROSAT of pulsar, and limit
 for remnant.
 Giacani et al. 2001, AJ, 121, 3133. VLA at 1.4, 4.9 and
 8.5 GHz (25″) of pulsar wind nebula.
 Gotthelf et al. 2002, ApJ, 567, L125. Pulsar x-ray detection.
 Dodson & Golap 2002, MNRAS, 334, L1. ATCA at 1.4 GHz
 (47″×70″) including polarisation, and Chandra observations of
 pulsar wind nebula.

Aharonian et al. 2005, A&A, 432, L9. H.E.S.S. limit.
 H.E.S.S. Collaboration: Abramowski et al. 2011, A&A, 528,
 A143. H.E.S.S. observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for dis-
 tance.
 de Vries et al. 2021, ApJ, 908, 50. Pulsar proper motion.
 Liu et al. 2023, ApJ, 945, 82. ATCA at 1.4 and 2.5 GHz (70″),
 including polarisation, and at 5 and 8 GHz of pulsar and neb-
 ula.

G343.1−0.7

RA: 17^h00^m25^s
Dec: −43°14′

1-GHz flux/Jy: 7.8
Spectral index: 0.55

Size/arcmin: 27×21
Type: S

Radio: Shell, with smaller thermal shell adjacent.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz
 (43″×63″: $S=8.5\pm0.6$), plus Parkes 64-m at 4.5 GHz ($S=$
 3.9 ± 0.6 Jy) and 8.55 GHz ($S=2.4\pm0.5$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Koralesky et al. 1998, AJ, 116, 1323. VLA search for OH emis-
 sion.

G344.7–0.1

RA: 17^h03^m51^s
Dec: –41°42′

1-GHz flux/Jy: 2.5?
Spectral index: 0.3?

Size/arcmin: 8
Type: C?

Radio: Asymmetric shell, with possible core.

X-ray: Detected.

Distance: H_I absorption and association with features suggests 6.3 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S = 4.7$ Jy) and Parkes 64-m at 5 GHz (4′ : $S = 1.3$ Jy).
 Dubner et al. 1993, AJ, 105, 2251. VLA at 1.47 GHz (30″ × 43″ : $S = 1.7 \pm 0.1$ Jy).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″ × 65″ : $S = 2.5$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Yamauchi et al. 2005, PASJ, 57, 459. ASCA observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Combi et al. 2010, A&A, 522, A50. XMM-Newton and Chandra and other observations.

Giacani et al. 2011, A&A, 531, A138. VLA and ATCA at 1.4 GHz (5″6 × 8″), ATCA at 5 GHz (10″ × 13″) and 8.4 GHz (5″ × 10″), plus XMM-Newton observations and H_I from SGPS.
 Andersen et al. 2011, ApJ, 742, 7. Spitzer observations.
 Yamaguchi et al. 2012, ApJ, 749, 137. Suzaku observations.
 Yang et al. 2013, ApJ, 766, 44. Suzaku spectroscopy.
 Ingallinera et al. 2019, MNRAS, 490, 5063. ATCA at 1.4 to 3.1 GHz ($\sim 10''$).
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Fukushima et al. 2020, ApJ, 897, 62. Chandra observations.
 Eagle et al. 2020, ApJ, 904, 123. Fermi observations.

G345.1–0.2

RA: 17^h05^m21^s
Dec: –41°26′

1-GHz flux/Jy: 1.4?
Spectral index: 0.7?

Size/arcmin: 6
Type: S

Radio: Asymmetric shell.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″ × 65″ : $S = 1.8$ Jy).
 Roy & Pal 2014, IAUS, 296, 197. GMRT at 330 MHz (13″ × 19″).
 Green et al. 2014, PASA, 31, 42. MGPS at 843 MHz (45″ × 45″ cosec(δ)).

Ingallinera et al. 2019, MNRAS, 490, 5063. ATCA at 1.4 to 3.1 GHz ($\sim 10''$).
 Hurley-Walker et al. 2019, PASA, 36, e048. MWA at 72 to 231 MHz ($\sim 2''$).

G345.1+0.2

RA: 17^h03^m40^s
Dec: –41°05′

1-GHz flux/Jy: 0.6?
Spectral index: 0.6?

Size/arcmin: 10
Type: S

Has been called G345.2+0.2.

Radio: Irregular shell.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″ × 65″ : $S = 0.7$ Jy).
 Green et al. 2014, PASA, 31, 42. MGPS at 843 MHz (45″ × 45″ cosec(δ)).

Ingallinera et al. 2019, MNRAS, 490, 5063. ATCA at 1.4 to 3.1 GHz ($\sim 10''$).
 Hurley-Walker et al. 2019, PASA, 36, e048. MWA at 72 to 231 MHz ($\sim 2''$).

G345.7–0.2

RA: 17^h07^m20^s
Dec: –40°53′

1-GHz flux/Jy: 0.6?
Spectral index: ?

Size/arcmin: 6
Type: S

Radio: Poorly defined diffuse shell.

Point sources: Old pulsar nearby.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″ × 66″ : $S = 0.7$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.

G346.6–0.2

RA: $17^{\text{h}}10^{\text{m}}19^{\text{s}}$
Dec: $-40^{\circ}11'$

1-GHz flux/Jy: 8?
Spectral index: 0.5?

Size/arcmin: 8
Type: S

Radio: Irregular shell.

X-ray: Centrally brightened, clumpy.

Distance: CO and H_I suggest 11.1 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3'$: $S = 14.9$ Jy) and Parkes 64-m at 5 GHz ($4'$: $S = 4.3$ Jy).
 Dubner et al. 1993, AJ, 105, 2251. VLA at 1.47 GHz ($31'' \times 43''$: $S = 8.1 \pm 0.9$ Jy).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 67''$: $S = 8.7$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Koralesky et al. 1998, AJ, 116, 1323. VLA detection of compact OH emission.
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Hewitt et al. 2009, ApJ, 694, 1266. Spitzer spectroscopy.

