

**G0.0+0.0**

Sgr A East

**RA:** 17<sup>h</sup>45<sup>m</sup>44<sup>s</sup>**Dec:** -29°00'**1-GHz flux/Jy:** 100?**Spectral index:** 0.8?**Size/arcmin:** 3.5×2.5**Type:** S

**Radio:** Non-thermal shell, in complex region, interacting with molecular material to the west.

**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''),  $S_{1.4\text{ GHz}} = 77$  Jy,  $S_{5.0\text{ GHz}} = 31$  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 NH<sub>3</sub> 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 H<sub>2</sub>O masers.
- Yusef-Zadeh *et al.* 1999, ApJ, 512, 230. OH maser observations.
- Coil & Ho 2000, ApJ, 533, 245. NH<sub>3</sub> 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 & 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.  $\gamma$ -ray detection.
- Koyama *et al.* 2007, PASJ, 59, S237. Suzaku observations.
- Lee *et al.* 2008, ApJ, 674, 247. Molecular H<sub>2</sub> 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 *et al.* 2012, PASJ, 64, 111. CO observations of SW.
- Minh *et al.* 2013, ApJ, 773, 31. NH<sub>3</sub> 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.  $\gamma$ -ray 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. CH<sub>3</sub>OH maser observations in region.

**G0.3+0.0****RA:** 17<sup>h</sup>46<sup>m</sup>15<sup>s</sup>**Dec:** -28°38'**1-GHz flux/Jy:** 22**Spectral index:** 0.6**Size/arcmin:** 15×8**Type:** S

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

**Radio:** Bilateral shell, near Galactic Centre.

**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.  $\gamma$ -ray observations.

**G0.9+0.1****RA:** 17<sup>h</sup>47<sup>m</sup>21<sup>s</sup>**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 (43''×24'').

*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.  $\gamma$ -ray detection.

Dubner *et al.* 2008, A&A, 487, 1033. ATCA and VLA at 1.4 GHz (1''2×2''5 : S=8.3±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.  $\gamma$ -ray observations.

**G1.0–0.1**

**RA:** 17<sup>h</sup>48<sup>m</sup>30<sup>s</sup>  
**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 (43''×24'').  
*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-Lopez & 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. H<sub>2</sub> IR observations.

**G1.4–0.1**

**RA:** 17<sup>h</sup>49<sup>m</sup>39<sup>s</sup>  
**Dec:** –27°46′

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

**Size/arcmin:** 10  
**Type:** S

**Radio:** Shell, brightest in E.

**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'.7×2'.4 : S=4.2±0.5).  
 Yusef-Zadeh *et al.* 2004, ApJS, 155, 421. VLA at 1.4 GHz (8''×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. H<sub>2</sub> IR observations.  
 McEwen *et al.* 2016, ApJ, 826, 189. NH<sub>3</sub> and CH<sub>3</sub>OH observations.

**G1.9+0.3**

**RA:** 17<sup>h</sup>48<sup>m</sup>45<sup>s</sup>  
**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<sub>I</sub> absorption gives < 10 kpc.

**References:**

Green & Gull 1984, *Nature*, 312, 527. VLA at 5 GHz (4''4×2'').  
 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.  
 Abramowski *et al.* 2014, *MNRAS*, 441, 790.  $\gamma$ -ray observations.  
 Borkowski *et al.* 2014, *ApJ*, 790, L18. Chandra expansion studies.  
 Roy & Pal 2014, *IAUS*, 296, 197. GMRT H<sub>I</sub> 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  $\gamma$ -ray observations.  
 Zoglauer *et al.* 2015, *ApJ*, 798, 98. NuSTAR observations.

**G3.7-0.2**

**RA:** 17<sup>h</sup>55<sup>m</sup>26<sup>s</sup>  
**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).

**G3.8+0.3**

**RA:** 17<sup>h</sup>52<sup>m</sup>55<sup>s</sup>  
**Dec:** -25°28'

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

**Size/arcmin:** 18  
**Type:** S?

**Radio:** Incomplete shell.

**References:**

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz ( $43'' \times 100''$ :  $S=3.5$  Jy).  
 Bhatnagar 2002, MNRAS, 332, 1. GMRT at 327 MHz ( $27'' \times 17''$ :  $S=6.0 \pm 0.4$ ).

### G4.2 – 3.5

**RA:**  $18^{\text{h}}08^{\text{m}}55^{\text{s}}$   
**Dec:**  $-27^{\circ}03'$

**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 $\alpha$  observations.

### G4.5 + 6.8

**RA:**  $17^{\text{h}}30^{\text{m}}42^{\text{s}}$   
**Dec:**  $-21^{\circ}29'$

**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 $\alpha$  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 ( $2'' \times 3'' \times 2$ ) and 5 GHz ( $3'' \times 2 \times 4'' \times 8$ ) and Einstein image ( $5''$ ).  
 Dickel *et al.* 1988, ApJ, 330, 254. VLA at 1.4 ( $1'' \times 2 \times 2'' \times 3$ ) and 5 GHz ( $0'' \times 6 \times 1'' \times 0$ ) 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 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 ( $23'' \times 13''$ ) for H $\alpha$  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 ( $7'' \times 2$ ) 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-Chenai *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.  $\gamma$ -ray upper limit.  
 Enomoto *et al.* 2008, ApJ, 683, 383.  $\gamma$ -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).

### G4.8+6.2

**RA:** 17<sup>h</sup>33<sup>m</sup>25<sup>s</sup>  
**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).  
 Bhatnagar 2000, MNRAS, 317, 453. GMRT at 327 MHz (2'2×1'3: S = 5.5±1.2 Jy), and NVSS at 1.4 GHz.  
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

### G5.2-2.6

**RA:** 18<sup>h</sup>07<sup>m</sup>30<sup>s</sup>  
**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**

Milne 56

**RA:** 18<sup>h</sup>02<sup>m</sup>10<sup>s</sup>**1-GHz flux/Jy:** 35?**Size/arcmin:** 35**Dec:** –24°54′**Spectral index:** 0.2?**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 east 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<sub>i</sub> absorption suggests > 4.3 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:  $S=21.9\pm 2.4$  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:  $S=30.8\pm 2.1$  Jy) and 8.4 GHz (3′:  $S=24\pm 3$  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<sub>i</sub> 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.

**G5.5+0.3****RA:** 17<sup>h</sup>57<sup>m</sup>04<sup>s</sup>**1-GHz flux/Jy:** 5.5**Size/arcmin:** 15×12**Dec:** –24°00′**Spectral index:** 0.7**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″:  $S=14.3\pm 0.3$  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 $\alpha$  observations.  
 Froebrich *et al.* 2015, MNRAS, 454, 2586. H $_2$  IR observations.

### G5.9+3.1

**RA:** 17<sup>h</sup>47<sup>m</sup>20<sup>s</sup>  
**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.

### G6.1+0.5

**RA:** 17<sup>h</sup>57<sup>m</sup>29<sup>s</sup>  
**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.

**Radio:** Partial shell.

**Optical:** Detected.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42'': S=13.4±0.2 Jy), plus other observations.  
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.  
 Stupar & Parker 2011, MNRAS, 414, 2282. H $\alpha$  observations.  
 Froebrich *et al.* 2015, MNRAS, 454, 2586. H $_2$  IR observations.

### G6.1+1.2

**RA:** 17<sup>h</sup>54<sup>m</sup>55<sup>s</sup>  
**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.

**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.



**G6.4–0.1**

W28

**RA:** 18<sup>h</sup>00<sup>m</sup>30<sup>s</sup>**1-GHz flux/Jy:** 310**Size/arcmin:** 48**Dec:** –23°26′**Spectral index:** varies**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:** Hi observations suggest 1.9 kpc.

**References:**

- Kundu & Velusamy 1972, A&A, 20, 237. NRAO 140-ft at 10 GHz (3′).  
 van den Bergh *et al.* 1973, ApJ, 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).  
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 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.  
 Odenwald *et al.* 1984, ApJ, 279, 162. Nearby IR source.  
 Andrews *et al.* 1985, AJ, 90, 310. VLA of central component.  
 Long *et al.* 1991, ApJ, 373, 567. Einstein and optical observations.  
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′.1×4′.4 : S=660 Jy).  
 Kaspi *et al.* 1993, ApJ, 409, L57. Pulsar association.  
 Frail *et al.* 1993, Nature, 365, 136. VLA at 327 MHz (smoothed to 65′′), plus pulsar association.  
 Frail *et al.* 1994, ApJ, 424, L111. VLA of associated OH masers.  
 Esposito *et al.* 1996, ApJ, 461, 820. Possible associated  $\gamma$ -ray emission.  
 Frail *et al.* 1996, AJ, 111, 1651. OH maser emission.  
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.  
 Claussen *et al.* 1997, ApJ, 489, 143. VLA of OH masers.  
 Claussen *et al.* 1999, ApJ, 522, 349. High resolution observations of OH masers.  
 Arikawa *et al.* 1999, PASJ, 51, L7. Observations of shocked CO.  
 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 (97′′×52′′ : S = 425±40 Jy) and 1415 MHz (88′′×48′′ : 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.  
 Rowell *et al.* 2000, A&A, 359, 337. Upper limit on high energy  $\gamma$ -rays.  
 Douvion *et al.* 2001, A&A, 373, 281. ISO observations.  
 Roberts *et al.* 2001, ApJ, 133, 451. ASCA observations.  
 Velázquez *et al.* 2002, AJ, 124, 2145. Parkes 64-m at 1.4 GHz (15′) for Hi.  
 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.  $\gamma$ -ray observations.  
 Casandjian & Grenier 2008, A&A, 489, 849.  $\gamma$ -ray observations.  
 Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.  
 Guilani *et al.* 2010, A&A, 516, L11.  $\gamma$ -ray observations.  
 Marquez-Lopez & 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.  
 Sawada *et al.* 2012, PASJ, 64, 81. Suzaku 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<sup>+</sup> and DCO<sup>+</sup> 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.  $\gamma$ -ray 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.  
 Froebrich *et al.* 2015, MNRAS, 454, 2586. H<sub>2</sub> IR observations.  
 Maxted *et al.* 2016, MNRAS, 462, 532. NH<sub>3</sub> observations of region.  
 Acero *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

### G6.4+4.0

**RA:** 17<sup>h</sup>45<sup>m</sup>10<sup>s</sup>  
**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, IAUCom, 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<sup>h</sup>02<sup>m</sup>11<sup>s</sup>  
**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.

#### 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±0.4 Jy), plus other observations.  
 Casandjian & Grenier 2008, A&A, 489, 849.  $\gamma$ -ray observations.  
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.  
 Stupar & Parker 2011, MNRAS, 414, 2282. H $\alpha$  observations.  
 Ajello *et al.* 2016, ApJ, 819, 44.  $\gamma$ -ray observations.

**G7.0–0.1**

**RA:** 18<sup>h</sup>01<sup>m</sup>50<sup>s</sup>  
**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 H<sub>II</sub> 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 (97″×52″) and 1415 MHz (88″×48″).

**G7.2+0.2**

**RA:** 18<sup>h</sup>01<sup>m</sup>07<sup>s</sup>  
**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±0.2 Jy), plus other observations.  
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

**G7.7–3.7**

**RA:** 18<sup>h</sup>17<sup>m</sup>25<sup>s</sup>  
**Dec:** –24°04′

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

1814–24  
**Size/arcmin:** 22  
**Type:** S

**Radio:** Shell, with high polarisation.

**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 (70″×35″: S=9.9±0.1 Jy), including polarisation.  
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

**G8.3–0.0**

**RA:** 18<sup>h</sup>04<sup>m</sup>34<sup>s</sup>  
**Dec:** –21°49′

**1-GHz flux/Jy:** 1.2  
**Spectral index:** 0.6

**Size/arcmin:** 5×4  
**Type:** S

Has been called G8.31–0.09.

**Radio:** Shell.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″: S=2.3±0.1 Jy), plus other observations.  
 Higashi *et al.* 2008, ApJ, 683, 957.  $\gamma$ -ray detection.  
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

Kilpatrick *et al.* 2016, ApJ, 816, 1. CO observations, including broad lines.

### G8.7–5.0

**RA:** 18<sup>h</sup>24<sup>m</sup>10<sup>s</sup>  
**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, IAUCom, 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.

### G8.7–0.1

(W30)

**RA:** 18<sup>h</sup>05<sup>m</sup>30<sup>s</sup>  
**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 western edge.

**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.  $\gamma$ -ray detection.  
 Aharonian *et al.* 2006, ApJ, 636, 777.  $\gamma$ -ray 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.  $\gamma$ -ray observations.

### G8.9+0.4

**RA:** 18<sup>h</sup>03<sup>m</sup>58<sup>s</sup>  
**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.

**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.

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**G9.7–0.0****RA:** 18<sup>h</sup>07<sup>m</sup>22<sup>s</sup>  
**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 and G9.70–0.06.

**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.  $\gamma$ -ray observations.

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**G9.8+0.6****RA:** 18<sup>h</sup>05<sup>m</sup>08<sup>s</sup>  
**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′:  $S=5.8\pm 0.6$  Jy).  
 Dubner *et al.* 1993, AJ, 105, 2251. VLA at 1.47 GHz (41″×63″:  $S=3.5\pm 0.4$  Jy).  
 Frail *et al.* 1994, AJ, 107, 1120. VLA at 327 MHz.  
 Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

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**G9.9–0.8****RA:** 18<sup>h</sup>10<sup>m</sup>41<sup>s</sup>  
**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.**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″:  $S=11.0\pm 0.3$  Jy), plus other observations.  
 Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.  
 Stupar & Parker 2011, MNRAS, 414, 2282. H $\alpha$  observations.  
 Froebrich *et al.* 2015, MNRAS, 454, 2586. H<sub>2</sub> IR observations.  
 Kilpatrick *et al.* 2016, ApJ, 816, 1. CO observations, including broad lines.

**G10.5–0.0****RA:** 18<sup>h</sup>09<sup>m</sup>08<sup>s</sup>**Dec:** –19°47′**1-GHz flux/Jy:** 0.9**Spectral index:** 0.6**Size/arcmin:** 6**Type:** S

Has been called G10.59–0.04.

**Radio:** Partial 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″:  $S=1.4\pm 0.1$  Jy), plus other observations.

Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

**G11.0–0.0****RA:** 18<sup>h</sup>10<sup>m</sup>04<sup>s</sup>**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 and G11.03–0.05.

**Radio:** Partial shell.

**X-ray:** Diffuse emission.

**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″:  $S=3.1\pm 0.2$  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.

**G11.1–1.0****RA:** 18<sup>h</sup>14<sup>m</sup>03<sup>s</sup>**Dec:** –19°46′**1-GHz flux/Jy:** 5.8**Spectral index:** 0.5**Size/arcmin:** 18×12**Type:** S

Has been called G11.2–1.1 and G11.17–1.04.

**Radio:** Shell.

**Optical:** Detected.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″:  $S=11.0\pm 0.3$  Jy), plus other observations.

Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

Stupar & Parker 2011, MNRAS, 414, 2282. H $\alpha$  observations.

Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5:  $S=3.40\pm 0.25$  Jy) including polarisation and review of flux densities.

**G11.1–0.7**

**RA:** 18<sup>h</sup>12<sup>m</sup>46<sup>s</sup>  
**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±0.1 Jy), plus other observations.

**G11.1+0.1**

**RA:** 18<sup>h</sup>09<sup>m</sup>47<sup>s</sup>  
**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±0.2 Jy), plus other observations.  
 Castelletti *et al.* 2016, A&A, 587, A71. VLA at 1.4 GHz (4''×8''/3) and CO observations of region.

**G11.2–0.3**

**RA:** 18<sup>h</sup>11<sup>m</sup>27<sup>s</sup>  
**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<sub>I</sub> absorption indicates 4.4 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<sub>I</sub> 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<sub>I</sub> absorption, Einstein observations.  
 Morsi & Reich 1987, A&AS, 71, 189. Effelsberg 100-m at 32 GHz (26''5: S=4.04±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.

Kothes & 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±0.5, 6.3±0.4, 5.7±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 (2''6×1''8 : S = 16.6±0.9 Jy) and 5 GHz (2''1×1''5 : S = 8.4±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±0.5 Jy) including polarisation and review of flux densities.

Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.

Lee *et al.* 2013, ApJ, 770, 143. IR observations.

Froebrich *et al.* 2015, MNRAS, 454, 2586. H<sub>2</sub> 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).

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### G11.4–0.1

**RA:** 18<sup>h</sup>10<sup>m</sup>47<sup>s</sup>

**Dec:** –19°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±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 (3'2×4'1 : S = 18 Jy).

Dubner *et al.* 1993, AJ, 105, 2251. VLA at 1.47 GHz (44''×63'' : S = 5.1±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.

Acerro *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.



**G11.8–0.2****RA:** 18<sup>h</sup>12<sup>m</sup>25<sup>s</sup>**Dec:** –18°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.

**G12.0–0.1****RA:** 18<sup>h</sup>12<sup>m</sup>11<sup>s</sup>**Dec:** –18°37′**1-GHz flux/Jy:** 3.5**Spectral index:** 0.7**Size/arcmin:** ??**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″×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.