Sezer et al. 2011, MNRAS, 415, 301. Suzaku observations.
 Andersen et al. 2011, ApJ, 742, 7. Spitzer observations.
 Yamauchi et al. 2013, PASJ, 65, 6. Suzaku observations.
 Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.
 Pannuti et al. 2014, AJ, 147, 55. ASCA observations.
 Auchettl et al. 2017, ApJ, 847, 121. XMM-Newton observations.
 Qiao et al. 2020, ApJS, 247, 5. ATCA of OH masers.
 Sano et al. 2021, ApJ, 923, 15. CO, H_I and other observations.

G347.3–0.5

RA: $17^{\text{h}}13^{\text{m}}50^{\text{s}}$
Dec: $-39^{\circ}45'$

1-GHz flux/Jy: 30?
Spectral index: ?

RX J1713.7–3946

Size/arcmin: 65×55
Type: S?

Radio: Faint emission.

X-ray: Non-thermal, limb-brightened to W, with central source.

Point sources: Central X-ray source.

Distance: Association with molecular clouds and X-ray observations imply 1.3 kpc, association with dust suggests 1.1 kpc, optical extinction suggests 4.6 kpc.

References:

Koyama et al. 1997, PASJ, 49, L7. ASCA of NW.
 Slane et al. 1999, ApJ, 525, 357. ASCA and other observations.
 Muraishi et al. 2000, A&A, 354, L57. γ -ray detection.
 Butt et al. 2001, ApJ, 562, L167. Associated γ -ray emission.
 Ellison et al. 2001, ApJ, 563, 191. ATCA at 1.4 GHz ($36'' \times 46''$), and ASCA observations.
 Enomoto et al. 2002, Nature, 416, 823. γ -ray observations.
 Uchiyama et al. 2002, PASJ, 54, L73. ASCA observations.
 Uchiyama et al. 2003, A&A, 400, 567. Chandra spectroscopy.
 Pannuti et al. 2003, ApJ, 593, 377. ROSAT, ASCA and RXTE observations.
 Lazendic et al. 2003, ApJ, 593, L27. Chandra, XMM-Newton and other X-ray observations of central source.
 Fukui et al. 2003, PASJ, 55, L61. CO observations of surroundings.
 Cassam-Chenaï et al. 2004, A&A, 427, 199. XMM-Newton and other observations.
 Aharonian et al. 2004, Nature, 432, 75. H.E.S.S. detection.
 Lazendic et al. 2004, ApJ, 602, 271. Chandra observations of parts, and ATCA at 1.4 GHz ($36'' \times 46''$).
 Hiraga et al. 2005, A&A, 431, 953. XMM-Newton observations.
 Moriguchi et al. 2005, ApJ, 631, 947. CO observations of surroundings.
 Aharonian et al. 2007, A&A, 464, 235. H.E.S.S. observations. see also: Aharonian et al. 2011, A&A, 531, C1. Erratum.
 Uchiyama et al. 2007, Nature, 449, 576. Chandra multi-epoch observations for study of small-scale variability.
 Tanaka et al. 2008, ApJ, 685, 988. Suzaku observations.
 Takahashi et al. 2008, PASJ, 60, S131. Suzaku observations of SW.
 Mignani et al. 2008, A&A, 484, 457. Optical and IR observations of central source.

Acero et al. 2009, A&A, 505, 157. XMM-Newton observations, plus other radio, IR and H.E.S.S. observations.
 Sano et al. 2010, ApJ, 724, 59. CO observations of region.
 Maxted et al. 2012, MNRAS, 422, 2230. Molecular line observations. see also: Maxted et al. 2013, MNRAS, 430, 2511. Erratum.
 Sano et al. 2013, ApJ, 778, 59. CO, SGPS H_I and Suzaku observations.
 Federici et al. 2015, A&A, 577, A12. Fermi detection.
 Sano et al. 2015, ApJ, 799, 175. Suzaku observations.
 Katsuda et al. 2015, ApJ, 814, 29. XMM-Newton observations.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Tsuji & Uchiyama 2016, PASJ, 68, 108. Chandra observations of NW.
 Acero et al. 2017, A&A, 597, A106. XMM-Newton observations for proper motion studies.
 Okuno et al. 2018, PASJ, 70, 77. Chandra observations.
 H.E.S.S. Collaboration: Abdalla et al. 2018, A&A, 612, A6. H.E.S.S. observations.
 Kuznetsova et al. 2019, MNRAS, 489, 1828. INTEGRAL observations.
 Tsuji et al. 2019, ApJ, 877, 96. NuSTAR observations.
 Higurashi et al. 2020, ApJ, 899, 102. Chandra of NW.
 Tanaka et al. 2020, ApJ, 900, L5. Chandra of SW.
 Sano et al. 2020, ApJ, 904, L24. ALMA CO observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Mayer & Becker 2021, A&A, 651, A40. Multi-epoch Chandra observations for proper motion of compact source.
 Fukui et al. 2021, ApJ, 915, 84. H.E.S.S. observations.
 Tateishi et al. 2021, ApJ, 923, 187. XMM-Newton spectroscopy.
 Leike et al. 2021, NatAs, 5, 832. Dust clouds, including distance.

G348.5–0.0

RA: 17^h15^m26^s
Dec: –38°28′

1-GHz flux/Jy: 10?
Spectral index: 0.4?

Size/arcmin: 10?
Type: S?

Radio: Arc, overlapping G348.5+0.1.

References:

Kassim et al. 1991, ApJ, 374, 212. VLA at 333 MHz (46″×53″), 1.4 GHz (18″×33″) and part at 5 GHz (2″5×3″9).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×69″: S=10.2 Jy).
 Frail et al. 1996, AJ, 111, 1651. OH emission near remnant, including masers.
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Koralesky et al. 1998, AJ, 116, 1323. VLA search for OH emission.
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.

Hewitt et al. 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
 Hewitt et al. 2009, ApJ, 694, 1266. Spitzer spectroscopy.
 Andersen et al. 2011, ApJ, 742, 7. Spitzer observations.
 Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.
 Pannuti et al. 2014, AJ, 147, 55. XMM-Newton upper limit.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Abdollahi et al. 2020, ApJ, 896, 76. Fermi observations.

G348.5+0.1

RA: 17^h14^m06^s
Dec: –38°32′

1-GHz flux/Jy: 72
Spectral index: 0.3

CTB 37A
Size/arcmin: 15
Type: S

Radio: Shell, poorly define to S and W, overlapping G348.5–0.0 in E.

X-ray: Brighter to W.

Distance: H I absorption indicates 8.0 kpc.

References:

Clark et al. 1975, AuJPA, 37, 75. Molonglo at 408 MHz (3′: S=97 Jy).
 Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz (4′4′: S=43 Jy).
 Caswell et al. 1975, A&A, 45, 239. Parkes H I absorption.
 Milne et al. 1979, MNRAS, 188, 437. FIRST at 1415 MHz (0′8′: S>50) and Parkes 64-m at 14.7 GHz (2′2′: S=18±5 Jy).
 Downes 1984, MNRAS, 210, 845. VLA at 1465 MHz (20″×45″).
 Kassim et al. 1991, ApJ, 374, 212. VLA at 333 MHz (46″×53″), 1.4 GHz (18″×33″) and part at 5 GHz (2″5×3″9).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×69″: S=71 Jy).
 Brogan et al. 2000, ApJ, 537, 875. VLA at 1.7 GHz for OH Zeeman splitting.
 Reynoso & Mangum 2000, ApJ, 545, 874. CO observations.

Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Aharonian et al. 2008, A&A, 490, 685. H.E.S.S. observations.
 Castro & Slane 2010, ApJ, 717, 372. Fermi observations.
 Andersen et al. 2011, ApJ, 742, 7. Spitzer observations.
 Sezer et al. 2011, MNRAS, 417, 1387. Suzaku observations.
 Tian & Leahy 2012, MNRAS, 421, 2593. SGPS H I absorption observations.
 Maxted et al. 2013, MNRAS, 434, 2188. Molecular line observations of region.
 Pannuti et al. 2014, AJ, 147, 55. XMM-Newton and Chandra observations.
 Yamauchi et al. 2014, PASJ, 66, 2. Suzaku observations.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Qiao et al. 2020, ApJS, 247, 5. ATCA of OH masers.

G348.7+0.3

CTB 37B

RA: 17^h13^m55^s**1-GHz flux/Jy:** 26**Size/arcmin:** 17?**Dec:** –38°11′**Spectral index:** 0.3**Type:** S**Radio:** Incomplete shell with faint eastern extensions.**X-ray:** Diffuse emission.**Point sources:** X-ray pulsar.**Distance:** H_I absorption suggests 9.8 kpc.**References:**

Clark et al. 1975, AuJPA, 37, 75. Molonglo at 408 MHz (3′:S=34 Jy).
 Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz (4′4″:S=32 Jy).
 Caswell et al. 1975, A&A, 45, 239. Parkes H_I absorption.
 Milne et al. 1979, MNRAS, 188, 437. FIRST at 1415 MHz (0′8″:S>20) and Parkes 64-m at 14.7 GHz (2′2″:S=8±3 Jy).
 Downes 1984, MNRAS, 210, 845. VLA at 1465 MHz (20″×45″).
 Kassim et al. 1991, ApJ, 374, 212. VLA at 333 MHz (46″×53″).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×69″:S=33 Jy).
 Frail et al. 1996, AJ, 111, 1651. OH emission near remnant.
 Aharonian et al. 2006, ApJ, 636, 777. H.E.S.S. detection.
 Aharonian et al. 2008, A&A, 486, 829. H.E.S.S. and Chandra observations.

Nakamura et al. 2009, PASJ, 61, S197. Suzaku and Chandra observations.
 Halpern & Gotthelf 2010, ApJ, 710, 941. Chandra detection of pulsar.
 Halpern & Gotthelf 2010, ApJ, 725, 1384. Chandra observations of pulsar.
 Tian & Leahy 2012, MNRAS, 421, 2593. SGPS H_I observations.
 Xin et al. 2016, ApJ, 817, 64. Fermi observations.
 Blumer et al. 2019, MNRAS, 487, 5019. XMM-Newton, Chandra and H_I observations.
 Watanabe et al. 2019, PASJ, 71, 84. XMM-Newton observations of pulsar.
 Gotthelf et al. 2019, ApJ, 882, 173. Chandra, XMM-Newton and NuSTAR observations of pulsar.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.

G348.8+1.1**RA:** 17^h11^m29^s**1-GHz flux/Jy:** 0.6?**Size/arcmin:** 10**Dec:** –37°36′**Spectral index:** 0.7?**Type:** S

Has been called G348.9+1.1.

Radio: Faint, Incomplete shell.**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×70″:S=0.1 Jy).
 Green et al. 2014, PASA, 31, 42. MGPS at 843 MHz (45″×45″ cosec(δ)).
 Hurley-Walker et al. 2019, PASA, 36, e048. MWA at 72 to 231 MHz (~2′).

G349.2–0.1**RA:** 17^h17^m15^s**1-GHz flux/Jy:** 1.4?**Size/arcmin:** 9×6**Dec:** –38°04′**Spectral index:** ?**Type:** S**Radio:** Elongated shell, adjacent to bright H_{II} region.**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×70″:S=1.6 Jy).
 Frail et al. 1996, AJ, 111, 1651. OH emission near remnant.