**G12.2+0.3****RA:** 18<sup>h</sup>11<sup>m</sup>17<sup>s</sup>**Dec:** –18°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.

**G12.5+0.2**

**RA:** 18<sup>h</sup>12<sup>m</sup>14<sup>s</sup>  
**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.

**G12.7-0.0**

**RA:** 18<sup>h</sup>13<sup>m</sup>19<sup>s</sup>  
**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.

**G12.8-0.0**

**RA:** 18<sup>h</sup>13<sup>m</sup>37<sup>s</sup>  
**Dec:** -17°49'

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

**Size/arcmin:** 3  
**Type:** C?

Has been called G12.82-0.02 and G12.83-0.02.

**Radio:** Shell.

**X-ray:** Diffuse.

**Point sources:** Central X-ray pulsar.

**References:**

Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.  
Brogan *et al.* 2005, ApJ, 629, L105. VLA at 330 MHz (19'' × 32''), plus other observations.  
Ubertini *et al.* 2005, ApJ, 629, L109. X-ray,  $\gamma$ -ray and other observations.  
Aharonian *et al.* 2006, ApJ, 636, 777.  $\gamma$ -ray detection.  
Albert *et al.* 2006, ApJ, 637, L41.  $\gamma$ -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.

**G13.3–1.3****RA:** 18<sup>h</sup>19<sup>m</sup>20<sup>s</sup>**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.**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.**G13.5+0.2****RA:** 18<sup>h</sup>14<sup>m</sup>14<sup>s</sup>**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.**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. H<sub>2</sub> IR observations.**G14.1–0.1****RA:** 18<sup>h</sup>16<sup>m</sup>40<sup>s</sup>**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 &amp; Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

**G14.3+0.1****RA:** 18<sup>h</sup>15<sup>m</sup>58<sup>s</sup>**Dec:** –16°27′**1-GHz flux/Jy:** 0.6**Spectral index:** 0.4**Size/arcmin:** 5×4**Type:** S

Has been called G14.30+0.14. Has been suggested this is not an SNR.

**Radio:** Partial shell.**References:**Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz ( $42'' : S = 1.2 \pm 0.1$  Jy), plus other observations.

Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.  
 Pinheiro Gonçalves *et al.* 2011, AJ, 142, 47. IR observations.

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### G15.1–1.6

**RA:** 18<sup>h</sup>24<sup>m</sup>00<sup>s</sup>  
**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.

**References:**

Reich *et al.* 1988, IAUCom, 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 $\alpha$  observations.  
 Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : S = 4.8±0.3 Jy) including polarisation and review of flux densities.

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### G15.4+0.1

**RA:** 18<sup>h</sup>18<sup>m</sup>02<sup>s</sup>  
**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 $\alpha$  observations suggest 4.8 kpc.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : S = 10.9±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±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 $\alpha$  and CO observations of region.  
 Abramowski *et al.* 2014, A&A, 562, A40.  $\gamma$ -ray and XMM-Newton observations.  
 Supan *et al.* 2015, A&A, 576, A81. GMRT at 624 MHz (10″).

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### G15.9+0.2

**RA:** 18<sup>h</sup>18<sup>m</sup>52<sup>s</sup>  
**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.

**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 ( $58'' \times 44''$ ).  
 Dubner *et al.* 1996, *AJ*, 111, 1304. VLA at 330 MHz ( $77'' \times 61'' : S = 11.2 \pm 1.0$  Jy), 1.4 GHz ( $23'' \times 14'' : S = 3.9 \pm 0.1$  Jy) and 4.9 GHz ( $13'' \times 16''$ ).  
 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).

### G16.0–0.5

**RA:**  $18^{\text{h}}21^{\text{m}}56^{\text{s}}$   
**Dec:**  $-15^{\circ}14'$

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

**Size/arcmin:**  $15 \times 10$   
**Type:** S

Has been called G16.05–0.57.

**Radio:** Shell.

#### 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. H<sub>2</sub> IR observations.

### G16.2–2.7

**RA:**  $18^{\text{h}}29^{\text{m}}40^{\text{s}}$   
**Dec:**  $-16^{\circ}08'$

**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.

### G16.4–0.5

**RA:**  $18^{\text{h}}22^{\text{m}}38^{\text{s}}$   
**Dec:**  $-14^{\circ}55'$

**1-GHz flux/Jy:** 4.6  
**Spectral index:** 0.3?

**Size/arcmin:** 13  
**Type:** S

Has been called G16.41–0.55.

**Radio:** Partial shell.

#### References:

Brogan *et al.* 2006, *ApJ*, 639, L25. VLA at 330 MHz ( $42'' : S = 10.0 \pm 0.3$  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 ( $9'5:S=3.0\pm 0.3$  Jy) including polarisation and review of flux densities.

### G16.7+0.1

**RA:** 18<sup>h</sup>20<sup>m</sup>56<sup>s</sup>

**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.

#### References:

Helfand *et al.* 1989, ApJ, 341, 151. VLA at 5 GHz ( $5:S=0.95$  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 ( $19''\times 25''$ ).

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.

### G17.0-0.0

**RA:** 18<sup>h</sup>21<sup>m</sup>57<sup>s</sup>

**Dec:** -14°08'

**1-GHz flux/Jy:** 0.5

**Spectral index:** 0.5

**Size/arcmin:** 5

**Type:** S

Has been called 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.

### G17.4-2.3

**RA:** 18<sup>h</sup>30<sup>m</sup>55<sup>s</sup>

**Dec:** -14°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.  $\gamma$ -ray 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.

### 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 and G18.16–0.16.

**Radio:** Shell.

**X-ray:** Possibly detected.

**Distance:** H $\alpha$  absorption suggests 5.6 kpc.

**References:**

Odegard 1986, AJ, 92, 1372. TPT at 57.5 MHz (8').  
 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 $\alpha$  observations.  
 Froebrich *et al.* 2015, MNRAS, 454, 2586. H $_2$  IR observations.  
 Voison *et al.* 2016, MNRAS, 458, 2813. Molecular line observations of region.

**G18.6–0.2****RA:** 18<sup>h</sup>25<sup>m</sup>55<sup>s</sup>**Dec:** –12°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.**References:**Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″: S=1.9±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.**G18.8+0.3**

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**RA:** 18<sup>h</sup>23<sup>m</sup>58<sup>s</sup>**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<sub>II</sub> region W39.**Distance:** Association with molecular cloud and H<sub>I</sub> absorption suggests 12 kpc.**References:**

Willis 1973, A&amp;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<sub>I</sub> absorption.

Dickel &amp; 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 (75″×55″: S=29.9±0.3 Jy).Dubner *et al.* 1999, AJ, 118, 930. Parkes 64-m at 1.6 GHz (15″) for H<sub>I</sub>, VLA at 1.6 GHz (17″×12″) 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<sub>I</sub>, 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.



**G18.9–1.1****RA:** 18<sup>h</sup>29<sup>m</sup>50<sup>s</sup>**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:** Various observations suggest 2 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′ : S = 82 ± 15 Jy), plus review of flux densities. Barnes & Turtle 1988, *IAUCo*, 101, 347. Molonglo at 408 MHz (2′.9 × 3′.1 : S = 58 ± 9 Jy) and Parkes 64-m at 5 GHz (4′.4 × 4′.1 : 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 (19″ × 14″), and Effelsberg 100-m at 1.4 GHz (9′) for Hi.

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 $\alpha$  observations.

Froebrich *et al.* 2015, *MNRAS*, 454, 2586. H<sub>2</sub> IR observations.

Acerio *et al.* 2016, *ApJS*, 224, 8.  $\gamma$ -ray observations.

**G19.1+0.2****RA:** 18<sup>h</sup>24<sup>m</sup>56<sup>s</sup>**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.

**References:**

Brogan *et al.* 2006, *ApJ*, 639, L25. VLA at 330 MHz (42″ : S = 17.4 ± 0.4 Jy), plus other observations.

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**G20.0–0.2****RA:** 18<sup>h</sup>28<sup>m</sup>07<sup>s</sup>**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.**References:**

Becker &amp; 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±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 &amp; 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±0.5 Jy) including polarisation and review of flux densities.Petriella *et al.* 2013, A&A, 554, A73. Chandra observations, plus CO and H<sub>i</sub> observations of region.Acerio *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

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**G20.4+0.1****RA:** 18<sup>h</sup>27<sup>m</sup>51<sup>s</sup>**Dec:** –11°00′**1-GHz flux/Jy:** 9?**Spectral index:** 0.1?**Size/arcmin:** 8**Type:** S?

Has been called G20.47+0.16.

**Radio:** Shell.**References:**Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″: S=4.2±0.1 Jy), plus other observations.Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′5: S=7.5±0.5 Jy) including polarisation and review of flux densities.

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**G21.0–0.4****RA:** 18<sup>h</sup>31<sup>m</sup>12<sup>s</sup>**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±0.2 Jy), plus other observations.

**G21.5–0.9****RA:** 18<sup>h</sup>33<sup>m</sup>33<sup>s</sup>**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<sub>I</sub> absorption indicates 4.6 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 (20''×5'') and 8 GHz (7''×2''), 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<sub>I</sub> 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<sub>I</sub> 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 (8'6×4'6).

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<sub>I</sub>.

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.

Arnaud *et al.* 2016, A&A, 586, A134. Planck flux densities at 70, 100 and 143 GHz.

**G21.5–0.1**

**RA:** 18<sup>h</sup>30<sup>m</sup>50<sup>s</sup>  
**Dec:** –10°09′

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

**Size/arcmin:** 5  
**Type:** S

Has been called G21.56–0.10.

**Radio:** Partial 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=0.5±0.1 Jy), plus other observations.

**G21.6–0.8**

**RA:** 18<sup>h</sup>33<sup>m</sup>40<sup>s</sup>  
**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. H<sub>2</sub> IR observations.

**G21.8–0.6**

**RA:** 18<sup>h</sup>32<sup>m</sup>45<sup>s</sup>  
**Dec:** –10°08′

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

**Size/arcmin:** 20  
**Type:** S

Kes 69

**Radio:** Incomplete shell.

**X-ray:** Detected.

**Distance:** Association with CO indicates 5.2 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. H<sub>2</sub>CO 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 at 2.7 GHz (5′: S=42.3±4.6 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<sub>i</sub>.

Zhou *et al.* 2009, ApJ, 691, 516. CO and HCO<sup>+</sup> 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 ( $9'.5 : S = 24.0 \pm 1.3$  Jy) including polarisation and review of flux densities.

Anderson *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. H<sub>2</sub> IR observations.

## G22.7–0.2

**RA:** 18<sup>h</sup>33<sup>m</sup>15<sup>s</sup>  
**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.

**Point sources:** Variable radio source near centre, and  $\gamma$ -ray source near edge.

**Distance:** association with CO indicates 4.4 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 = 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.

Anderson *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.

Abramowski *et al.* 2015, MNRAS, 446, 1163.  $\gamma$ -ray observations.

## G23.3–0.3

W41

**RA:** 18<sup>h</sup>34<sup>m</sup>45<sup>s</sup>  
**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<sub>I</sub> and CO observations indicate 4.2 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.  $\gamma$ -ray detection.

Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.

Aharonian *et al.* 2006, ApJ, 636, 777.  $\gamma$ -ray observations.

Albert *et al.* 2006, ApJ, 643, L53.  $\gamma$ -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<sub>I</sub>, plus XMM-Newton observations.

Leahy & Tian 2008, AJ, 135, 167. VGPS at 1.4 GHz (1') including H<sub>I</sub>, plus CO observations.

Mukherjee *et al.* 2009, ApJ, 691, 1707. XMM-Newton and  $\gamma$ -ray observations.

Frail *et al.* 2013, ApJ, 773, L19. OH observations.  
 Castro *et al.* 2013, ApJ, 774, 36. Fermi observations.  
 Abramowski *et al.* 2015, A&A, 574, A27.  $\gamma$ -ray observations.  
 Su *et al.* 2015, ApJ, 811, 134. CO observations of region.  
 Acero *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

### G23.6+0.3

**RA:** 18<sup>h</sup>33<sup>m</sup>03<sup>s</sup>  
**Dec:** -08°13'

**1-GHz flux/Jy:** 8?  
**Spectral index:** 0.3

**Size/arcmin:** 10?  
**Type:** ?

Has been suggested this is not an SNR.

**Radio:** Not well resolved, in complex region.

#### 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).  
 Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.  
 Pinheiro Gonçalves *et al.* 2011, AJ, 142, 47. IR observations.  
 Kilpatrick *et al.* 2016, ApJ, 816, 1. CO observations, including broad lines.

### G24.7-0.6

**RA:** 18<sup>h</sup>38<sup>m</sup>43<sup>s</sup>  
**Dec:** -07°32'

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

**Size/arcmin:** 15?  
**Type:** S?

**Radio:** Incomplete shell, defined in SW.

#### 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±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.

### G24.7+0.6

**RA:** 18<sup>h</sup>34<sup>m</sup>10<sup>s</sup>  
**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 compact H<sub>II</sub> region to the S.

#### 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±3 Jy) and 4.75 GHz (2'.4: S=17±4 Jy) and NRO 45-m at 10.2 GHz (2'.7: S=15±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. H<sub>2</sub> IR observations.  
 Acero *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

**G25.1–2.3**

**RA:** 18<sup>h</sup>45<sup>m</sup>10<sup>s</sup>  
**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.

**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.

**G27.4+0.0**

**RA:** 18<sup>h</sup>41<sup>m</sup>19<sup>s</sup>  
**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<sub>I</sub> absorption suggests 7.5 to 9.8 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 (60″×45″ :  $S = 3.5$  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<sub>I</sub> 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<sub>I</sub>.

Mizuno *et al.* 2010, AJ, 139, 1542. Spitzer observations.

An *et al.* 2013, ApJ, 779, 163. NuSTAR and  $\gamma$ -ray observations.

Kumar *et al.* 2014, ApJ, 781, 41. Chandra and XMM-Newton observations.

Froeblich *et al.* 2015, MNRAS, 454, 2586. H<sub>2</sub> 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).

**G27.8+0.6****RA:** 18<sup>h</sup>39<sup>m</sup>50<sup>s</sup>**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.**References:**

Reich *et al.* 1984, A&A, 133, L4. Effelsberg 100-m at 2.7 GHz (4'3 : S = 23±2 Jy), and 4.75 GHz (2'4 : S = 18±2 Jy) and NRO 45-m at 10.2 GHz (smoothed to 4'3 : S = 8.5±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.  $\gamma$ -ray observations.

Misanovic *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±1.1 Jy) including polarisation and review of flux densities.

Froebrich *et al.* 2015, MNRAS, 454, 2586. H<sub>2</sub> IR observations.

**G28.6-0.1****RA:** 18<sup>h</sup>43<sup>m</sup>55<sup>s</sup>**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.**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.

**G28.8+1.5****RA:** 18<sup>h</sup>39<sup>m</sup>00<sup>s</sup>**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.  $\gamma$ -ray observations.

Misanovic *et al.* 2010, ApJ, 725, 931. XMM-Newton pulsar/wind nebula search.

Froebrich *et al.* 2015, MNRAS, 454, 2586. H<sub>2</sub> IR observations.



**G29.6+0.1**

**RA:** 18<sup>h</sup>44<sup>m</sup>52<sup>s</sup>  
**Dec:** -02°57'

**1-GHz flux/Jy:** 1.5?  
**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.

**G29.7-0.3**

Kes 75

**RA:** 18<sup>h</sup>46<sup>m</sup>25<sup>s</sup>  
**Dec:** -02°59'

**1-GHz flux/Jy:** 10  
**Spectral index:** 0.63

**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.

**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':S=5±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 (20''×7'') and 8 GHz (25''×8''), 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 HI.  
 Morsi & Reich 1987, *A&AS*, 71, 189. Effelsberg 100-m at 32 GHz (26'':S=1.02±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.  $\gamma$ -ray and Chandra observations.  
 Leahy & Tian 2008, *A&A*, 480, L25. VGPS at 1.4 GHz (1') including HI.  
 Kumar & Safi-Harb 2008, *Apj*, 678, L43. Chandra observations.  
 Ng *et al.* 2008, *Apj*, 686, 508. Chandra observations.  
 Gavriil *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±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).

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### G30.7–2.0

**RA:** 18<sup>h</sup>54<sup>m</sup>25<sup>s</sup>  
**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, IAUCom, 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.

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### G30.7+1.0

**RA:** 18<sup>h</sup>44<sup>m</sup>00<sup>s</sup>  
**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.

**References:**

Reich *et al.* 1986, A&A, 155, 185. Effelsberg 100-m at 4.75 GHz (2′4: S=3.4±0.4 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±0.19 Jy) including polarisation and review of flux densities.

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### G31.5–0.6

**RA:** 18<sup>h</sup>51<sup>m</sup>10<sup>s</sup>  
**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 H<sub>II</sub> 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.