G349.7+0.2

RA: 17^h17^m59^s
Dec: –37°26′

1-GHz flux/Jy: 20
Spectral index: 0.5

Size/arcmin: 2.5×2
Type: S

Radio: Incomplete clumpy shell, with enhancement to the S.

X-ray: Irregular shell, brighter to S and E.

Distance: H_i absorption indicates 11.5 kpc.

References:

Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3').
 Caswell et al. 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3' : S = 31.0 Jy) and Parkes 64-m at 5 GHz (4' : S = 9.1 Jy), no maps.
 Caswell et al. 1975, A&A, 45, 239. Parkes H_i absorption.
 Shaver et al. 1985, Nature, 313, 113. VLA at 1.4 GHz (3''4×14''5).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43''×71'' : S=22 Jy).
 Frail et al. 1996, AJ, 111, 1651. OH emission near remnant, including masers.
 Brogan et al. 2000, ApJ, 537, 875. VLA at 1.7 GHz for OH Zeeman splitting.
 Reynoso & Mangum 2001, AJ, 121, 347. CO observations of the vicinity.
 Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Slane et al. 2002, ApJ, 580, 904. ASCA observations.
 Dubner et al. 2004, A&A, 426, 201. CO observations of surroundings.
 Lazendic et al. 2005, ApJ, 618, 733. Chandra observations.
 Reach et al. 2006, AJ, 131, 1479. Spitzer observations.
 Hewitt et al. 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
 Hewitt et al. 2009, ApJ, 694, 1266. Spitzer spectroscopy.

Castro & Slane 2010, ApJ, 717, 372. Fermi observations.
 Lazendic et al. 2010, MNRAS, 409, 371. OH, CO and other molecular line observations of region.
 Andersen et al. 2011, ApJ, 742, 7. Spitzer observations.
 Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.
 Tian & Leahy 2014, ApJ, 783, L2. SGPS H_i observations.
 Yasumi et al. 2014, PASJ, 66, 68. Suzaku observations.
 H.E.S.S. Collaboration: Abramowski et al. 2015, A&A, 574, A100. H.E.S.S. observations.
 see also: H.E.S.S. Collaboration: Abramowski et al. 2015, A&A, 580, C1. Corrigendum.
 Ergin et al. 2015, ApJ, 804, 124. Fermi and Suzaku observations.
 Rho et al. 2015, ApJ, 812, 44. Herschel observations.
 Koo et al. 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 H.E.S.S. Collaboration: Abdalla et al. 2018, A&A, 612, A1. H.E.S.S. observations.
 Ogbodo et al. 2020, MNRAS, 493, 199. OH maser observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Qiao et al. 2020, ApJS, 247, 5. ATCA of OH masers.

G350.0–2.0

RA: 17^h27^m50^s
Dec: –38°32′

1-GHz flux/Jy: 26
Spectral index: 0.4

Size/arcmin: 45
Type: S

Incorporates the previously catalogued G350.0–1.8 in the NW.

Radio: Shell, brightest in NW.

Optical: Detected.

X-ray: Brighter to NW.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3' : S = 49.5 Jy) and Parkes 64-m at 5 GHz (4' : S = 13.6 Jy).
 Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz (4'4).

Gaensler 1998, ApJ, 493, 781. VLA and Parkes 64-m at 1.4 GHz (18''×21'' : S=22.3±0.3 Jy), clarifying extent of remnant.
 Stupar & Parker 2011, MNRAS, 414, 2282. H_α observations.
 Karpova et al. 2016, MNRAS, 462, 3845. XMM-Newton observations.

G350.1–0.3

RA: 17^h21^m05^s
Dec: –37°27′

1-GHz flux/Jy: 6?
Spectral index: 0.8?

Size/arcmin: 4?
Type: ?

Radio: Several clumps of emission.

X-ray: Diffuse emission, with compact source.

Point sources: X-ray source.

Distance: H_I absorption indicates 4.5 to 10.7 kpc, possible interaction with molecular cloud indicates 4.5 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S = 10.7$) and Parkes 64-m at 5 GHz (4′ : $S = 1.7$).
 Salter et al. 1986, A&A, 162, 217. VLA at 1.5 (4′′0×10′′4), 4.8 GHz (15′′×35′′) and 15 GHz (2′′×5′′).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43′′×71′′).
 Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Gaensler et al. 2008, ApJ, 680, L37. VLA at 4.8 GHz (5′′6×11′′4) plus XMM-Newton observations.
 Lovchinsky et al. 2011, ApJ, 731, 70. Chandra and Spitzer observations.

Yasumi et al. 2014, PASJ, 66, 68. Suzaku observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Borkowski et al. 2020, ApJ, 905, L19. Chandra observations, including expansion.
 Mayer & Becker 2021, A&A, 651, A40. Multi-epoch Chandra observations for proper motion of compact source.
 Tsuchioka et al. 2021, ApJ, 912, 131. Chandra observations, including expansion.

G351.0–5.4

RA: 17^h46^m00^s
Dec: –39°25′

1-GHz flux/Jy: ?
Spectral index: ?

Size/arcmin: 30
Type: S

Radio: Faint shell, brighter to E and W.

References:

de Gasperin et al. 2014, A&A, 568, A107. GMRT at 325 MHz (89′′×141′′), plus other observations.

G351.2+0.1

RA: 17^h22^m27^s
Dec: –36°11′

1-GHz flux/Jy: 5?
Spectral index: 0.4

Size/arcmin: 7
Type: C?

Has been called G351.3+0.2.

Radio: Distorted shell, with possible flat-spectrum core.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S = 8.1$ Jy) and Parkes 64-m at 5 GHz (4′ : $S = 3.1$ Jy).
 Becker & Helfand 1988, AJ, 95, 883. VLA at 5 GHz (15′′), and at 15 GHz of core.
 Dubner et al. 1993, AJ, 105, 2251. VLA at 1.47 GHz (32′′×36′′ : $S = 4.8 \pm 0.2$ Jy).

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43′′×73′′ : $S = 5.5$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.

G351.7+0.8

RA: 17^h21^m00^s
Dec: –35°27′

1-GHz flux/Jy: 10
Spectral index: 0.5?

Size/arcmin: 18×14
Type: S

Radio: Elongated shell, adjacent to bright H_{II} region.

Point sources: Pulsar nearby.

Distance: Optical extinction suggests 3.4 kpc.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43′′×74′′ : $S = 11$ Jy).
 Tian et al. 2007, MNRAS, 378, 1283. SGPS at 1.4 GHz (100′′ : $S = 8.4 \pm 0.7$ Jy) including H_I.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G351.9–0.9

RA: 17^h28^m52^s
Dec: –36°16′

1-GHz flux/Jy: 1.8?
Spectral index: ?

Size/arcmin: 12×9
Type: S

Radio: Asymmetric shell.

Point sources: Central X-ray source.

Distance: Association with X-ray source would imply 8.4 kpc.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×73″: $S=2.0$ Jy).
 Balakrishnan et al. 2023, ApJ, 947, 38. X-ray observations of central source, plus MeerKAT at 1.28 GHz.
 Draghis et al. 2023, ApJ, 947, 39. NuSTAR observations of central source.

G352.7–0.1

RA: 17^h27^m40^s
Dec: –35°07′

1-GHz flux/Jy: 4
Spectral index: 0.6

Size/arcmin: 8×6
Type: S

Radio: Distorted shell.

X-ray: Centrally brightened.

Distance: H_I absorption indicates 6.8 to 8.4 kpc, association with CO suggests 10.5 kpc.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′: $S=9.6$ Jy) and Parkes 64-m at 5 GHz (4′: $S=2.3$ Jy).
 Caswell et al. 1983, MNRAS, 203, 595. FIRST at 1415 MHz (1′.1).
 Dubner et al. 1993, AJ, 105, 2251. VLA at 1.47 GHz (34″: $S=3.4\pm0.4$ Jy).
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×75″: $S=4.4$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Kinugasa et al. 1998, PASJ, 50, 249. ASCA observations.

Koralesky et al. 1998, AJ, 116, 1323. VLA search for OH emission.
 Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Giacani et al. 2009, A&A, 507, 841. VLA at 4.8 GHz (9″×12″), plus H_I and XMM-Newton observations.
 Pannuti et al. 2014, ApJ, 782, 102. XMM-Newton and Chandra observations.
 Sezer & Gök 2014, ApJ, 790, 81. Suzaku observations.
 Zhang et al. 2023, ApJ, 952, 107. CO observations of surrounding.
 Fujishige et al. 2023, PASJ, 75, 907. Suzaku observations.

G353.3–1.1

RA: 17^h33^m10^s
Dec: –35°12′

1-GHz flux/Jy: 24?
Spectral index: 0.85?

Size/arcmin: 60
Type: S

Radio: Faint shell.

References:

Duncan et al. 1995, MNRAS, 277, 36. Parkes 64-m at 2.4-GHz (10′.4).
 Duncan et al. 1997, MNRAS, 287, 722. Parkes 64-m at 2.4 GHz (11′).
 Hurley-Walker et al. 2019, PASA, 36, e048. MWA at 72 to 231 MHz ($\sim 2'$).

G353.6–0.7

RA: 17^h32^m00^s
Dec: –34°44′

1-GHz flux/Jy: 2.5?
Spectral index: ?

Size/arcmin: 30
Type: S

Has erroneously been called G353.6–0.37.

Radio: Shell, brighter to S.

X-ray: Patchy shell, brighter to E.

Point sources: Central neutron star.

Distance: Neutron star companion implies 2.5 kpc.

References:

Tian et al. 2008, ApJ, 679, L85. SGPS at 1.4 GHz (100″), plus 843 MHz (43″) and X-ray observations.
 Halpern & Gotthelf 2010, ApJ, 710, 941. XMM-Newton observations.
 Tian et al. 2010, ApJ, 712, 790. XMM-Newton, Suzaku and CO observations.
 H.E.S.S. Collaboration: Abramowski et al. 2011, A&A, 531, A81. H.E.S.S. observations.
 Bamba et al. 2012, ApJ, 756, 149. Suzaku observations. see also: Bamba et al. 2012, ApJ, 761, 80. Erratum.
 Klochkov et al. 2013, A&A, 556, A41. XMM-Newton and other X-ray observations.
 Fukuda et al. 2014, ApJ, 788, 94. H.E.S.S., SGPS Hi and CO observations.
 Nayana et al. 2017, MNRAS, 467, 155. GMRT at 325 MHz (97″×135″) and 610 MHz (105″×150″), plus other observations.

de Wilt et al. 2017, MNRAS, 468, 2093. Molecular line observations of region.
 Doroshenko et al. 2017, A&A, 608, A23. XMM-Newton observations.
 Condon et al. 2017, ApJ, 851, 100. Fermi observations.
 Guo et al. 2018, ApJ, 853, 2. Fermi observations.
 H.E.S.S. Collaboration: Abdalla et al. 2018, A&A, 612, A1. H.E.S.S. observations.
 Maxted et al. 2018, MNRAS, 474, 662. CO and Hi observations.
 Cui et al. 2019, ApJ, 887, 47. Fermi observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Doroshenko et al. 2022, NatAs, 6, 1444. Observations of neutron star.
 Doroshenko et al. 2023, A&A, 679, A152. Multi-epoch Chandra observations.