**G31.9+0.0**

3C391

**RA:** 18<sup>h</sup>49<sup>m</sup>25<sup>s</sup>**1-GHz flux/Jy:** 25**Size/arcmin:** 7×5**Dec:** -00°55′**Spectral index:** varies**Type:** S**Radio:** Shell, brightest in NW, with low frequency turnover.**X-ray:** Diffuse with central core.**Distance:** H<sub>I</sub> absorption suggests 7.2 kpc.**References:**

- Radhakrishnan *et al.* 1972, *ApJS*, 24, 49. H<sub>I</sub> 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 (24″×9″), 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, *AJ*, 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<sup>+</sup> 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.  $\gamma$ -ray and Suzaku observations.  
 Gusdorf *et al.* 2014, *IAUS*, 296, 178. CO observations.  
 Su *et al.* 2014, *IAUS*, 296, 372. VGPS for H<sub>I</sub> 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. H<sub>2</sub> 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).

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**G32.0–4.9**

3C396.1

**RA:** 19<sup>h</sup>06<sup>m</sup>00<sup>s</sup>  
**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, *AJPh*, 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, *AJPh*, 23, 105. Revision of low frequency flux densities.

Dickel & DeNoyer 1975, *AJ*, 80, 437. Arecibo at 111 MHz ( $S=105\pm 30$  Jy).

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**G32.1–0.9****RA:** 18<sup>h</sup>53<sup>m</sup>10<sup>s</sup>  
**Dec:** –01°08′**1-GHz flux/Jy:** ?  
**Spectral index:** ?**Size/arcmin:** 40?  
**Type:** C?**Radio:** Possible faint shell, not well defined.**X-ray:** Diffuse, with clumps.**References:**

Folgheraiter *et al.* 1997, *MNRAS*, 292, 365. ROSAT and ASCA observations.

Froebrich *et al.* 2015, *MNRAS*, 454, 2586. H<sub>2</sub> IR observations.

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**G32.4+0.1****RA:** 18<sup>h</sup>50<sup>m</sup>05<sup>s</sup>  
**Dec:** –00°25′**1-GHz flux/Jy:** 0.25?  
**Spectral index:** ?**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 *XRRRC*, E4.18. XMM-Newton observations.

Acero *et al.* 2016, *ApJS*, 224, 8.  $\gamma$ -ray observations.

Kilpatrick *et al.* 2016, *ApJ*, 816, 1. CO observations, including broad lines.

**G32.8–0.1**

Kes 78

**RA:** 18<sup>h</sup>51<sup>m</sup>25<sup>s</sup>**1-GHz flux/Jy:** 11?**Size/arcmin:** 17**Dec:** –00°08′**Spectral index:** 0.2?**Type:** S?

Part has been called G33.1–0.1.

**Radio:** Elongated shell?**Optical:** Detected.**X-ray:** Detected.**Distance:** Association with CO indicates 4.8 kpc.**References:**

Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft et 2.7 GHz ( $5': S=7.2\pm 0.5$  Jy).  
 Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo at 430 MHz ( $S=19.0\pm 15.5$  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 ( $3'6\times 3'8: S=31.3$  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 $\alpha$  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. H $_2$  IR observations.  
 Bamba *et al.* 2016, ApJ, 818, 63. Suzaku observations.

**G33.2–0.6****RA:** 18<sup>h</sup>53<sup>m</sup>50<sup>s</sup>**1-GHz flux/Jy:** 3.5**Size/arcmin:** 18**Dec:** –00°02′**Spectral index:** varies**Type:** S**Radio:** Incomplete shell.**Optical:** Filaments and diffuse emission.**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 ( $4'4: S=2.6\pm 0.3$  Jy) and 4.75 GHz ( $2'5: S=1.75\pm 0.2$  Jy).  
 Dubner *et al.* 1996, AJ, 111, 1304. VLA at 1.4 GHz ( $68''\times 52'': S=2.7\pm 0.3$  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. H $_2$  IR observations.

**G33.6+0.1**

Kes 79, 4C00.70, HC13

**RA:** 18<sup>h</sup>52<sup>m</sup>48<sup>s</sup>**1-GHz flux/Jy:** 20**Size/arcmin:** 10**Dec:** +00°41′**Spectral index:** 0.51**Type:** S

Has been called G33.7+0.0.

**Radio:** Shell, with bright central region, in complex region.**X-ray:** Multiple shells and filaments.**Point sources:** Central X-ray pulsar.**Distance:** H<sub>I</sub> absorption gives about 7.8 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<sub>I</sub> absorption.
- Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo S<sub>430 MHz</sub> = 69±33 Jy.
- Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′:S=6.8±1.5 Jy).
- Angerhofer *et al.* 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6′8″:S=11.4±1.1 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<sub>I</sub> absorption to nearby point source, possibly extragalactic.
- Sequist & 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<sub>I</sub> 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.
- Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
- Koralesky *et al.* 1998, AJ, 116, 1323. VLA search for OH emission.
- Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.
- Tsunemi & Enoguchi 2002, PASJ, 54, 735. ASCA observations.
- Seward *et al.* 2003, ApJ, 584, 414. Chandra observations.
- Stanimirović 2003, ApJ, 592, 953. Arecibo OH absorption.
- Sun *et al.* 2004, ApJ, 605, 742. Chandra observations.
- Gotthelf *et al.* 2005, ApJ, 627, 390. XMM-Newton pulsar detection.
- 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±10 Jy), 324 MHz (13″:S=39±8 Jy) and 1.5 GHz (17″×19″:S=11.5±1.5 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±0.5 Jy) including polarisation and review of flux densities.
- Auchetti *et al.* 2014, ApJ, 783, 32.  $\gamma$ -ray 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.

**G34.7–0.4**

W44, 3C392

**RA:** 18<sup>h</sup>56<sup>m</sup>00<sup>s</sup>**1-GHz flux/Jy:** 240**Size/arcmin:** 35×27**Dec:** +01°22′**Spectral index:** 0.37**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<sub>I</sub> absorption indicates ~ 3 kpc.**References:**

- Kundu & Velusamy 1972, A&A, 20, 237. NRAO 140-ft at 10.7 GHz (3′:S=105±7 Jy).  
 Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′:S=177±10 Jy).  
 Caswell *et al.* 1975, A&A, 45, 239. H<sub>I</sub> absorption.  
 Clark *et al.* 1975, AujPA, 37, 75. Molonglo at 408 MHz (3′:S=299 Jy).  
 Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo S<sub>430 MHz</sub>=540±187 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).  
 Smith *et al.* 1985, MNRAS, 217, 99. Einstein observations.  
 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<sub>I</sub> of surrounding shell.  
 Esposito *et al.* 1996, ApJ, 461, 820. Possible associated  $\gamma$ -ray emission.  
 Harrus *et al.* 1996, ApJ, 464, L161. ASCA observations.  
 Frail *et al.* 1996, ApJ, 464, L165. VLA at 1.5 and 8.4 GHz (8″.9×7″.8) of pulsar nebula.  
 Frail *et al.* 1996, AJ, 111, 1651. OH maser emission.  
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.  
 Reach & Rho 1996, A&A, 315, L277. ISO spectroscopy.  
 Harrus *et al.* 1997, ApJ, 488, 781. X-ray observations.  
 Claussen *et al.* 1997, ApJ, 489, 143. VLA of associated OH masers.  
 Giacani *et al.* 1997, AJ, 113, 1379. VLA at 1.4 GHz (15″), plus optical images.  
 Seta *et al.* 1998, ApJ, 505, 286. CO observations of surroundings.  
 Cox *et al.* 1999, ApJ, 524, 179. Revision of distance.  
 Reach & Rho 2000, ApJ, 544, 843. ISO observations of interactions with surroundings.  
*see also:* Reach & Rho 2001, ApJ, 558, 943. Erratum.  
 Roberts *et al.* 2001, ApJS, 133, 451. ASCA observations.  
 Petre *et al.* 2002, ApJ, 579, 404. Chandra observations of pulsar and wind nebula.  
 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.  
 Neufeld *et al.* 2007, ApJ, 664, 890. Spitzer observations.  
 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).  
 Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.  
 Abdo *et al.* 2010, Science, 327, 1103. Fermi observations.  
 Yuan & Neufeld 2011, ApJ, 726, 76. Spitzer observations.

Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ( $9'.5 : S = 118 \pm 6$  Jy) including polarisation and review of flux densities.  
 Giuliani *et al.* 2011, ApJ, 742, L30.  $\gamma$ -ray observations.  
 Uchiyama *et al.* 2012, ApJ, 749, L35. Fermi observations.  
 Uchida *et al.* 2012, PASJ, 64, 141. Suzaku observations.  
 Ackermann *et al.* 2013, Science, 339, 807. Fermi observations.  
 Yoshiike *et al.* 2013, ApJ, 768, 179. CO and H $\alpha$  observations of region.  
 Sashida *et al.* 2013, ApJ, 774, 10. HCO $^+$  and CO observations of region.  
 Park *et al.* 2013, ApJ, 777, 14. Arecibo H $\alpha$  observations of region.  
 Pihlström *et al.* 2014, AJ, 147, 73. VLA search for methanol masers.  
 Anderl *et al.* 2014, A&A, 569, A81. CO observations of regions in NE.  
 Su *et al.* 2014, IAUS, 296, 372. VGPS for H $\alpha$  absorption.  
 Froebrich *et al.* 2015, MNRAS, 454, 2586. H $_2$  IR observations.  
 Arnaud *et al.* 2016, A&A, 586, A134. Planck flux densities at 30, 44 and 70 GHz.  
 Koo *et al.* 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).  
 McEwen *et al.* 2016, ApJ, 826, 189. NH $_3$  and CH $_3$ OH observations.  
 Acero *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

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### G35.6–0.4

**RA:** 18<sup>h</sup>57<sup>m</sup>55<sup>s</sup>  
**Dec:** +02°13'

**1-GHz flux/Jy:** 9  
**Spectral index:** 0.5

**Size/arcmin:** 15×11  
**Type:** S?

Re-identified as SNR in 2009.

**Radio:** Diffuse, with some limb brightening.

#### 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 $\alpha$  and other observations.  
 Paredes *et al.* 2014, A&A, 561, A56. GMRT at 610 MHz (12'' $\times$ 4'' $\times$ 8).

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### G36.6–0.7

**RA:** 19<sup>h</sup>00<sup>m</sup>35<sup>s</sup>  
**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?

#### 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 $\times$ 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 ( $9'.5 : S = 0.39 \pm 0.04$  Jy) including polarisation and review of flux densities.



**G36.6 + 2.6**

**RA:** 18<sup>h</sup>48<sup>m</sup>49<sup>s</sup>  
**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<sup>h</sup>06<sup>m</sup>40<sup>s</sup>  
**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.

**References:**

Schudel *et al.* 2002, ASPC, 271, 391. ROSAT observations of E.  
 Sabin *et al.* 2013, MNRAS, 431, 279. H $\alpha$  and radio survey observations.  
 Huang *et al.* 2014, ApJ, 785, 118. XMM-Newton and Chandra observations.  
 Froebrich *et al.* 2015, MNRAS, 454, 2586. H<sub>2</sub> IR observations.

**G39.2 – 0.3**

**RA:** 19<sup>h</sup>04<sup>m</sup>08<sup>s</sup>  
**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 $\alpha$  absorption suggests > 7.7 kpc.

**References:**

Shaver & Goss 1970, AujPA, 14, 133. Molonglo at 408 MHz (3′).  
 Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo S<sub>430 MHz</sub> = 54±38 Jy.  
 Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′:S=4.1±1.0 Jy).  
 Caswell *et al.* 1975, A&A, 45, 239. H $\alpha$  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 (65″×48″).  
 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 1.5 GHz (25″) and 1.4 GHz (7″8×7″5) and 5 GHz (25″) including polarisation, plus Ooty at 327 MHz (100″×31″), including review of flux densities.  
 Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′5×3′6:S=42.5 Jy).  
 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. Limit on high energy  $\gamma$ -rays.  
 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 ( $9'5 : S = 8.8 \pm 0.5$  Jy) including polarisation and review of flux densities.  
 Su *et al.* 2011, ApJ, 727, 43. Chandra and CO observations of region.  
 Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.  
 Froebrich *et al.* 2015, MNRAS, 454, 2586. H<sub>2</sub> 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).  
 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.

**G39.7–2.0**

W50, SS433

**RA:** 19<sup>h</sup>12<sup>m</sup>20<sup>s</sup>  
**Dec:** +04°55'

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

**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 H<sub>II</sub> 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<sub>I</sub> absorption indicates 6.0±0.5 kpc.

**References:**

van den Bergh 1980, ApJ, 236, L23. Optical in H $\alpha$  and [SII].  
 Zealey *et al.* 1980, MNRAS, 192, 731. Optical spectra.  
 van Gorkom *et al.* 1982, MNRAS, 198, 757. WSRT H<sub>I</sub> absorption to nearby point source (not SS433).  
 Seagquist & Gilmore 1982, AJ, 87, 378. VLA observations of nearby source.  
 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.  
 Romney *et al.* 1987, ApJ, 321, 822. VLBI of SS433, including distance.  
 Elston & Baum 1987, AJ, 94, 1633. Mosaic with VLA at 1.4 GHz ( $30''$ ) of fine structure only.  
 Kawai *et al.* 1989, PASJ, 41, 491. X-ray observations of SS433.  
 Band 1989, ApJ, 336, 937. Einstein and EXOSAT observations.  
 Yamauchi *et al.* 1994, PASJ, 46, L109. X-ray spectral observations.  
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.  
 Brinkmann *et al.* 1996, A&A, 312, 306. ROSAT observations.  
 Kotani *et al.* 1996, PASJ, 48, 619. X-ray line emission from SS433.  
 Safi-Harb & Ögelman 1997, ApJ, 483, 868. ROSAT observations.  
 Dubner *et al.* 1998, AJ, 116, 1842. VLA at 328 MHz ( $64'' \times 60'' : S = 160 \pm 20$  Jy), and 1.4 GHz ( $56'' \times 54''$ ), plus NRAO 140-ft at 1.4 GHz ( $21''$ ) for H<sub>I</sub> observations.  
 Safi-Harb & Petre 1999, ApJ, 512, 784. X-ray observations.  
 Aharonian *et al.* 2001, A&A, 375, 1008. Limit on high energy  $\gamma$ -rays.

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<sub>I</sub> observations.  
 Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9'5 : S = 37±4 Jy), including polarisation and review of flux densities.

### G40.5–0.5

**RA:** 19<sup>h</sup>07<sup>m</sup>10<sup>s</sup>  
**Dec:** +06°31'

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

**Size/arcmin:** 22  
**Type:** S

**Radio:** Shell, brightest to the NE.

#### 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±1.3 Jy), and 2.7 GHz (4'4 : S = 7.2±0.5 Jy), plus review of flux densities.  
 Aharonian *et al.* 2001, A&A, 375, 1008. Limit on high energy  $\gamma$ -rays.  
 Yang *et al.* 2006, ChJAA, 6, 210. CO observations of surroundings.  
 Abdo *et al.* 2007, ApJ, 664, L91.  $\gamma$ -ray observations.  
 Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9'5 : S = 6.4±0.3 Jy) including polarisation and review of flux densities.  
 Aliu *et al.* 2014, ApJ, 787, 166.  $\gamma$ -ray observations of region.

### G41.1–0.3

3C397

**RA:** 19<sup>h</sup>07<sup>m</sup>34<sup>s</sup>  
**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 H<sub>II</sub> region.

**X-ray:** Brighter to the E and W, with central component.

**Distance:** H<sub>I</sub> absorption suggest 8 to 10 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±1.2 Jy for both components).  
 Caswell *et al.* 1975, A&A, 45, 239. H<sub>I</sub> absorption.  
 Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo S<sub>430 MHz</sub> = 82±51 Jy, also Algonquin 46-m at 10.6 GHz (3' : S = 12±2 Jy), and Haystack 36-m at 15.5 GHz (2'3 : S = 8.5±3.0 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 (58''×52'').  
 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±0.19 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 (6'9×6'6) and 4.8 GHz (46''4×5''6), 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. Limit on high energy  $\gamma$ -rays.  
 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 ( $9'5'' : S = 18.5 \pm 1.1$  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.  $\gamma$ -ray observations.  
 Kilpatrick *et al.* 2016, ApJ, 816, 1. CO observations, including broad lines.  
 Leahy & Ranasinghe 2016, ApJ, 817, 74. VGPS for H $\alpha$  absorption.  
 Koo *et al.* 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).

### G41.5 + 0.4

**RA:** 19<sup>h</sup>05<sup>m</sup>50<sup>s</sup>  
**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 ( $20'' : S = 1.8 \pm 0.4$  Jy).  
 Alves *et al.* 2012, MNRAS, 422, 2429. Radio observations.

### G42.0 – 0.1

**RA:** 19<sup>h</sup>08<sup>m</sup>10<sup>s</sup>  
**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 ( $20'' : S = 1.8 \pm 0.4$  Jy).  
 Alves *et al.* 2012, MNRAS, 422, 2429. Radio observations.

### G42.8 + 0.6

**RA:** 19<sup>h</sup>07<sup>m</sup>20<sup>s</sup>  
**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.

#### References:

Fürst *et al.* 1987, A&AS, 69, 403. Effelsberg 100-m at 4.75 GHz ( $2'4'' : S = 1.5 \pm 0.2$  Jy), plus other flux densities.  
 Vasisht *et al.* 1994, ApJ, 431, L35. VLA at 327 MHz ( $3'2'' \times 3'4''$ ).  
 Hurlley *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. Limit on high energy  $\gamma$ -rays.