G353.9–2.0

RA: 17^h38^m55^s
Dec: –35°11′

1-GHz flux/Jy: 1?
Spectral index: 0.5?

Size/arcmin: 13
Type: S

Radio: Shell, with central double source.

References:

Green 2001, MNRAS, 326, 283. VLA at 327 MHz (2.7″×3.0″) and 1.4 GHz (36″×42″), plus 8.4 GHz (6″1×8″4) of central source only.

G354.1+0.1

RA: 17^h30^m28^s
Dec: –33°46′

1-GHz flux/Jy: ?
Spectral index: varies

Size/arcmin: 15×3?
Type: C?

Is this a SNR?

Radio: Elongated N–S.

Point sources: Pulsar at S tip.

References:

Frail et al. 1994, ApJ, 437, 781. VLA at 330 MHz (47″×99″) and 1.4 GHz (8″8×21″).
 Ajello et al. 2016, ApJ, 819, 44. Fermi observations.

G354.8–0.8

RA: $17^{\text{h}}36^{\text{m}}00^{\text{s}}$
Dec: $-33^{\circ}42'$

1-GHz flux/Jy: 2.8?
Spectral index: ?

Size/arcmin: 19
Type: S

Radio: Distorted shell.

References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 78''$; $S=3.1$ Jy).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Koralesky et al. 1998, AJ, 116, 1323. VLA search for OH emission.

G355.4+0.7

RA: $17^{\text{h}}31^{\text{m}}20^{\text{s}}$
Dec: $-32^{\circ}26'$

1-GHz flux/Jy: 5?
Spectral index: ?

Size/arcmin: 25
Type: S

Radio: Faint, incomplete shell.

Distance: Optical extinction suggests 4.2 kpc.

References:

Gray 1994, MNRAS, 270, 835. MOST at 843 MHz ($43'' \times 77''$).
 Roy & Bhatnagar 2006, JPhCS, 54, 152. GMRT at 330 MHz ($1'$; $S=8.9 \pm 1.3$ Jy).
 Ajello et al. 2016, ApJ, 819, 44. Fermi observations.

Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G355.6–0.0

RA: $17^{\text{h}}35^{\text{m}}16^{\text{s}}$
Dec: $-32^{\circ}38'$

1-GHz flux/Jy: 3?
Spectral index: ?

Size/arcmin: 8×6
Type: S

Radio: Well defined shell.

X-ray: Centrally brightened.

References:

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz ($43'' \times 80''$; $S=2.6$ Jy).
 Sugizaki et al. 2001, ApJS, 134, 77. ASCA survey observations.
 Roy & Bhatnagar 2006, JPhCS, 54, 152. GMRT at 330 MHz ($1'$; $S=3.3 \pm 0.5$ Jy).

Marquez-Lugo & Phillips 2010, MNRAS, 407, 94. Mid-IR observations.
 Minami et al. 2013, PASJ, 65, 99. Suzaku observations.

G355.9–2.5

RA: $17^{\text{h}}45^{\text{m}}53^{\text{s}}$
Dec: $-33^{\circ}43'$

1-GHz flux/Jy: 8
Spectral index: 0.5

Size/arcmin: 13
Type: S

Radio: Distorted shell, brightest to SE.

References:

Clark et al. 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3'$; $S=12.3$ Jy) and Parkes 64-m at 5 GHz ($4'$; $S=3.4$ Jy).
 Dubner et al. 1993, AJ, 105, 2251. VLA at 1.47 GHz ($32'' \times 34''$; $S=5.0 \pm 0.3$ Jy).

Gray 1994, MNRAS, 270, 835. MOST at 843 MHz ($43'' \times 77''$).
 Green et al. 1997, AJ, 114, 2058. Parkes 64-m OH observations.
 Marquez-Lugo & Phillips 2010, MNRAS, 407, 94. Mid-IR observations.

G356.2+4.5

RA: $17^{\text{h}}19^{\text{m}}00^{\text{s}}$
Dec: $-29^{\circ}40'$

1-GHz flux/Jy: 4
Spectral index: 0.7

Size/arcmin: 25
Type: S

Has been called G356.2+4.4.

Radio: Faint shell.

References:

Duncan et al. 1995, MNRAS, 277, 36. Parkes 64-m at 2.4-GHz
 ($10''.4$).
 Duncan et al. 1997, MNRAS, 287, 722. Parkes 64-m at 2.4 GHz
 ($11' : S = 3.0 \pm 0.3$ Jy).
 Bhatnagar 2000, MNRAS, 317, 453. GMRT at 327 MHz
 ($1'.5 \times 3' : S = 8.1 \pm 1.7$ Jy), and NVSS at 1.4 GHz.

G356.3–1.5

RA: $17^{\text{h}}42^{\text{m}}35^{\text{s}}$
Dec: $-32^{\circ}52'$

1-GHz flux/Jy: 3?
Spectral index: ?

Size/arcmin: 20×15
Type: S

Radio: Double arc.

References:

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz ($43'' \times 79'' : S = 2.8$ Jy).
 Bhatnagar 2002, MNRAS, 332, 1. GMRT at 327 MHz ($0'.8 \times 1'.7 : S = 5.7 \pm 0.2$).

G356.3–0.3

RA: $17^{\text{h}}37^{\text{m}}56^{\text{s}}$
Dec: $-32^{\circ}16'$

1-GHz flux/Jy: 3?
Spectral index: ?

Size/arcmin: 11×7
Type: S

Has been suggested this part of a larger SNR.

Radio: Diffuse emission.

References:

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz ($43'' \times 81'' : S = 2.6$ Jy).
 Roy & Pramesh Rao 2002, MNRAS, 329, 775. GMRT at
 330 MHz ($2'.7 \times 4'.8$).
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.