Kaplan *et al.* 2002, ApJ, 566, 378. VLA at 333 MHz (50''), and other observations of the region.

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### G43.3–0.2

W49B

**RA:** 19<sup>h</sup>11<sup>m</sup>08<sup>s</sup>**1-GHz flux/Jy:** 38**Size/arcmin:** 4×3**Dec:** +09°06′**Spectral index:** 0.46**Type:** S

**Radio:** Shell, brightest to the SE and W, near the H<sub>II</sub> region W49A.

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

**Point sources:** Compact X-ray source.

**Distance:** H<sub>I</sub> absorption indicates 10 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'':  $S=9.0\pm 0.7$  Jy).
- Lockhart & Goss 1978, A&A, 67, 355. H<sub>I</sub> 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'':  $S=6.90\pm 0.38$  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. Limit on high energy  $\gamma$ -rays.
- Brogan & Troland 2001, ApJ, 550, 799. VLA at 1.4 GHz (27''×24'' and 5'') for H<sub>I</sub> Zeeman splitting.
- Lacey *et al.* 2001, ApJ, 559, 954. VLA at 74 MHz (26''×23'' :  $S=55.6$  Jy) and 326 MHz (6''6×6''2 :  $S=56.0$  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 :  $S=19.1\pm 1.0$  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. H<sub>2</sub> IR observations.
- Acerro *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray 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).

**G43.9+1.6**

**RA:** 19<sup>h</sup>05<sup>m</sup>50<sup>s</sup>  
**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.

**References:**

Reich *et al.* 1988, IAUCom, 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±0.24 Jy) including polarisation and review of flux densities.

**G45.7–0.4**

**RA:** 19<sup>h</sup>16<sup>m</sup>25<sup>s</sup>  
**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.

**References:**

Fürst *et al.* 1987, A&AS, 69, 403. Effelsberg 100-m at 4.75 GHz (2′.4: S=2.6±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.

Acerro *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

**G46.8–0.3**

(HC30)

**RA:** 19<sup>h</sup>18<sup>m</sup>10<sup>s</sup>  
**Dec:** +12°09′

**1-GHz flux/Jy:** 17  
**Spectral index:** 0.54

**Size/arcmin:** 17×13  
**Type:** S

Has been called G46.6–0.2.

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

**Distance:** H $\alpha$  absorption suggests 6.8–8.8 kpc.

**References:**

Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz (5′: S=9.8±0.9 Jy), and 37-m at 1.7 GHz (S=14.5±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<sub>430 MHz</sub>=46±21 Jy.

Angerhofer *et al.* 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6′.8: S=5.9±0.6 Jy).

Sato 1979, ApL, 20, 43. H $\alpha$  observations.

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 (58″×53″: S=13.3±0.1 Jy).

Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5: S=7.02±0.18 Jy) including polarisation and review of flux densities.

**G49.2–0.7**

(W51)

**RA:** 19<sup>h</sup>23<sup>m</sup>50<sup>s</sup>  
**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. H<sub>I</sub> suggest 4.3 kpc.

**References:**

Shaver & Goss 1970, *AJPA*, 14, 133. Parkes 64-m at 5 GHz (4′).

Sato 1973, *PASJ*, 25, 135. H<sub>I</sub> absorption.

Velusamy & Kundu 1974, *A&A*, 32, 375. NRAO 300-ft at 2.7 GHz (5′),  $S = 51.5 \pm 3.2$  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<sub>I</sub>.

Copetti & Moon 1997, *ApJ*, 485, 263. NRAO 12-m CO and HCO<sup>+</sup> 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. SGPS of high velocity H<sub>I</sub>.

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<sub>I</sub> Zeeman splitting observations.

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

Aleksić *et al.* 2012, *A&A*, 541, A13.  $\gamma$ -ray observations.

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

Tian & Leahy 2013, *ApJ*, 769, L17. H<sub>I</sub> 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<sub>I</sub> 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.  $\gamma$ -ray observations.

McEwen *et al.* 2016, *ApJ*, 826, 189. NH<sub>3</sub> and CH<sub>3</sub>OH observations.

Acero *et al.* 2016, *ApJS*, 224, 8.  $\gamma$ -ray observations.

**G53.6–2.2**

3C400.2, NRAO 611

**RA:** 19<sup>h</sup>38<sup>m</sup>50<sup>s</sup>**1-GHz flux/Jy:** 8**Size/arcmin:** 33×28**Dec:** +17°14′**Spectral index:** 0.50**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<sub>I</sub> 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, AujPA, 37, 75. Molonglo at 408 MHz ( $3' : S = 11.7$  Jy).

Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo  $S_{430 \text{ MHz}} = 20 \pm 10$  Jy,  $S_{318 \text{ MHz}} = 20 \pm 3.6$  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<sub>I</sub> 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 ( $9' : S = 4.00 \pm 0.22$  Jy) including polarisation and review of flux densities.

Broersen & Vink 2015, MNRAS, 446, 3885. Chandra observations.

**G54.1+0.3****RA:** 19<sup>h</sup>30<sup>m</sup>31<sup>s</sup>**1-GHz flux/Jy:** 0.5**Size/arcmin:** 12?**Dec:** +18°52′**Spectral index:** 0.1**Type:** C?

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

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

**Point sources:** Central pulsar.

**Distance:** H<sub>I</sub> absorption suggests 4.5–9 kpc, association with CO suggest 8.2 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 ( $2' : S = 0.37 \pm 0.04$  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<sub>i</sub>.  
 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''6×6''8), 4.7 GHz (3''2×3''3), and 8.2 GHz (3''0×3''2) and Spitzer observations.  
 Acciari *et al.* 2010, ApJ, 719, L69.  $\gamma$ -ray observations.  
 Lee *et al.* 2012, JKAS, 45, 117. CO observations of region.

**G54.4–0.3**

(HC40)

**RA:** 19<sup>h</sup>33<sup>m</sup>20<sup>s</sup>  
**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.

**References:**

Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5': S=34.4±5.0 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±4 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. SGPS of high velocity H<sub>i</sub>.  
 Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.  
 Park *et al.* 2013, ApJ, 777, 14. Arecibo of H<sub>i</sub> in region.  
 Froebrich *et al.* 2015, MNRAS, 454, 2586. H<sub>2</sub> IR observations.

**G55.0+0.3**

**RA:** 19<sup>h</sup>32<sup>m</sup>00<sup>s</sup>  
**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<sub>i</sub> features implies 14 kpc.

**References:**

Matthews *et al.* 1998, ApJ, 493, 312. WSRT at 327 MHz (1'0×2'9: S=0.98±0.15 Jy), DRAO at 1.4 GHz (1'0×2'9: S=0.25±0.12 Jy), plus H<sub>i</sub> observations.  
 Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.

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**G55.7 + 3.4****RA:** 19<sup>h</sup>21<sup>m</sup>20<sup>s</sup>  
**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 observations at 610 MHz (57''×156'' :  $S = 1.9 \pm 0.2$  Jy) and 1415 MHz (27''×72'' :  $S = 1.0 \pm 0.1$  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 :  $S = 0.52 \pm 0.03$  Jy) including polarisation and review of flux densities.

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**G57.2 + 0.8**

(4C21.53)

**RA:** 19<sup>h</sup>34<sup>m</sup>59<sup>s</sup>  
**Dec:** +21°57′**1-GHz flux/Jy:** 1.8  
**Spectral index:** 0.62**Size/arcmin:** 12?  
**Type:** S?**Radio:** Extended non-thermal arc.**Point sources:** Central magnetar.**References:**

Sieber & Seiradakis 1984, A&A, 130, 257. Effelsberg 100-m at 1.4 GHz (8':8 :  $1.34 \pm 0.1$ ), 2.7 GHz (4':3 :  $0.86 \pm 0.1$ ), 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 :  $S = 0.74 \pm 0.04$  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.

Isreal *et al.* 2016, MNRAS, 457, 3448. Chandra, XMM-Newton and Swift observations of magnetar.

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**G59.5 + 0.1****RA:** 19<sup>h</sup>42<sup>m</sup>33<sup>s</sup>  
**Dec:** +23°35′**1-GHz flux/Jy:** 3?  
**Spectral index:** ?**Size/arcmin:** 15  
**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 :  $S = 5.1 \pm 0.2$  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.

**G59.8 + 1.2****RA:** 19<sup>h</sup>38<sup>m</sup>55<sup>s</sup>**Dec:** +24°19′**1-GHz flux/Jy:** 1.5**Spectral index:** 0.0**Size/arcmin:** 20×16?**Type:** ?

Has been called G59.7+1.2.

**Radio:** Poorly defined source.

**Optical:** Faint diffuse emission and filaments.

**References:**

Reich *et al.* 1988, IAUCom, 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).

Boumis *et al.* 2005, A&A, 443, 175. Optical observations.

Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 :  $S = 1.43 \pm 0.08$  Jy) including polarisation and review of flux densities.

**G63.7 + 1.1****RA:** 19<sup>h</sup>47<sup>m</sup>52<sup>s</sup>**Dec:** +27°45′**1-GHz flux/Jy:** 1.8**Spectral index:** 0.24**Size/arcmin:** 8**Type:** F

**Radio:** Centrally brightened, with core.

**X-ray:** Diffuse emission.

**References:**

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 :  $S = 1.12 \pm 0.06$  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<sup>h</sup>50<sup>m</sup>25<sup>s</sup>**Dec:** +28°16′**1-GHz flux/Jy:** 0.15?**Spectral index:** 0.5**Size/arcmin:** 8**Type:** S?

**Radio:** Shell with central source.

**References:**

Hurley-Walker *et al.* 2009, MNRAS, 398, 249. Radio identification.

**G65.1+0.6****RA:** 19<sup>h</sup>54<sup>m</sup>40<sup>s</sup>**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<sub>I</sub> suggests 9 kpc.**References:**Landecker *et al.* 1990, A&A, 232, 207. DRAO at 408 MHz (3′.5×7′.0: S=9.5±0.1 Jy), and 1.4 GHz (1′.0×2′.0: S=5.4±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±0.8 Jy) and 1.4 GHz (0′.8×1′.7: S=4.9±0.5 Jy) including H<sub>I</sub>.Kotthes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (~3′: S=9.1±1.0 Jy) and 1420 MHz (~1′: S=3.9±0.5 Jy), including review of flux densities.Aleksić *et al.* 2010, ApJ, 725, 1629. Fermi observations.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.Froebrich *et al.* 2015, MNRAS, 454, 2586. H<sub>2</sub> IR observations.**G65.3+5.7****RA:** 19<sup>h</sup>33<sup>m</sup>00<sup>s</sup>**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.**References:**Gull *et al.* 1977, ApJ, 215, L69. Optical plates.Reich *et al.* 1979, A&A, 72, 270. Effelsberg 100-m observations at 1.42 GHz (smoothed to 11′: S=42.4±1.6 Jy), estimate S<sub>408 MHz</sub>=91±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 [O III] 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±3 Jy), and Urumqi 21-m at 4.8 GHz (9′.5: S=16.8±1.8 Jy) including polarisation and review of flux densities.Gosachinskii 2010, AstL, 36, 260. H<sub>I</sub> observations.Kim *et al.* 2010, ApJ, 722, 388. Far UV observations.

**G65.7+1.2**

DA 495

**RA:** 19<sup>h</sup>52<sup>m</sup>10<sup>s</sup>**1-GHz flux/Jy:** 5.1**Size/arcmin:** 22**Dec:** +29°26′**Spectral index:** varies**Type:** F

Has mistakenly 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:** H<sub>i</sub> polarisation observations suggest 1.5 kpc.

**References:**

Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz ( $S = 2.8 \pm 0.4$  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. H<sub>i</sub> 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.

**G65.8–0.5****RA:** 19<sup>h</sup>59<sup>m</sup>20<sup>s</sup>**1-GHz flux/Jy:** ?**Size/arcmin:** 10×6?**Dec:** +28°38′**Spectral index:** ?**Type:** S

**Radio:** Arc in W.

**Optical:** Diffuse shell, brighter in W.

**References:**

Sabin *et al.* 2013, MNRAS, 431, 279. H $\alpha$  and radio survey observations.

**G66.0–0.0**

**RA:** 19<sup>h</sup>57<sup>m</sup>50<sup>s</sup>  
**Dec:** +29°03′

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

**Size/arcmin:** 31×25?  
**Type:** S

**Radio:** Some emission in N.

**Optical:** Incomplete shell.

**References:**

Sabin *et al.* 2013, MNRAS, 431, 279. H $\alpha$  and radio survey observations.

**G67.6+0.9**

**RA:** 19<sup>h</sup>57<sup>m</sup>45<sup>s</sup>  
**Dec:** +30°53′

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

**Size/arcmin:** 50×45?  
**Type:** S

**Radio:** Arc in S.

**Optical:** Filamentary shell.

**References:**

Sabin *et al.* 2013, MNRAS, 431, 279. H $\alpha$  and radio survey observations.

**G67.7+1.8**

**RA:** 19<sup>h</sup>54<sup>m</sup>32<sup>s</sup>  
**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.

**References:**

Taylor *et al.* 1992, AJ, 103, 931. WSRT at 327 MHz (1′9×1′0 :  $S = 1.9 \pm 0.1$  Jy), and northern sky survey at 4.9 GHz ( $S = 0.42 \pm 0.05$  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), including 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 observations 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.

**G67.8+0.5****RA:** 20<sup>h</sup>00<sup>m</sup>00<sup>s</sup>**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 $\alpha$  and radio survey observations.**G68.6–1.2****RA:** 20<sup>h</sup>08<sup>m</sup>40<sup>s</sup>**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.Kotthes *et al.* 2006, A&A, 457, 1081. CGPS at 1420 MHz ( $\sim 1′$ :  $S=0.57\pm 0.08$  Jy), including review of flux densitiesSun *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****RA:** 19<sup>h</sup>53<sup>m</sup>20<sup>s</sup>**Dec:** +32°55′**1-GHz flux/Jy:** 120?**Spectral index:** varies**Size/arcmin:** 80?**Type:** ?

CTB 80

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 western edge of core.**Distance:** H $\alpha$  observations suggest 1.5 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 &amp; Kundu 1983, JApA, 4, 253. VLA of compact sources.

Blair *et al.* 1984, ApJ, 282, 161. Optical images and spectra.

Wang &amp; 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 $\alpha$  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 $\alpha$  (1'), plus IRAS.
- Safi-Harbi *et al.* 1995, ApJ, 439, 722. ROSAT observations.
- Srinivasan 1997, ApJ, 489, 170.  $\gamma$ -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 (26''×17'' and 10''×6'') and VLA at 324 and 1380 MHz (73''×63'' and 93''×78'').
- 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. SGPS of high velocity H $\alpha$ .
- Albert *et al.* 2007, ApJ, 669, 1143.  $\gamma$ -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 $\alpha$ , plus ROSAT observations.
- Park *et al.* 2013, ApJ, 777, 14. Arecibo of H $\alpha$  in region.
- Arnaud *et al.* 2016, A&A, 586, A134. Planck flux densities at 30 and 44 GHz.

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## G69.7 + 1.0

**RA:** 20<sup>h</sup>02<sup>m</sup>40<sup>s</sup>  
**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, IAUCom, 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.



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**G70.0–21.5****RA:** 21<sup>h</sup>24<sup>m</sup>00<sup>s</sup>  
**Dec:** +19°23′**1-GHz flux/Jy:** ?  
**Spectral index:** ?**Size/arcmin:** 330×240  
**Type:** S**Optical:** Large, faint shell of filaments.**X-ray:** Partially detected.**References:**Boumis *et al.* 2002, A&A, 396, 225. Optical and ROSAT observations.Fesen *et al.* 2015, ApJ, 812, 37. H $\alpha$  and other optical/UV line and ROSAT observations.

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**G73.9+0.9****RA:** 20<sup>h</sup>14<sup>m</sup>15<sup>s</sup>  
**Dec:** +36°12′**1-GHz flux/Jy:** 9  
**Spectral index:** 0.23**Size/arcmin:** 27  
**Type:** S?**Radio:** Diffuse, centrally brightened to SW.**Optical:** Faint shell.**References:**Reich *et al.* 1986, A&A, 155, 185. Effelsberg 100-m at 4.75 GHz (2′.4 : S = 6.7±0.5 Jy), plus other flux densities.

Chastenay &amp; Pineault 1988, IAUCom, 101, 297. DRAO at 408 MHz (3′.5×5′.9) and 1.4 GHz (1′.0×1′.7).

Pineault &amp; Chastenay 1990, MNRAS, 246, 169. DRAO at 408 MHz (3′.4×5′.8 : S = 12.7±1.2 Jy) and 1.4 GHz (1′.0×1′.7 : S = 7.4±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 $\alpha$ .Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.

Mavromatakis 2003, A&amp;A, 398, 153. Optical observations.

Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ( $\sim$ 3′ : S = 10.0±1.7 Jy) and 1420 MHz ( $\sim$ 1′ : S = 7.6±0.6 Jy), including polarisation and review of flux densities.Sitnik 2010, ARep, 54, 317. H $\alpha$  and CO observations of region.Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : S = 6.2±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.  $\gamma$ -ray observations.Zdziarski *et al.* 2016, MNRAS, 455, 1451.  $\gamma$ -ray observations.