G357.7–0.1

RA: 17^h40^m29^s
Dec: –30°58′

1-GHz flux/Jy: 37
Spectral index: 0.4

MSH 17–39

Size/arcmin: 8×3?
Type: ?

Has been suggested that this is not a SNR.

Radio: Multiple arcs and filaments, brighter to NW ‘head’.

X-ray: Detected from NW ‘head’, and SW ‘tail’.

Distance: H I absorption suggests beyond Galactic Centre.

References:

Caswell et al. 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′ : $S=54.2$ Jy) and Parkes 64-m at 5 GHz (4′ : $S=18.5$ Jy).
 Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz (4′4″ : $S=14.6$ Jy).
 Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6″).
 Caswell et al. 1980, MNRAS, 190, 881. FIRST at 1415 MHz (50″).
 Weiler & Panagia 1980, A&A, 90, 269. Effelsberg 100-m at 9 GHz (1′5″) (private communication from Baker).
 Shaver et al. 1985, Nature, 313, 113. VLA at 1.4 GHz (3″8×10″9) and 5 GHz (12″×26″).
 Becker & Helfand 1985, Nature, 313, 115. VLA at 1.4 GHz and 5 GHz.
 Helfand & Becker 1985, Nature, 313, 118. Suggest it is not a SNR.
 Shaver et al. 1985, A&A, 147, L23. Observations of peripheral compact source.
 Caswell et al. 1989, PASA, 8, 184. MOST at 843 MHz (43″×83″).
 Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×84″).
 Stewart et al. 1994, ApJ, 432, L39. ATCA at 4.79 and 5.84 GHz (12″×22″) and Effelsberg 100-m at 10.6 GHz (1′), including polarisation.
 Frail et al. 1996, AJ, 111, 1651. OH emission near remnant, including masers.
 Yusef-Zadeh et al. 1999, ApJ, 527, 172. VLA of nearby OH masers.
 LaRosa et al. 2000, AJ, 119, 207. VLA at 333 MHz (24″×43″).

see also: LaRosa et al. 2000, AJ, 119, 3145. Erratum.
 Brogan et al. 2000, ApJ, 537, 875. VLA at 1.7 GHz for OH Zeeman splitting.
 Brogan & Goss 2003, AJ, 125, 272. VLA at 1.4 GHz (11″4×13″6), including H I, and 8.3 GHz (6″8×14″3) recombination line observation of H II region.
 Gaensler et al. 2003, ApJ, 594, L35. Chandra detection.
 Lazendic et al. 2003, AN, 324 (No S1), 157. Molecular line observations.
 Burton et al. 2004, MNRAS, 348, 638. IR and radio observations of H II region.
 Lazendic et al. 2004, MNRAS, 354, 393. IR and molecular line observations.
 Hewitt et al. 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
 Phillips et al. 2009, MNRAS, 397, 1215. Observations of interactions with surroundings.
 Castro et al. 2013, ApJ, 774, 36. Fermi observations.
 Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.
 Acero et al. 2016, ApJS, 224, 8. Fermi observations.
 Qiao et al. 2018, ApJS, 239, 15. OH maser observations.
 Chawner et al. 2020, MNRAS, 493, 2706. Herschel observations.
 Chawner et al. 2020, MNRAS, 499, 5665. Spitzer and Herschel observations.
 Guan et al. 2021, ApJ, 920, 6. Observations at 90 GHz (0′5).

G357.7+0.3

RA: 17^h38^m35^s
Dec: –30°44′

1-GHz flux/Jy: 10
Spectral index: 0.4?

Size/arcmin: 24
Type: S

Radio: Non-thermal shell in complex region.

Distance: Optical extinction suggests 3.8 kpc.

References:

Reich & Fürst 1984, A&AS, 57, 165. Effelsberg 100-m at 2.7 GHz (4′3″ : $S=7\pm1.5$ Jy), $S_{5\text{ GHz}}=5.5\pm1.5$ Jy from surveys.
 Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×84″).
 Yusef-Zadeh et al. 1999, ApJ, 527, 172. VLA of nearby OH masers.
 Hewitt et al. 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.

Phillips & Marquez-Lugo 2010, MNRAS, 409, 701. Spitzer observations of region.
 Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Rho et al. 2017, ApJ, 834, 12. Molecular line observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.

G358.0+3.8

RA: 17^h26^m00^s
Dec: −28°36′

1-GHz flux/Jy: 1.5?
Spectral index: ?

Size/arcmin: 38
Type: S

Radio: Faint shell.

References:

Duncan et al. 1995, MNRAS, 277, 36. Parkes 64-m at 2.4-GHz (10′4).
Duncan et al. 1997, MNRAS, 287, 722. Parkes 64-m at 2.4 GHz (11′: $S=2.4\pm0.4$ Jy).
Bhatnagar 2000, MNRAS, 317, 453. GMRT at 327 MHz (1′3×2′2: $S=2.5\pm1.3$ Jy), and NVSS at 1.4 GHz.

G358.1+1.0

RA: 17^h37^m00^s
Dec: −29°59′

1-GHz flux/Jy: 2?
Spectral index: ?

Size/arcmin: 20
Type: S

Was erroneously called G358.1+0.1.

Radio: Faint shell.

References:

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz (43″×77″).
Roy & Bhatnagar 2006, JPhCS, 54, 152. GMRT at 330 MHz (1′: $S=6.0\pm2.5$ Jy).
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.

G358.5−0.9

RA: 17^h46^m10^s
Dec: −30°40′

1-GHz flux/Jy: 4?
Spectral index: ?

Size/arcmin: 17
Type: S

Radio: Shell, brighter to NE.

References:

Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×77″).
Roy & Bhatnagar 2006, JPhCS, 54, 152. GMRT at 330 MHz (1′: $S=8.0\pm2.5$ Jy).
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.