**G74.0–8.5**

Cygnus Loop

**RA:** 20<sup>h</sup>51<sup>m</sup>00<sup>s</sup>**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, including CL4, plus X-ray sources in S.

**Distance:** Optical proper motion and shock velocity gives 0.44 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.
- Shull & Clarke 1991, PASP, 103, 811. Optical spectroscopy of nearside filaments.
- Fesen *et al.* 1992, AJ, 104, 719. H $\alpha$  imagery.
- Long *et al.* 1992, ApJ, 400, 214. Optical of Balmer dominated filament.
- Arendt *et al.* 1992, ApJ, 400, 562. IRAS observations.
- Hester *et al.* 1994, ApJ, 420, 721. H $\alpha$ , [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.
- Levenson *et al.* 1997, ApJ, 484, 304. ROSAT observations.
- 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.
- Aschenbach & Leahy 1999, A&A, 341, 602. ROSAT image, and comparison with radio.
- Danforth *et al.* 2000, AJ, 119, 2319. UV, optical and X-ray comparison of selected regions.
- Ghavamian *et al.* 2001, ApJ, 547, 995. Optical spectroscopy.
- Miyata *et al.* 2001, ApJ, 550, 1023. ASCA observations of compact X-ray sources.
- Miyata & Tsunemi 2001, ApJ, 552, 624. ASCA spectroscopy of regions in N and E.
- Danforth *et al.* 2001, AJ, 122, 938. Far-UV spectroscopy, H $\alpha$  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 (4′×2′) for H $\alpha$ .
- Blair *et al.* 2002, ApJS, 140, 367. UV spectroscopy.
- Welsh *et al.* 2002, A&A, 391, 705. Optical absorption to background stars.
- Sankrit & Blair 2002, ApJ, 565, 297. UV observations of NE filament.
- 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±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.
- Miyata *et al.* 2007, PASJ, 59, S163. Suzaku observations of NE.
- 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.
- Katsuda *et al.* 2012, ApJ, 754, L7. Suzaku and XMM-Newton 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.
- Arnaud *et al.* 2016, A&A, 586, A134. Planck flux density 30 GHz.
- Katsuda *et al.* 2016, ApJ, 819, L32. H $\alpha$  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.  $\gamma$ -ray observations.

**G74.9 + 1.2**

CTB 87

**RA:** 20<sup>h</sup>16<sup>m</sup>02<sup>s</sup>**1-GHz flux/Jy:** 9**Size/arcmin:** 8×6**Dec:** +37°12'**Spectral index:** varies**Type:** F**Radio:** Filled-centre, with high polarisation and high frequency turnover.**X-ray:** Centrally brightened.**Point sources:** Compact X-ray source in SE.**Distance:** H $\alpha$  absorption indicates 12 kpc, optical extinction gives 6.1 kpc.**References:**

- Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo  $S_{430\text{ MHz}} = 12.2 \pm 9.7$  Jy,  $S_{318\text{ MHz}} = 17.7 \pm 5.0$  Jy.
- Weiler & Shaver 1978, A&A, 70, 389. WSRT at 610 MHz (57''×94'' : S = 9.1±1.2 Jy), 1.4 (24''×40'' : S = 8.7±1.2 Jy) and 5 GHz (24''×40'' : S = 5.6±1.3 Jy).
- Geldzahler *et al.* 1980, A&A, 84, 237. Effelsberg 100-m at 2.7 GHz (4'4 : S = 7.6±0.5 Jy).
- Wilson 1980, ApJ, 241, L19. Einstein observations.
- van Gorkom *et al.* 1982, MNRAS, 198, 757. WSRT H $\alpha$  absorption of nearby compact source.

Sequist & 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<sub>i</sub>.  
 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<sub>i</sub> 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<sub>i</sub> (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 (1'6"×1') including H<sub>i</sub>, 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 $\alpha$  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  $\gamma$ -ray observations.  
 Aliu *et al.* 2014, *ApJ*, 788, 78.  $\gamma$ -ray detection.  
 Saha 2016, *MNRAS*, 460, 3563.  $\gamma$ -ray observations.  
 Acero *et al.* 2016, *ApJS*, 224, 8.  $\gamma$ -ray observations.

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## G76.9 + 1.0

**RA:** 20<sup>h</sup>22<sup>m</sup>20<sup>s</sup>  
**Dec:** +38°43'

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

**Size/arcmin:** 9  
**Type:** C

**Radio:** Bipolar shell.

**Point sources:** Central pulsar.

### References:

Landecker *et al.* 1993, *A&A*, 276, 522. VLA at 1.49 GHz (14''), 4.86 GHz (13''×16'') and 8.55 GHz  
 (11''×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 polarisa-  
 tion and review of flux densities.  
 Marthi *et al.* 2011, *MNRAS*, 416, 2560. GMRT at 618 MHz (51''×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<sup>h</sup>20<sup>m</sup>50<sup>s</sup>**Dec:** +40°26′**1-GHz flux/Jy:** 320**Spectral index:** 0.51DR4,  $\gamma$  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 H $\text{II}$  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.

**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 H $\alpha$  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 H $\alpha$  observations.
- Fukui & Tatematsu 1988, IAUCo, 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).
- Eposito *et al.* 1996, ApJ, 461, 820. Associated  $\gamma$ -ray emission.
- Brazier *et al.* 1996, MNRAS, 281, 1033.  $\gamma$ -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.
- Kothes *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. SGPS of high velocity H $\alpha$ .
- Casandjian & Grenier 2008, A&A, 489, 849.  $\gamma$ -ray observations.
- Ladouceur & Pineault 2008, A&A, 490, 197. CGPS at 408 MHz ( $2'9 \times 4'5$ ) and 1.4 GHz ( $0'8 \times 1'5$ ).
- 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 H $\alpha$ .
- Aliu *et al.* 2013, ApJ, 770, 93.  $\gamma$ -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.  $\gamma$ -ray observations.
- Acero *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

**G82.2 + 5.3**

W63

**RA:** 20<sup>h</sup>19<sup>m</sup>00<sup>s</sup>**1-GHz flux/Jy:** 120?**Size/arcmin:** 95×65**Dec:** +45°30′**Spectral index:** 0.5?**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.

**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.

Kothes *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.

**G83.0–0.3****RA:** 20<sup>h</sup>46<sup>m</sup>55<sup>s</sup>**1-GHz flux/Jy:** 1**Size/arcmin:** 9×7**Dec:** +42°52′**Spectral index:** 0.4**Type:** S

**Radio:** Incomplete shell.

**References:**

Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ( $\sim 3′$ :  $S=1.2\pm 0.3$  Jy) and 1420 MHz ( $\sim 1′$ :  $S=0.8\pm 0.1$  Jy), including polarisation and review of flux densities.

**G84.2–0.8****RA:** 20<sup>h</sup>53<sup>m</sup>20<sup>s</sup>**1-GHz flux/Jy:** 11**Size/arcmin:** 20×16**Dec:** +43°27′**Spectral index:** 0.5**Type:** S

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

**X-ray:** Detected.

**Distance:** H $\alpha$  absorption suggests 6 kpc.

**References:**

Matthews *et al.* 1977, A&A, 55, 1. WSRT at 610 MHz (56″×81″:  $S=12.4\pm 1.5$  Jy) and Effelsberg 100-m at 2.7 GHz (4′4:  $S=6.8\pm 1.3$  Jy).

Matthews & Shaver 1980, A&A, 87, 255. WSRT at 1415 MHz (23″×32″), and Effelsberg 100-m at 2.7 GHz (4′4:  $S=5.6\pm 0.5$  Jy).

Feldt & Green 1993, A&A, 274, 421. DRAO at 1.4 GHz (1′×1′5), including H $\alpha$ , 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 ( $\sim 3'$ :  $S = 14.5 \pm 0.5$  Jy) and 1420 MHz ( $\sim 1'$ :  
 $S = 7.2 \pm 0.8$  Jy), including review of flux densities.  
 Leahy & Green 2012, ApJ, 760, 25. CGPS, including H $\alpha$ , plus Chandra observations.  
 Jeong *et al.* 2012, Ap&SS, 342, 389. CO observations of region.

### G85.4 + 0.7

**RA:** 20<sup>h</sup>50<sup>m</sup>40<sup>s</sup>  
**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 $\alpha$  observations suggest 3.5 kpc.

#### References:

Kothes *et al.* 2001, A&A, 376, 641. CGPS at 408 MHz ( $4'.4 \times 2'.8$ :  $S < 0.45$  Jy) and 1.4 GHz ( $1'.1 \times 0'.8$ ), plus H $\alpha$ , X-ray and optical data.  
 Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ( $\sim 3'$ :  $S = 2.9 \pm 0.5$  Jy) and 1420 MHz ( $\sim 1'$ :  $S = 2.3 \pm 0.2$  Jy), including review of flux densities.  
 Jackson *et al.* 2008, ApJ, 674, 936. XMM-Newton and H $\alpha$  observations.  
 Jeong *et al.* 2012, Ap&SS, 342, 389. CO observations of region.

### G85.9 – 0.6

**RA:** 20<sup>h</sup>58<sup>m</sup>40<sup>s</sup>  
**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 $\alpha$  observations suggest 4.8 kpc.

#### References:

Kothes *et al.* 2001, A&A, 376, 641. CGPS at 408 MHz ( $4'.4 \times 2'.8$ :  $S < 0.9$  Jy) and 1.4 GHz ( $1'.1 \times 0'.8$ ), plus H $\alpha$ , 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 $\alpha$  observations.  
 Gök *et al.* 2009, Ap&SS, 324, 17. Optical observations.  
 Jeong *et al.* 2012, Ap&SS, 342, 389. CO observations of region.

**G89.0+4.7**

HB21

**RA:** 20<sup>h</sup>45<sup>m</sup>00<sup>s</sup>**1-GHz flux/Jy:** 220**Size/arcmin:** 120×90**Dec:** +50°35′**Spectral index:** 0.38**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 imply 0.8 kpc.

**References:**

- Hirabayashi & Takahashi 1972, PASJ, 24, 231. 30-m dish at 4.2 GHz (11′:S=160±40 Jy).  
 Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz (5′:S=148±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, IAUCom, 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<sub>i</sub>, 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±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 (~3′:S=259±19 Jy) and 1420 MHz (~1′:S=183±9 Jy), including polarisation and review of flux densities.  
 Kang & Koo 2007, ApJS, 173, 85. SGPS of high velocity H<sub>i</sub>.  
 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±11 Jy), including polarisation and review of flux densities.  
 Reichardt *et al.* 2012, A&A, 546, A21.  $\gamma$ -ray detection.  
 Shinn *et al.* 2012, ApJ, 759, 34. Akari observations of H<sub>2</sub>.  
 Pivato *et al.* 2013, ApJ, 779, 179. Fermi observations.  
 Anaud *et al.* 2016, A&A, 586, A134. Planck flux densities at 30 and 44 GHz.  
 Acero *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.



**G93.3+6.9****RA:** 20<sup>h</sup>52<sup>m</sup>25<sup>s</sup>**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<sub>I</sub> observations suggest 2.2 kpc.**References:**

Roger &amp; Costain 1976, A&amp;A, 51, 151. DRAO at 1.42 GHz (2′×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±0.52 Jy) and 2.7 GHz (4′.4: S=5.64±0.64 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±0.57 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<sub>I</sub>.Foster & Routledge 2003, ApJ, 598, 1005. H<sub>I</sub> for distance.Kaplan *et al.* 2004, ApJS, 153, 269. Chandra limits for any compact source.Köthes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (~3′: S=10.5±0.7 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.**G93.7–0.2****RA:** 21<sup>h</sup>29<sup>m</sup>20<sup>s</sup>**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<sub>I</sub> features suggests 1.5 kpc.**References:**

Velusamy &amp; Kundu 1974, A&amp;A, 32, 375. NRAO 300-ft at 2.7 GHz (5′: S=18.4±1.0 Jy).

Mantovani *et al.* 1982, A&A, 105, 176. Effelsberg 100-m at 1.7 GHz (7′.6: S=53.5±5.0 Jy), plus review of flux densities.Landecker *et al.* 1985, AJ, 90, 1082. DRAO at 1.4 GHz (smoothed to 2′: S=58±6 Jy).Mantovani *et al.* 1991, A&A, 147, 545. Effelsberg 100-m at 4.75 GHz (smoothed to 3′: S=33.5±4.0 Jy), including polarisation, plus review of flux densities.

Biggs &amp; 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 (54″×49″), including H<sub>I</sub>, and 408 MHz (3′.7×2′.8).Uyaniker *et al.* 2003, ApJ, 585, 785. CGPS at 1.4 GHz (1′) including polarisation.Köthes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (~3′: S=67±6 Jy) and 1420 MHz (~1′: S=35±4 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±2.5 Jy), including polarisation and review of flux densities.

**G94.0+1.0**

3C434.1

**RA:** 21<sup>h</sup>24<sup>m</sup>50<sup>s</sup>  
**Dec:** +51°53′**1-GHz flux/Jy:** 13  
**Spectral index:** 0.45**Size/arcmin:** 30×25  
**Type:** S**Radio:** Incomplete shell, containing H<sub>I</sub> shell.**Distance:** Association with stellar wind bubble implies 5.2 kpc.**References:**

- Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz (5′:S=6.1±0.8 Jy), and 37-m at 1.7 GHz (S=11±3 Jy).
- Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′:S=5.8±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±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±1.7 Jy) and Effelsberg 100-m at 4.75 GHz (2′4″:S=7.2±0.5 Jy).
- Landecker *et al.* 1985, AJ, 90, 1082. DRAO at 1.4 GHz (smoothed to 2′:S=16±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<sub>I</sub>.
- Foster 2005, A&A, 441, 1043. CGPS at 408 MHz (2′8″×3′6″) and 1.4 GHz (0′8″×1′0″) for spectral index studies, plus other observations.
- Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (~3′:S=20±2 Jy) and 1420 MHz (~1′:S=11.3±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±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.

**G96.0+2.0****RA:** 21<sup>h</sup>30<sup>m</sup>30<sup>s</sup>  
**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<sub>I</sub> indicates 4 kpc.**References:**

- Kothes *et al.* 2005, A&A, 444, 871. CGPS at 408 MHz (2′8″×3′5″) and 1.4 GHz (50″×61″) including H<sub>I</sub>.
- Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (~3′:S=0.42±0.06 Jy) and 1420 MHz (~1′:S=0.24±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±0.02 Jy) including polarisation and review of flux densities.

**G106.3 + 2.7****RA:** 22<sup>h</sup>27<sup>m</sup>30<sup>s</sup>**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′9×3′5 : S = 10.5±0.3 Jy) and 1.4 GHz (1′2×1′0 : S = 4.9±0.6 Jy), plus H<sub>i</sub>.
- 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<sub>i</sub>, 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<sub>i</sub> 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 (~3′ : S = 8.6±1.0 Jy) and 1420 MHz (~1′ : S = 4.8±0.5 Jy), including polarisation and review of flux densities.
- Abdo *et al.* 2007, ApJ, 664, L91.  $\gamma$ -ray observations.
- Casandjian & Grenier 2008, A&A, 489, 849.  $\gamma$ -ray observations.
- Acciari *et al.* 2009, ApJ, 703, L6.  $\gamma$ -ray observations.
- Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′.5 : S = 2.0±0.3 Jy), including polarisation and review of flux densities.

**G108.2 – 0.6****RA:** 22<sup>h</sup>53<sup>m</sup>40<sup>s</sup>**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<sub>i</sub> structures suggest 3.2 kpc.

**References:**

- Tian *et al.* 2007, A&A, 465, 907. DRAO at 408 MHz (2′8×3′3 : S = 11.5±1.2 Jy) and 1.4 GHz (1′0×1′2 : S = 6.6±0.7 Jy) including H<sub>i</sub>.

**G109.1–1.0**

CTB 109

**RA:** 23<sup>h</sup>01<sup>m</sup>35<sup>s</sup>**1-GHz flux/Jy:** 22**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.

**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 $\alpha$  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.
- Hurfurd & 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 ( $68'' \times 59''$ ), including H $\alpha$ , 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 $\alpha$  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 $\alpha$  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.
- Nakano *et al.* 2015, *PASJ*, 67, 9. Suzaku observations.
- Acerro *et al.* 2016, *ApJS*, 224, 8.  $\gamma$ -ray observations.

**G111.7–2.1**

Cassiopeia A, 3C461

**RA:** 23<sup>h</sup>23<sup>m</sup>26<sup>s</sup>**Dec:** +58°48′**1-GHz flux/Jy:** 2400**Spectral index:** 0.77**Size/arcmin:** 5**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.  
 Anderson & Rudnick 1996, *Apj*, 456, 234. VLA for spectral index comparisons.  
 Schwarz *et al.* 1997, *A&AS*, 123, 43. WSRT at 1.4 GHz (30′′) for H<sub>i</sub> absorption.  
 O’Sullivan & Green 1999, *MNRAS*, 303, 575. Flux density changes at 13.5, 15.5 and 16.5 GHz.  
 Agüeros & Green 1999, *MNRAS*, 305, 957. 151 MHz observations for bulk expansion studies.  
 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.  
 Reynoso & Goss 2002, *Apj*, 575, 871. VLA at 5 GHz (6′′.4×6′′.0) for H<sub>2</sub>CO absorption studies.  
 Morse *et al.* 2004, *Apj*, 614, 727. HST proper motion studies.  
 Krause *et al.* 2004, *Nature*, 432, 596. IR and molecular line observations of surroundings.  
 Bamba *et al.* 2005, *Apj*, 621, 793. Chandra observations of rim.  
 Wilson & Batrla 2005, *A&A*, 430, 561. Observational constraints on dust.  
 Krause *et al.* 2005, *Science*, 308, 1604. Spitzer light echoes from surroundings.  
 Fesen *et al.* 2006, *Apj*, 636, 848. Optical and IR limits for central sources.  
 Laming *et al.* 2006, *Apj*, 644, 260. Chandra observations, particularly of NE ‘jet’.  
 Fesen *et al.* 2006, *Apj*, 645, 283. HST observations for expansion studies.  
 Renaud *et al.* 2006, *Apj*, 647, L41.  $\gamma$ -ray line observations.  
 Lazendic *et al.* 2006, *Apj*, 651, 250. Chandra spectroscopy of bright knots.  
 Ennis *et al.* 2006, *Apj*, 652, 376. Spitzer observations.  
 Kang & Koo 2007, *ApJS*, 173, 85. SGPS of high velocity H<sub>i</sub>.  
 Albert *et al.* 2007, *A&A*, 474, 937.  $\gamma$ -ray observations.  
 Rho *et al.* 2008, *Apj*, 673, 271. Spitzer observations.  
 Uchiyama & Aharonian 2008, *Apj*, 677, L105. X-ray variability of compact features.  
 Rest *et al.* 2008, *Apj*, 681, L81. SN light echo.  
 Hammell & Fesen 2008, *ApJS*, 179, 195. HST of outer knots.  
 Krause *et al.* 2008, *Science*, 320, 1195. SN light echo spectrum.  
 Hurlley-Walker *et al.* 2009, *MNRAS*, 396, 365. Radio observations at 14 to 18 GHz.  
 Helmboldt & Kassim 2009, *AJ*, 138, 838. Low radio frequency temporal variations.  
 Smith *et al.* 2009, *Apj*, 693, 713. Spitzer observations.  
 Patnaude & Fesen 2009, *Apj*, 697, 535. X-ray proper motions.  
 Pavlov & Luna 2009, *Apj*, 703, 910. Chandra observations of central source.  
 Barlow *et al.* 2010, *A&A*, 518, L138. Herschel observations.  
 Abdo *et al.* 2010, *Apj*, 710, L92. Fermi observations.  
 Acciari *et al.* 2010, *Apj*, 714, 163.  $\gamma$ -ray observations.  
 Sibthorpe *et al.* 2010, *Apj*, 719, 1553. Akari and sub-mm observations of region.  
 Delaney *et al.* 2010, *Apj*, 725, 2038. Spitzer and Chandra observations for 3-D structure.

Patnaude *et al.* 2011, ApJ, 729, L28. Chandra observations of fading.  
 Rest *et al.* 2011, ApJ, 732, 3. SN light echo observations.  
 Fesen *et al.* 2011, ApJ, 736, 109. HST variability studies.  
 Besel & Krause 2012, A&A, 541, L3. IR light echoes.  
 Hwang & Laming 2012, ApJ, 746, 130. Chandra observations.  
 Rho *et al.* 2012, ApJ, 747, L6. Akari CO observations.  
 Vogt *et al.* 2012, ApJ, 750, 155. Spitzer light echoes.  
 Isenne *et al.* 2012, ApJ, 757, 126. Spitzer spectroscopy.  
 Asgekar *et al.* 2013, A&A, 551, L11. LOFAR of carbon recombination lines.  
 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.  
 Koo *et al.* 2013, Science, 342, 1346. IR spectroscopy.  
 Willström *et al.* 2013, A&A, 558, L2. CO observations.  
 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.  
 Lee *et al.* 2014, ApJ, 789, 7. Spitzer and CO observations.  
 Vinyaikin 2014, ARep, 58, 626. Time evolution of radio emission.  
 Alarie *et al.* 2014, MNRAS, 441, 2996. Optical imaging/spectroscopy, including distance from expansion.  
 Grefenstette *et al.* 2014, Nature, 506, 339. NuSTAR <sup>44</sup>Ti observations.  
 Siegart *et al.* 2015, A&A, 579, A124. INTEGRAL observations.  
 Grefenstette *et al.* 2015, ApJ, 802, 15. NuSTAR observations.  
 Lee *et al.* 2015, ApJ, 808, 98. WISE, Spitzer and other IR observations.  
 Gorbynov *et al.* 2015, OAP, 28, 224. Time evolution of radio emission.  
 Milisavljevic & Fesen 2015, Science, 347, 526. Near-IR observations.  
 Arnaud *et al.* 2016, A&A, 586, A134. Planck flux densities at 7 frequencies between 30 and 353 GHz.  
 Kilpatrick *et al.* 2016, ApJ, 816, 1. CO observations, including broad lines.  
 Fesen & Milisavljevic 2016, ApJ, 818, 17. HST [S<sub>III</sub>] and [S<sub>II</sub>] observations.  
 Koo *et al.* 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).  
 Wang & Li 2016, ApJ, 825, 102. INTEGRAL observations.  
 Acero *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

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## G113.0+0.2

**RA:** 23<sup>h</sup>26<sup>m</sup>50<sup>s</sup>  
**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<sub>I</sub> 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<sub>I</sub>.  
 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<sup>h</sup>37<sup>m</sup>00<sup>s</sup>**Dec:** +61°55′**1-GHz flux/Jy:** 5.5**Spectral index:** 0.5**Size/arcmin:** 90×55**Type:** S**Radio:** Shell, with H<sub>II</sub> 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<sub>I</sub> 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<sub>1.4 GHz</sub> = 4.4 Jy from 1.4 GHz survey data, plus H<sub>I</sub> 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<sub>I</sub> (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<sup>h</sup>53<sup>m</sup>40<sup>s</sup>**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<sub>I</sub> 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<sub>1.4 GHz</sub> = 8.0±0.8 Jy from 1.4 GHz survey data, plus H<sub>I</sub> 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<sub>I</sub> (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.

**G116.9+0.2**

CTB 1

**RA:** 23<sup>h</sup>59<sup>m</sup>10<sup>s</sup>**Dec:** +62°26′**1-GHz flux/Jy:** 8**Spectral index:** 0.57**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 to NE.

**Distance:** Association with H<sub>I</sub> features implies 1.6 kpc.

**References:**

Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz ( $5' : S = 3.9 \pm 1.0$  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 ( $5' : S = 4.2 \pm 0.2$  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<sub>I</sub> 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<sub>I</sub> ( $2' \times 2'3 : S = 8.3 \pm 0.5$  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.

Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.

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<sub>I</sub> ( $1'0 \times 1'1$ ).

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.



**G119.5 + 10.2**

CTA 1

**RA:** 00<sup>h</sup>06<sup>m</sup>40<sup>s</sup>**1-GHz flux/Jy:** 36**Size/arcmin:** 90?**Dec:** +72°45'**Spectral index:** 0.6**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<sub>I</sub> 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 [O III] 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<sub>I</sub> 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  $\gamma$ -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.  $\gamma$ -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.  $\gamma$ -ray observations.  
 Li *et al.* 2016, ApJ, 831, 19.  $\gamma$ -ray observations of pulsar.

**G120.1 + 1.4**

Tycho, 3C10, SN1572

**RA:** 00<sup>h</sup>25<sup>m</sup>18<sup>s</sup>**1-GHz flux/Jy:** 56**Size/arcmin:** 8**Dec:** +64°09′**Spectral index:** 0.58**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<sub>i</sub> 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.
- Reid *et al.* 1982, ApJ, 261, 485. Einstein 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<sub>i</sub> observations.
- Green & Gull 1987, MNRAS, 224, 1055. VLA H<sub>i</sub> absorption observations towards central radio source.
- Smith *et al.* 1988, ApJ, 325, 288. EXOSAT spectrum and image (smoothed to 13'').
- Dickel *et al.* 1991, AJ, 101, 2151. VLA at 1.4 and 5 GHz (1''.5).
- Wood *et al.* 1992, AJ, 103, 1338. VLA at 5 GHz (1''.5) polarisation studies.
- Fink *et al.* 1994, A&A, 283, 635. X-ray spectra.
- Vancura *et al.* 1995, ApJ, 441, 680. X-ray spectra and ROSAT image.
- Predehl & Schmitt 1995, A&A, 293, 889. ROSAT of dust scattered halo.
- 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.
- Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
- Hwang & Gotthelf 1997, ApJ, 475, 665. ASCA observations.
- 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<sub>i</sub> studies.
- Katz-Stone *et al.* 2000, ApJ, 529, 453. VLA at 333 MHz and 1.4 GHz (9''.5×7''.7), for spectral index studies.
- Ghavamian *et al.* 2000, ApJ, 535, 266. Optical observations of shock precursors.
- Hughes 2000, ApJ, 545, L53. ROSAT X-ray expansion.
- Decourchelle *et al.* 2001, A&A, 365, L218. XMM-Newton observations.
- Ghavamian *et al.* 2001, ApJ, 547, 995. Optical spectroscopy.
- Douvion *et al.* 2001, A&A, 373, 281. ISO observations.
- Aharonian *et al.* 2001, A&A, 373, 292. Upper limit on high energy  $\gamma$ -rays.
- Hwang *et al.* 2002, ApJ, 581, 1101. Chandra observations.
- Lee *et al.* 2004, ApJ, 605, L113. Observations of molecular clouds in vicinity.
- Bamba *et al.* 2005, ApJ, 621, 793. Chandra observations of rim.
- Warren *et al.* 2005, ApJ, 634, 376. Chandra observations.

- Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ( $\sim 3' : S = 86 \pm 5$  Jy) and 1420 MHz ( $\sim 1' : S = 40.5 \pm 1.5$  Jy), including polarisation and review of flux densities.
- Lee *et al.* 2007, ApJ, 659, L133. H $\alpha$  observations.
- Cassam-Chenai *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.
- Katsuda *et al.* 2010, ApJ, 709, 1387. Chandra proper motions study.
- Raymond *et al.* 2010, ApJ, 712, 901. H $\alpha$  spectroscopy.
- Lee *et al.* 2010, ApJ, 715, L146. H $\alpha$  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 $\alpha$  and CO observations.
- Acciari *et al.* 2011, ApJ, 730, L20.  $\gamma$ -ray observations.
- Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ( $9'5 : S = 20.0 \pm 2.0$  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.
- Yang *et al.* 2013, ApJ, 766, 44. Suzaku spectroscopy.
- Williams *et al.* 2013, ApJ, 770, 129. Spitzer observations.
- Yamaguchi *et al.* 2014, ApJ, 780, 136. Suzaku 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.
- Tran *et al.* 2015, ApJ, 812, 101. Chandra observations.
- Lopez *et al.* 2015, ApJ, 814, 132. NuSTAR observations.
- Arnaud *et al.* 2016, A&A, 586, A134. Planck flux densities at 5 frequencies between 30 and 143 GHz.
- Koo *et al.* 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).
- Williams *et al.* 2016, ApJ, 823, L32. Multi-epoch X-ray and radio observations for expansion.
- Zhou *et al.* 2016, ApJ, 826, 34. CO observations of region.

## G126.2 + 1.6

**RA:** 01<sup>h</sup>22<sup>m</sup>00<sup>s</sup>  
**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 ( $9' : S = 6.8 \pm 0.7$  Jy) and 2.7 GHz ( $4'4 : S = 3.9 \pm 0.4$  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 ( $3'5 \times 3'9 : S = 12 \pm 2.5$  Jy) and part at 1.4 GHz ( $1'1 \times 1'0$ ), 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 ( $14'5 : S = 6.1 \pm 1.6$  Jy).

Boumis *et al.* 2005, A&A, 443, 175. Optical observations.  
 Tian & Leahy 2006, A&A, 447, 205. CGPS at 408 MHz ( $3'4 \times 3'8 : S = 9.7 \pm 3.9$  Jy) and 1.4 GHz ( $1'0 \times 1'1 : S = 6.7 \pm 2.1$  Jy), plus other observations for spectral index studies.  
 Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ( $\sim 3' : S = 5.7 \pm 0.7$  Jy) and 1420 MHz ( $\sim 1' : S = 6.4 \pm 1.1$  Jy), including review of flux densities.  
 Sun *et al.* 2007, A&A, 463, 993. Urumqi 25-m at 5 GHz ( $9'5 : S = 2.6 \pm 0.6$  Jy), including polarisation.  
*see also: Sun et al.* 2007, A&A, 469, 1003. Erratum.

**G127.1+0.5**

R5

**RA:** 01<sup>h</sup>28<sup>m</sup>20<sup>s</sup>  
**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 ( $3'5 \times 3'9$ ), plus other observations of central source.  
 Pauls 1977, A&A, 59, L13. Effelsberg 100-m at 1.4 GHz ( $9' : S = 8 \pm 1$  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 ( $9' : S = 10.8 \pm 1.3$  Jy).  
 Pauls *et al.* 1982, A&A, 112, 120. WSRT at 610 MHz ( $56'' \times 62''$ ) and H $\alpha$  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 H $\alpha$  absorption of central source.  
 Joncas *et al.* 1989, A&A, 219, 303. DRAO at 408 MHz ( $3'5 \times 3'9 : S = 17.9 \pm 2.0$  Jy) and 1.4 GHz ( $1'13 \times 1'0 : S = 10.1 \pm 0.8$  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 ( $14'5 : S = 14.6 \pm 0.8$  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 ( $3'4 \times 3'8 : S = 17.1 \pm 1.7$  Jy) and 1.4 GHz ( $1'0 \times 1'2 : S = 10.0 \pm 0.8$  Jy).  
 Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ( $\sim 3' : S = 15.9 \pm 1.0$  Jy) and 1420 MHz ( $\sim 1' : S = 9.7 \pm 0.6$  Jy), including polarisation and review of flux densities.  
 Sun *et al.* 2007, A&A, 463, 993. Urumqi 25-m at 5 GHz ( $9'5 : S = 6.3 \pm 0.7$  Jy), including polarisation.  
*see also: Sun et al.* 2007, A&A, 469, 1003. Erratum.  
 Zhou *et al.* 2014, ApJ, 791, 109. CO observations.

**G130.7 + 3.1**

3C58, SN1181

**RA:** 02<sup>h</sup>05<sup>m</sup>41<sup>s</sup>**1-GHz flux/Jy:** 33**Size/arcmin:** 9×5**Dec:** +64°49′**Spectral index:** 0.07**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 $\alpha$  absorption indicates 2 kpc.

**References:**

- Green *et al.* 1975, A&A, 44, 187. Effelsberg 100-m at 15.0 GHz (58'' : S = 26.7±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.  
 Green & Gull 1982, Nature, 299, 606. H $\alpha$  absorption distance.  
 Fesen 1983, ApJ, 270, L53. Optical spectra.  
 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.  
 Green 1986, MNRAS, 218, 533. 151 MHz observations (1'.2×1'.3 : S = 36±4 Jy), plus 2.7 GHz (4''), plus Einstein observations for limit on shell.  
 Green 1987, MNRAS, 225, 11P. Flux density increase at 408 MHz.  
 Morsi & Reich 1987, A&AS, 69, 533. Effelsberg 100-m at 32 GHz (26''.5 : S = 24.2±1.4 Jy).  
 Reynolds & Aller 1988, ApJ, 327, 845. VLA at 1.4 (2''.4) and 4.9 GHz (2''.5).  
 Salter *et al.* 1989, ApJ, 338, 171. NRAO 12-m at 84.2 GHz (90'' : S = 15.0±2.0 Jy), plus review of flux densities.  
 Asaoka & Koyama 1990, PASJ, 42, 625. Ginga X-ray spectrum.  
 Green & Scheuer 1992, MNRAS, 258, 833. IRAS upper limits.  
 Roberts *et al.* 1993, A&A, 274, 427. H $\alpha$  absorption.  
 Wallace *et al.* 1994, A&A, 286, 565. H $\alpha$  of surroundings.  
 Helfand *et al.* 1995, ApJ, 453, 741. ROSAT observations.  
 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.  
 Murray *et al.* 2002, ApJ, 568, 226. Chandra pulsar detection.  
 Camilo *et al.* 2002, ApJ, 571, L41. Pulsar detection in radio.  
 Reich 2002, in NSPS, p1. Effelsberg 100-m at 32 GHz (26'') for polarised intensity.  
 Slane *et al.* 2002, ApJ, 571, L45. Chandra observations.  
 Slane *et al.* 2004, ApJ, 616, 403. Deep Chandra imaging.  
 Bietenholz 2006, ApJ, 645, 1180. VLA at 1.4 GHz (1''.36) for expansion studies.  
 Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (~3' : S = 32.2±2.0 Jy) and 1420 MHz (~1' : S = 31.9±1.0 Jy), including polarisation and review of flux densities.  
 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.  
 Shibano *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±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<sub>I</sub> observations for distance.  
 Aleksić *et al.* 2014, A&A, 567, L8.  $\gamma$ -ray detection.  
 Arnaud *et al.* 2016, A&A, 586, A134. Planck flux densities at 7 frequencies between 30 and 353 GHz.