G359.0−0.9

RA: 17^h46^m50^s
Dec: −30°16′

1-GHz flux/Jy: 23
Spectral index: 0.5

Size/arcmin: 23
Type: S

Radio: Incomplete shell.

Optical: Detected.

X-ray: Partial shell.

Distance: Optical extinction suggests 3.5 or 3.3 kpc.

References:

Reich et al. 1988, IAUCo, 101, 293. Summary of parameters.
Reich et al. 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′3).
Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×86″).
LaRosa et al. 2000, AJ, 119, 207. VLA at 333 MHz (24″×43″).
see also: LaRosa et al. 2000, AJ, 119, 3145. Erratum.
Bamba et al. 2000, PASJ, 52, 259. ASCA observations.
Yusef-Zadeh et al. 2004, ApJS, 155, 421. VLA at 1.4 GHz (8″4×12″8) of part.
Bamba et al. 2009, ApJ, 691, 1854. Suzaku observations.

Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.
Ponti et al. 2015, MNRAS, 453, 172. XMM-Newton observations.
Froebrich et al. 2015, MNRAS, 454, 2586. H $_2$ IR observations.
de Wilt et al. 2017, MNRAS, 468, 2093. Molecular line observations of region.
Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″) including polarisation, and Spitzer observations.

G359.1–0.5

RA: 17^h45^m30^s
Dec: –29°57′

1-GHz flux/Jy: 14
Spectral index: 0.4?

Size/arcmin: 24
Type: S

Has been called G359.10–0.5.

Radio: Non-thermal shell in complex region, crossed by the ‘snake’.

Optical: Detected.

X-ray: Extended central emission.

Point sources: Several compact radio sources near centre, OH masers around edge.

Distance: H_I column density suggests 3.7 kpc, association with CO suggests 4 kpc, optical extinction suggests 3.3 or 3.2 kpc.

References:

Downes et al. 1979, A&AS, 35, 1. From observations by Altenhoff et al. 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′6″: $S=13$ Jy).
 Reich & Fürst 1984, A&AS, 57, 165. Effelsberg 100-m at 2.7 GHz (4′3″: $S=10\pm1.5$ Jy) and 4.8 GHz (2′4″: $S=8.1\pm0.5$ Jy).
 Uchida et al. 1992, ApJ, 398, 128. VLA at 1.5 GHz (10″×11″), and observations of nearby molecular material.
 Uchida et al. 1992, AJ, 104, 1533. VLA at 1.4 GHz.
 Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×85″).
 Yusef-Zadeh et al. 1995, Science, 270, 1801. VLA at 1.4 GHz (31″×33″), and 1.7 GHz for OH survey.
 LaRosa et al. 2000, AJ, 119, 207. VLA at 333 MHz (24″×43″). see also: LaRosa et al. 2000, AJ, 119, 3145. Erratum.
 Bamba et al. 2000, PASJ, 52, 259. ASCA observations.
 Lazendic et al. 2002, MNRAS, 331, 537. Observations of shocked molecular gas where the ‘snake’ crosses the remnant.
 Yusef-Zadeh et al. 2004, ApJS, 155, 421. VLA at 1.4 GHz (8″4″×12″8″).
 Aharonian et al. 2008, A&A, 483, 509. XMM-Newton and H.E.S.S. observations.
 Hewitt et al. 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.

Bamba et al. 2009, ApJ, 691, 1854. Suzaku observations.
 Stupar & Parker 2011, MNRAS, 414, 2282. H α observations.
 Ohnishi et al. 2011, PASJ, 63, 527. Suzaku observations.
 Pihlström et al. 2014, AJ, 147, 73. VLA search for methanol masers.
 Ponti et al. 2015, MNRAS, 453, 172. XMM-Newton observations.
 Froebrich et al. 2015, MNRAS, 454, 2586. H₂ IR observations.
 Hui et al. 2016, MNRAS, 457, 4262. Fermi observations of region.
 de Wilt et al. 2017, MNRAS, 468, 2093. Molecular line observations of region.
 Qiao et al. 2018, ApJS, 239, 15. OH maser observations.
 Ogbodo et al. 2020, MNRAS, 493, 199. OH maser observations.
 Eppens et al. 2020, MNRAS, 493, 3947. CO observations of region.
 Suzuki et al. 2020, ApJ, 893, 147. Suzaku and CO observations.
 Wang et al. 2020, A&A, 639, A72. Optical extinction for distance.
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″: $S=0.8$ Jy) including polarisation, and Spitzer observations.
 Eppens et al. 2022, MNRAS, 511, 5849. Chandra observations.

G359.1+0.9

RA: 17^h39^m36^s
Dec: –29°11′

1-GHz flux/Jy: 2?
Spectral index: ?

Size/arcmin: 12×11
Type: S

Radio: Shell, brightest in E.

References:

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz (43″×88″: $S=4.3$ Jy).
 Roy & Bhatnagar 2006, JPhCS, 54, 152. GMRT at 330 MHz (1′: $S=4.3\pm1.0$ Jy).

Law et al. 2008, ApJS, 177, 515. VLA at 1.4 GHz (10″9″×15″9″: $S=1.3\pm0.5$ Jy).
 Dokara et al. 2021, A&A, 651, A86. VLA at 4 to 8 GHz (18″: $S=0.07$ Jy) including polarisation, and Spitzer observations.

G359.2–1.1

RA: 17^h48^m14^s
Dec: –30°12′

1-GHz flux/Jy: 0.4?
Spectral index: 1.1?

Size/arcmin: 5×4
Type: S?

Radio: Poorly defined, asymmetric.

References:

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz (43″×86″).
 Hurley-Walker et al. 2019, PASA, 36, e048. MWA at 72 to 231 MHz ($\sim 2'$).