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**G132.7 + 1.3**

HB3

**RA:** 02<sup>h</sup>17<sup>m</sup>40<sup>s</sup>**1-GHz flux/Jy:** 45**Size/arcmin:** 80**Dec:** +62°45'**Spectral index:** 0.6**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±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<sub>I</sub> 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 (3'5×4':S=75±15 Jy), plus review of flux densities.  
 Routledge *et al.* 1991, A&A, 247, 529. DRAO at 1.4 GHz (1'0×1'1) for H<sub>I</sub>, plus CO observations.  
 Fesen *et al.* 1995, AJ, 110, 2876. Optical imaging and spectroscopy, DRAO at 408 MHz (3'5×4' and 1.4 GHz (1'0×1'1)).  
 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±3.5 Jy).  
 Tian & Leahy 2005, A&A, 436, 187. CGPS at 408 MHz (3'4×3'8") and 1.4 GHz (1'0×1'1), 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 (~3':S=61±9 Jy) and 1420 MHz (~1':S=29.4±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.  $\gamma$ -ray observations.  
 Kilpatrick *et al.* 2016, ApJ, 816, 1. CO observations, including broad lines.  
 Acero *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.  
 Katagiri *et al.* 2016, ApJ, 818, 114.  $\gamma$ -ray observations.  
 Zhou *et al.* 2016, ApJ, 833, 4. CO observations of region.

**G152.4–2.1****RA:** 04<sup>h</sup>07<sup>m</sup>50<sup>s</sup>**Dec:** +49°11′**1-GHz flux/Jy:** 3.5?**Spectral index:** 0.7?**Size/arcmin:** 100×95**Type:** S**Radio:** Bilateral shell.**References:**

Foster *et al.* 2013, A&A, 549, A107. Effelsberg 100-m at 2.7 GHz, including polarisation, plus various radio survey observations.

**G156.2+5.7****RA:** 04<sup>h</sup>58<sup>m</sup>40<sup>s</sup>**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.**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±1.0 Jy) and 2.7 GHz (4′3″:S=3.0±1.0 Jy), plus H $\alpha$  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, including polarisation.

Pannuti & Allen 2004, AdSpR, 33, 434. ASCA and RXTE observations.

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=8.1±1.3 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±0.5 Jy), including polarisation.

Gerardy & Fesen 2007, MNRAS, 376, 929. Optical observations.

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 $\alpha$  observations for expansion.

**G159.6+7.3****RA:** 05<sup>h</sup>20<sup>m</sup>00<sup>s</sup>**Dec:** +50°00′**1-GHz flux/Jy:** ?**Spectral index:** ?**Size/arcmin:** 240×180?**Type:** S**Optical:** Large, faint shell.**X-ray:** Possible emission.**References:**

Fesen & Milisavljevic 2010, AJ, 140, 1163. H $\alpha$  and other observations.

**G160.9+2.6**

HB9

**RA:** 05<sup>h</sup>01<sup>m</sup>00<sup>s</sup>**1-GHz flux/Jy:** 110**Size/arcmin:** 140×120**Dec:** +46°40′**Spectral index:** 0.64**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.

**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±150 Jy), plus review of flux densities.

van Gorkom *et al.* 1982, MNRAS, 198, 757. WSRT H $\alpha$  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 $\alpha$  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±340 Jy).

Reich *et al.* 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz (14′5: S=91±3 Jy).

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 (~3′: S=102±7 Jy) and 1420 MHz (~1′: S=54.0±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±5.3 Jy) and 1.4 GHz (58″×80″: S=65.9±3.4 Jy).

Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′5: S=34±3 Jy), including polarisation and review of flux densities.

Gosachinskii 2013, AstL, 39, 179. H $\alpha$  observations of region.

Araya *et al.* 2014, MNRAS, 444, 860.  $\gamma$ -ray detection.

**G166.0+4.3**

VRO 42.05.01

**RA:** 05<sup>h</sup>26<sup>m</sup>30<sup>s</sup>**1-GHz flux/Jy:** 7**Size/arcmin:** 55×35**Dec:** +42°56′**Spectral index:** 0.37**Type:** S

**Radio:** Two arcs of strikingly different radii.

**Optical:** Nearly complete ring.

**X-ray:** Predominantly in SW.

**Distance:** H $\alpha$  indicates 4.5 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, A&JPh, 32, 113. H $\alpha$  interferometry.  
 Landecker *et al.* 1982, ApJ, 261, L41. DRAO at 1.4 GHz ( $1'0 \times 1'4$ ), 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 ( $16'' \times 20''$ ) 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 $\alpha$  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 ( $1'0 \times 1'4$ ), including H $\alpha$ .  
 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 ( $3'4 \times 5'0$ ) and 1.4 GHz ( $1'0 \times 1'4$ ), for spectral index studies.  
*see also:* Tian & Leahy 2006, A&A, 451, 991. Erratum.  
 Kothés *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.

### G178.2–4.2

**RA:** 05<sup>h</sup>25<sup>m</sup>05<sup>s</sup>

**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 ( $9'5 : S = 1.0 \pm 0.1$  Jy), plus other observations.

### G179.0+2.6

**RA:** 05<sup>h</sup>53<sup>m</sup>40<sup>s</sup>

**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.

#### 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 ( $9'5 : S = 3.2 \pm 0.3$  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.  $\gamma$ -ray observations.

**G180.0–1.7**

S147

**RA:** 05<sup>h</sup>39<sup>m</sup>00<sup>s</sup>**1-GHz flux/Jy:** 65**Size/arcmin:** 180**Dec:** +27°50′**Spectral index:** varies**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:** Optical absorption towards stars indicates > 0.36 and < 0.88 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 &amp; 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 &amp; Reich 1986, A&amp;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 &amp; 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 &amp; Ng 2003, ApJ, 585, L41. Chandra of pulsar.

Kramer *et al.* 2003, ApJ, 593, L31. Pulsar observations.

Sallmen &amp; Welsh 2004, A&amp;A, 426, 555. Optical absorption towards background stars.

Drew *et al.* 2005, MNRAS, 362, 753. H $\alpha$  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.  $\gamma$ -ray observations.**G182.4+4.3****RA:** 06<sup>h</sup>08<sup>m</sup>10<sup>s</sup>**1-GHz flux/Jy:** 0.5**Size/arcmin:** 50**Dec:** +29°00′**Spectral index:** 0.4**Type:** S**Radio:** Incomplete shell.**Optical:** Brighter in S and NW.**X-ray:** Diffuse emission.**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±0.08 Jy, 4′.4 : S = 0.25±0.04 Jy, 2′.5 : S = 0.20±0.02 Jy and 1′.2 : S = 0.15±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±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.

## G184.6–5.8

Crab Nebula, 3C144, SN1054

**RA:** 05<sup>h</sup>34<sup>m</sup>31<sup>s</sup>

**1-GHz flux/Jy:** 960

**Size/arcmin:** 7×5

**Dec:** +22°01′

**Spectral index:** 0.30

**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:** Proper motions and radial velocities give 2 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'') and 1.5 and 14 GHz (6'') 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 $\alpha$  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 $\alpha$  halo.

van der Meulen *et al.* 1998, A&A, 330, 321.  $\gamma$ -ray observations.

Tanimori *et al.* 1998, ApJ, 492, L33.  $\gamma$ -ray observations.

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 $\alpha$  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.  $\gamma$ -ray observations.

Oser *et al.* 2001, ApJ, 547, 949.  $\gamma$ -ray 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.  $\gamma$ -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.  
Aharonian *et al.* 2004, ApJ, 614, 897.  $\gamma$ -ray 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.  
Temim *et al.* 2006, AJ, 132, 1610. Spitzer observations.  
*see also:* Temim *et al.* 2009, AJ, 137, 5155. Erratum.  
Aharonian *et al.* 2006, A&A, 457, 899.  $\gamma$ -ray observations  
Seward *et al.* 2006, ApJ, 652, 1277. Chandra observations.  
MacAlpine *et al.* 2007, AJ, 133, 81. Optical spectroscopy.  
Kaplan *et al.* 2008, ApJ, 677, 1201. HST proper motion of pulsar.  
Rudie *et al.* 2008, MNRAS, 384, 1200. [OIII] observations of 'jet', for proper motion.  
Hurley-Walker *et al.* 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.  
Tziamtzis *et al.* 2009, A&A, 497, 167. Limits on H $\alpha$  halo.  
Carlebois *et al.* 2010, AJ, 139, 2083. Optical imaging spectroscopy.  
Aumont *et al.* 2010, A&A, 514, A70. IRAM 30-m at 150 GHz (16''7 : S = 244 $\pm$ 24 Jy) and GBT at 90 GHz (9''3).  
Satterfield *et al.* 2012, AJ, 144, 27. Optical spectroscopy.  
Temim *et al.* 2012, ApJ, 753, 72. Spitzer observations of dust.  
Gomez *et al.* 2012, ApJ, 760, 96. Herschel IR and sub-mm observations of dust.  
Loh *et al.* 2012, MNRAS, 421, 789. IR observations of H<sub>2</sub>.  
Lundqvist & Tziamtzis 2012, MNRAS, 423, 1571. Optical limits on outer shell.  
Loll *et al.* 2013, ApJ, 765, 152. HST optical line and continuum observations.  
Barlow *et al.* 2013, Science, 342, 1343. Herschel far-IR spectroscopy.  
Black & Fesen 2015, MNRAS, 447, 2540. [OIII] observations of 'jet'.  
Owen & Barlow 2015, ApJ, 801, 141. Herschel and Spitzer observations.  
Bietenholz & Nugent 2015, MNRAS, 454, 2416. Multi-epoch VLA and optical observations for expansion study.  
Arnaud *et al.* 2016, A&A, 586, A134. Planck flux densities at 9 frequencies between 30 and 857 GHz.

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**G189.1+3.0**

IC443, 3C157

**RA:** 06<sup>h</sup>17<sup>m</sup>00<sup>s</sup>**1-GHz flux/Jy:** 165**Size/arcmin:** 45**Dec:** +22°34'**Spectral index:** 0.36**Type:** C**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:** Mean optical velocity suggests 0.7--1.5 kpc, association with S249 gives 1.5--2 kpc.**References:**

Fesen 1984, ApJ, 281, 658. Optical of filament to far NE.

Erickson &amp; Mahoney 1985, ApJ, 290, 596. TPT at 4 frequencies between 31 and 74 MHz (13'×11' to 5'4×4'7'), plus review of flux densities.

- Braun & Strom 1986, A&A, 164, 193. WSRT at 327 MHz ( $72'' \times 185''$ ) and 1.4 GHz ( $17'' \times 43''$ ), plus H $\alpha$  and IRAS.
- Green 1986, MNRAS, 221, 473. 151 MHz observations ( $1'.2 \times 3'.1$ ) and Half-Mile Telescope at 1.4 GHz ( $2'.1 \times 5'.4$ ).
- Mufson *et al.* 1986, AJ, 92, 1349. Radio, IR, optical, UV and X-ray comparison, including VLA at 1.6 GHz ( $3''.8 \times 3''.3$  and  $40''$ ).
- Petre *et al.* 1988, ApJ, 335, 215. Einstein and other X-ray observations.
- Dickel *et al.* 1989, AJ, 98, 1363. VLA at 1.4 GHz ( $1''.1 \times 1''.2$ ) of NE.
- Wood *et al.* 1991, AJ, 102, 224. VLA at 5 GHz ( $3''.6 \times 3''.8$ ) of northeast, including polarisation.
- van Dishoeck *et al.* 1993, A&A, 279, 541. Observations of shocked molecular species.
- Asaoka & Aschenbach 1994, A&A, 284, 573. X-ray, including possible overlapping remnant.
- Tauber *et al.* 1994, ApJ, 421, 570. Observations of shocked molecular species.
- Seta *et al.* 1998, ApJ, 505, 286. CO observations of surroundings.
- Claussen *et al.* 1999, ApJ, 522, 349. High resolution observations of OH masers.
- Cesarsky *et al.* 1999, A&A, 348, 945. ISO observations of shocked molecular H $_2$ .
- Rho *et al.* 2001, ApJ, 547, 885. ISO and 2Mass IR spectroscopy and imaging.
- Olbert *et al.* 2001, ApJ, 554, L205. Chandra of compact X-ray source and surrounding nebula.
- Reich *et al.* 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz ( $14'.5 : S = 160 \pm 5$  Jy).
- Welsh & Sallmen 2003, A&A, 408, 545. Optical absorption studies.
- Leahy 2004, AJ, 127, 2277. DRAO at 408 MHz ( $3'.3 \times 8'.6$ ) and 1.4 GHz ( $1'.0 \times 2'.6$ ), for spectral index studies.  
*see also:* Leahy 2004, AJ, 128, 1478. Addendum.
- Snell *et al.* 2005, ApJ, 620, 758. Molecular line and IR observations of shocked material.
- Bykov *et al.* 2005, ApJ, 624, L41. Chandra observations of compact source.
- Kawasaki *et al.* 2005, ApJ, 631, 935. ASCA observations.
- Gaensler *et al.* 2006, ApJ, 648, 1037. Chandra of X-ray source and nebula.
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- Rosado *et al.* 2007, AJ, 133, 89. Observations of shocked H $_2$ .
- Albert *et al.* 2007, ApJ, 664, L87.  $\gamma$ -ray observations.
- Troja *et al.* 2008, A&A, 485, 777. XMM-Newton observations.
- Casandjian & Grenier 2008, A&A, 489, 849.  $\gamma$ -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 ( $39'' \times 42''$ ) including H $\alpha$ .
- Bocchino *et al.* 2008, AdSpR, 41, 396. INTEGRAL observations.
- Bocchino *et al.* 2009, A&A, 498, 139. XMM-Newton observations.
- Hirschauer *et al.* 2009, ApJ, 696, 1533. Optical absorption spectroscopy.
- Acciari *et al.* 2009, ApJ, 698, L133.  $\gamma$ -ray observations.
- Yamaguchi *et al.* 2009, ApJ, 705, L6. Suzaku observations.
- Koo *et al.* 2010, AJ, 140, 262. H $\alpha$  Zeeman splitting observations.
- Tavani *et al.* 2010, ApJ, 710, L151.  $\gamma$ -ray observations.
- Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz ( $9'.5 : S = 85 \pm 9$  Jy), including polarisation and review of flux densities.
- Castelletti *et al.* 2011, A&A, 534, A21. VLA at 74 MHz ( $35'' : S = 470 \pm 51$  Jy) and 330 MHz ( $17'' : S = 248 \pm 15$  Jy), plus review of flux densities.
- Yuan & Neufeld 2011, ApJ, 726, 76. Spitzer observations.
- Xu *et al.* 2011, ApJ, 727, 81. CO observations of region.
- Shinn *et al.* 2011, ApJ, 732, 124. Akari observations of H $_2$ .
- Lee *et al.* 2012, ApJ, 749, 34. CO and HCO $^+$  of region.
- Taylor *et al.* 2012, ApJ, 750, L15. Optical absorption of background stars.
- Yuan *et al.* 2012, ApJ, 753, 126. Spitzer spectroscopy.
- Shinn *et al.* 2012, ApJ, 759, 34. Akari observations of H $_2$ .
- Ackermann *et al.* 2013, Science, 339, 807. Fermi observations.
- Hezareh *et al.* 2013, A&A, 558, A45. CO observations, including polarisation, of region.

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.  
 Gusdorf *et al.* 2014, IAUS, 296, 178. CO observations.  
 Mitra *et al.* 2014, IAUS, 296, 376. Combined GMRT and CLFST observations at 150 MHz (19''×24'').

Swartz *et al.* 2015, ApJ, 808, 84. Chandra observations of compact source and nebula.  
 Kokusho *et al.* 2015, P&SS, 116, 92. IR [FeII] observations.  
 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.  
 Koo *et al.* 2016, ApJ, 821, 20. Spitzer and Herschel flux densities (and comparison with X-ray properties).  
 McEwen *et al.* 2016, ApJ, 826, 189. NH<sub>3</sub> and CH<sub>3</sub>OH observations.  
 Acero *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

### G190.9–2.2

**RA:** 06<sup>h</sup>01<sup>m</sup>55<sup>s</sup>  
**Dec:** +18°24'

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

**Size/arcmin:** 70×60  
**Type:** S

**Radio:** Incomplete shell.

**References:**

Foster *et al.* 2013, A&A, 549, A107. Various radio survey observations.

### G205.5 + 0.5

**RA:** 06<sup>h</sup>39<sup>m</sup>00<sup>s</sup>  
**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<sub>II</sub> regions.

**Optical:** Large ring, near Rosette nebula.

**X-ray:** Possibly detected.

**Distance:** Mean optical velocity suggests 0.8 kpc, low frequency radio absorption suggests 1.6 kpc.

**References:**

Milne & Dickel 1974, AujPh, 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±180 Jy) and S<sub>610 MHz</sub> = 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±12.5 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  $\gamma$ -ray emission.  
 Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.  
 Oliver *et al.* 1996, A&A, 315, 578. CO observations of some of surroundings.

Jaffe *et al.* 1997, ApJ, 484, L129.  $\gamma$ -ray detection.  
 Aharonian *et al.* 2004, A&A, 417, 973.  $\gamma$ -ray limits.  
 Kaplan *et al.* 2006, ApJS, 163, 344. X-ray upper limit on compact sources.  
 Casandjian & Grenier 2008, A&A, 489, 849.  $\gamma$ -ray observations.  
 Xiao & Zhu 2012, A&A, 545, A86. Review of radio, H $\alpha$  and H $\alpha$  observations.  
 Dirks & Meyer 2016, ApJ, 819, 45. Time variation of optical line absorption.  
 Katagiri *et al.* 2016, ApJ, 831, 106.  $\gamma$ -ray observations.  
 Acero *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

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**G206.9 + 2.3**
**RA:** 06<sup>h</sup>48<sup>m</sup>40<sup>s</sup>**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.**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±0.6 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±0.3 Jy), including polarisation and review of flux densities.  
 Ambrocio-Cruz *et al.* 2014, RMxAA, 50, 323. [SiII] spectroscopy.

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**G213.0 – 0.6**
**RA:** 06<sup>h</sup>50<sup>m</sup>50<sup>s</sup>**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**References:**

Reich *et al.* 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz (14′.5 : S = 22.0±3.7 Jy).  
 Stupar & Parker 2012, MNRAS, 419, 1413. H $\alpha$ , radio survey and other observations.

**G260.4–3.4**

Puppis A, MSH 08–44

**RA:** 08<sup>h</sup>22<sup>m</sup>10<sup>s</sup>**1-GHz flux/Jy:** 130**Size/arcmin:** 60×50**Dec:** –43°00′**Spectral index:** 0.5**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<sub>I</sub> gives 2.2 kpc.

**References:**

Green 1971, *AujPh*, 24, 773. Molonglo at 408 MHz (3′:S=198±20 Jy).

Goudis & Meaburn 1978, *A&A*, 62, 283. H $\alpha$ + [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<sub>I</sub> 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±5 Jy) and 8.4 GHz (3′:S=38±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.

Zavlin *et al.* 1999, *ApJ*, 525, 959. X-ray observations of central source.

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<sub>I</sub> 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±8 Jy) and 327 MHz (45″×90″:S=263±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.



Abramowski *et al.* 2015, A&A, 575, A81. High energy  $\gamma$ -ray limit.  
 Reynoso & Walsh 2015, MNRAS, 451, 3044. ATCA at 1.4 GHz ( $51'' \times 82''$ ) and 1.7 GHz for spectral index study.  
 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.  $\gamma$ -ray observations.

### G261.9+5.5

**RA:**  $09^{\text{h}}04^{\text{m}}20^{\text{s}}$   
**Dec:**  $-38^{\circ}42'$

**1-GHz flux/Jy:** 10?  
**Spectral index:** 0.4?

**Size/arcmin:**  $40 \times 30$   
**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  $S_{1410 \text{ MHz}} = 8$  Jy,  $S_{81.5 \text{ MHz}} = 25$  Jy.  
 Colomb & Dubner 1980, A&A, 82, 244. Argentine 30-m dish at 1.4 GHz, for H $\alpha$  possibly associated with remnant.  
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz ( $44'' \times 71''$ ).  
 Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

### G263.9–3.3

**RA:**  $08^{\text{h}}34^{\text{m}}00^{\text{s}}$   
**Dec:**  $-45^{\circ}50'$

**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 $\alpha$  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.  
 Milne 1980, A&A, 81, 293. Maps of Vela X with Parkes 64-m at 1.66, 2.7 and 5 GHz ( $12', 8'.4$  and  $4'.4$ ).  
 Weiler & Panagia 1980, A&A, 90, 269. Clarification of notation of this region and review previous observations.  
 Bignami & Caraveo 1988, ApJ, 325, L5. Pulsar proper motion from optical observations.  
 Dwarakanath 1991, JApA, 12, 199. Gauribidanur 'T' array at 34.5 MHz ( $26' \times 84' : S = 1800$  Jy for Vela X and  $S = 3900$  Jy for Vela YZ), plus review of flux densities.

- Bietenholz *et al.* 1991, *Apj*, 376, L41. VLA at 5 GHz in vicinity of pulsar.
- Willmore *et al.* 1992, *MNRAS*, 254, 139. Hard X-ray observations.
- Dubner *et al.* 1992, *A&AS*, 96, 505. Argentine 30-m at 1.4 GHz (30') of surrounding H $\alpha$ .
- Strom *et al.* 1995, *Nature*, 373, 590. Radio of X-ray extensions.
- Markwardt & Ögelman 1995, *Nature*, 375, 40. X-ray jet from pulsar.
- Jenkins & Wallerstein 1995, *Apj*, 440, 227. Optical absorption of associated neutral carbon cloud.
- Milne 1995, *MNRAS*, 277, 1435. Parkes 64-m at 8.4 GHz (3'), including polarisation, of Vela X.
- Danks & Sembach 1995, *Aj*, 109, 2627. Optical spectroscopy of background stars.
- Blair *et al.* 1995, *Aj*, 110, 312. UV spectroscopy.
- Duncan *et al.* 1996, *MNRAS*, 280, 252. Parkes 64-m at 2.4 GHz (8'9).
- Whiteoak & Green 1996, *A&AS*, 118, 329. MOST at 843 MHz (43'' $\times$ 62'') of part.
- Green *et al.* 1997, *Aj*, 114, 2058. Parkes 64-m and ATCA OH observations.
- Frail *et al.* 1997, *Apj*, 475, 224. VLA at 330 MHz (1' $\times$ 1'8) and comparison with ROSAT observations of Vela X.
- Markwardt & Ögelman 1997, *Apj*, 480, L13. ASCA observations of pulsar 'jet'.
- Raymond *et al.* 1997, *Apj*, 482, 881. UV spectroscopy.
- Yoshikoshi *et al.* 1997, *Apj*, 487, L65.  $\gamma$ -ray observations of pulsar.
- Jenkins *et al.* 1998, *Apj*, 492, L147. UV absorption to background star.
- Dubner *et al.* 1998, *Aj*, 116, 813. Parkes 64-m at 1.4 GHz (15') for H $\alpha$  studies.
- Bock *et al.* 1998, *Aj*, 116, 1886. MOST at 843 MHz (43'' $\times$ 60'').
- Cha *et al.* 1999, *Apj*, 515, L25. Optical spectra, for distance.
- Lu & Aschenbach 2000, *A&A*, 362, 1083. ROSAT spatially resolved spectroscopy.
- Chadwick *et al.* 2000, *Apj*, 537, 414. Limit on high energy  $\gamma$ -rays from pulsar.
- Sankrit *et al.* 2001, *Apj*, 549, 416. Far-UV observations of selected region.
- Pavlov *et al.* 2001, *Apj*, 554, L189. Chandra two epoch observations of pulsar nebula.
- Helfand *et al.* 2001, *Apj*, 556, 380. Chandra observations of pulsar and its nebula.
- Miyata *et al.* 2001, *Apj*, 559, L45. Chandra of X-ray extension.
- Alvarez *et al.* 2001, *A&A*, 372, 636. Radio spectral index studies.  
see also: Alvarez *et al.* 2001, *A&A*, 379, 323. Erratum.
- Caraveo *et al.* 2001, *Apj*, 561, 930. HST parallax observations of pulsar.
- Moriguchi *et al.* 2001, *PASJ*, 53, 1025. CO observations.
- Dodson *et al.* 2003, *MNRAS*, 343, 116. ATCA at 1.4, 2.4, 5.2 and 8.5 GHz (6'' $\times$ 8''1, 26'' $\times$ 36'', 12''1 $\times$ 10''5 and 11''2 $\times$ 10''6) of pulsar nebula.
- Sankrit *et al.* 2003, *Apj*, 589, 242. Optical nebulosity to NE of G266.2-1.2.
- Nichols & Slavin 2004, *Apj*, 610, 285. UV absorption toward background sources.
- Hales *et al.* 2004, *Apj*, 613, 977. Vela X at 31 GHz (4'1).
- Mongano *et al.* 2005, *A&A*, 436, 917. XMM-Newton and other X-ray observations of pulsar nebula.
- Miceli *et al.* 2005, *A&A*, 442, 513. XMM-Newton observations of N rim.
- Katsuda & Tsunemi 2005, *PASJ*, 57, 621. XMM-Newton observations of E.
- Aharonian *et al.* 2006, *A&A*, 448, L43.  $\gamma$ -ray observations.
- McConnell *et al.* 2006, *Aj*, 131, 648. ATCA at 4.9 GHz (12') including polarisation.
- Katsuda & Tsunemi 2006, *Apj*, 642, 917. XMM-Newton observations of NE.
- Nishikida *et al.* 2006, *Apj*, 644, L171. Far UV observations.
- Miceli *et al.* 2008, *Apj*, 676, 1064. XMM-Newton observations.
- LaMassa *et al.* 2008, *Apj*, 689, L121. XMM-Newton observations of Vela X.
- Grondin *et al.* 2013, *Apj*, 774, 110. Fermi observations of Vela X.
- Arnaud *et al.* 2016, *A&A*, 586, A134. Planck flux densities at 30, 44 and 70 GHz.
- Rao *et al.* 2016, *MNRAS*, 455, 2529. Time variation of optical line absorption.

**G266.2–1.2**

RX J0852.0–4622

**RA:** 08<sup>h</sup>52<sup>m</sup>00<sup>s</sup>**1-GHz flux/Jy:** 50?**Size/arcmin:** 120**Dec:** –46°20′**Spectral index:** 0.3?**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.  $\gamma$ -ray observations.
- Combi *et al.* 1999, *ApJ*, 519, L177. Radio observations.
- Duncan & Green 2000, *A&A*, 364, 732. Parkes 64-m at 1.4 GHz (14'0), and comparison with other observations.
- Redman *et al.* 2000, *ApJ*, 543, L153. Optical of nearly nebulosity.
- Tsunemi *et al.* 2000, *PASJ*, 52, 887. ASCA spectral observations.
- Slane *et al.* 2001, *ApJ*, 548, 814. ASCA observations.
- Mereghetti *et al.* 2001, *ApJ*, 548, L213. BeppoSAX observations of central sources.
- 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.
- Iyudin *et al.* 2005, *A&A*, 429, 225. XMM-Newton observations.
- Aharonian *et al.* 2005, *A&A*, 437, L7.  $\gamma$ -ray observations.
- Katagiri *et al.* 2005, *ApJ*, 619, L163.  $\gamma$ -ray observations.
- Bamba *et al.* 2005, *ApJ*, 632, 294. Chandra of NW rim.
- Reynoso *et al.* 2006, *A&A*, 449, 243. ATCA at 1.38 GHz (32'' $\times$ 37'').
- Enomoto *et al.* 2006, *ApJ*, 652, 1268.  $\gamma$ -ray observations.
- Mignani *et al.* 2007, *A&A*, 473, 883. Deep optical observations of compact X-ray source.
- Aharonian *et al.* 2007, *ApJ*, 661, 236.  $\gamma$ -ray 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.  $\gamma$ -ray observations.
- Takeda *et al.* 2016, *PASJ*, 68, S10. Suzaku observations.

**G272.2–3.2**

**RA:** 09<sup>h</sup>06<sup>m</sup>50<sup>s</sup>  
**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.

**G279.0+1.1**

**RA:** 09<sup>h</sup>57<sup>m</sup>40<sup>s</sup>  
**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.

**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 $\alpha$  observations.

**G284.3–1.8**

**RA:** 10<sup>h</sup>18<sup>m</sup>15<sup>s</sup>  
**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.

**Point sources:** Central X-/ $\gamma$ -ray source.

**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.  
 Abramowski *et al.* 2012, A&A, 541, A5.  $\gamma$ -ray observations.  
 Williams *et al.* 2015, ApJ, 808, L19. Chandra observations.

**G286.5–1.2**

**RA:** 10<sup>h</sup>35<sup>m</sup>40<sup>s</sup>  
**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 $\alpha$  observations.

**G289.7–0.3**

**RA:** 11<sup>h</sup>01<sup>m</sup>15<sup>s</sup>  
**Dec:** –60°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″×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<sup>h</sup>03<sup>m</sup>05<sup>s</sup>  
**Dec:** –60°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 $\alpha$  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.  
 Kirshner & Winkler 1979, ApJ, 227, 853. Optical observations.  
 Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×50″).  
 Milne *et al.* 1989, PASA, 8, 187. MOST at 843 MHz (43″×49″:  $S=45\pm 11$  Jy), and Parkes 64-m at 8.4 GHz (3′:  $S=19.5\pm 1.0$  Jy), including polarisation.  
 Seward 1990, ApJS, 73, 781. Einstein observations.  
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×49″:  $S=43$  Jy).  
 Rosado *et al.* 1996, A&A, 315, 243. Optical kinematics.  
 Kaspi *et al.* 1997, ApJ, 485, 820. Pulsar detection.

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''5×25''0) including H $\alpha$ .  
 Pavan *et al.* 2014, A&A, 562, A122. Chandra and ATCA observations at 2 GHz (4'':1×5''2) of PWN.  
 Halpern *et al.* 2014, ApJ, 795, L27. XMM-Newton observations of PWN.  
 Auchetti *et al.* 2015, ApJ, 810, 43.  $\gamma$ -ray and Suzaku observations.  
 Kamitsukasa *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<sup>h</sup>11<sup>m</sup>54<sup>s</sup>**1-GHz flux/Jy:** 16**Size/arcmin:** 15×13**Dec:** –60°38'**Spectral index:** 0.29**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±1.0 Jy), and Parkes 64-m at 5 and 8.4 GHz (4'6 and 3' : S=10.4±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 $\alpha$  observations.  
 Slane *et al.* 2012, ApJ, 749, 131. Chandra, XMM-Newton and Fermi observations.  
 Acero *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

**G292.0+1.8**

MSH 11–54

**RA:** 11<sup>h</sup>24<sup>m</sup>36<sup>s</sup>**1-GHz flux/Jy:** 15**Size/arcmin:** 12×8**Dec:** –59°16'**Spectral index:** 0.4**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 $\alpha$  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.  
 Clark *et al.* 1980, MNRAS, 193, 129. X-ray spectrum.  
 Tuohy *et al.* 1982, ApJ, 260, L65. Einstein observations.  
 Dopita & Tuohy 1984, ApJ, 282, 135. Optical spectra.  
 Braun *et al.* 1986, A&A, 162, 259. MOST at 843 MHz (0'8) and IRAS.  
 Hughes & Singh 1994, ApJ, 422, 126. EXOSAT spectrum.

Sutherland & Dopita 1995, ApJ, 439, 365. Spectrophotometry.  
 Hughes *et al.* 2001, ApJ, 559, L153. Chandra observations, including central nebula.  
 Park *et al.* 2002, ApJ, 564, L39. Chandra observations.  
 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 ( $9''.6 \times 8''.0, 7''.2 \times 6''.2$  and  $5''.5 \times 4''.8$ :  $S = 11.9 \pm 0.1, 11.4 \pm 0.1$  and  $8.8 \pm 0.1$ ), plus H $\alpha$  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.  
 Lee *et al.* 2009, ApJ, 706, 441. IR observations.  
 Lee *et al.* 2010, ApJ, 711, 861. Chandra observations.  
 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.  
 Kamitsukasa *et al.* 2014, PASJ, 66, 64. Suzaku observations.  
 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.  $\gamma$ -ray observations.

## G292.2–0.5

**RA:**  $11^{\text{h}}19^{\text{m}}20^{\text{s}}$

**Dec:**  $-61^{\circ}28'$

**1-GHz flux/Jy:** 7

**Spectral index:** 0.5

**Size/arcmin:**  $20 \times 15$

**Type:** S

**Radio:** Shell.

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

**Point sources:** Central, young pulsar.

**Distance:** H $\alpha$  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 ( $29'' \times 25''$ :  $S = 5.6 \times 0.3$  Jy) and 2.5 GHz ( $21'' \times 20''$ ).  
 Pivovarov *et al.* 2001, ApJ, 554, 161. ROSAT and ASCA observations.  
 Gonzalez & Safi-Harb 2003, ApJ, 591, L143. Chandra observations 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 $\alpha$  absorption.  
 Gonzalez & Safi-Harb 2005, ApJ, 619, 856. Chandra observations.  
 Gonzalez *et al.* 2005, ApJ, 630, 489. XMM-Newton observations of pulsar.  
 Safi-Harb *et al.* 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.  $\gamma$ -ray observations.

**G293.8+0.6****RA:** 11<sup>h</sup>35<sup>m</sup>00<sup>s</sup>**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 &amp; Caswell 1987, A&amp;A, 183, 118. MOST at 843 MHz (44"×51").

Whiteoak &amp; Green 1996, A&amp;AS, 118, 329. MOST at 843 MHz (43"×49": S=2.6 Jy).

**G294.1-0.0****RA:** 11<sup>h</sup>36<sup>m</sup>10<sup>s</sup>**Dec:** -61°38'**1-GHz flux/Jy:** >2?**Spectral index:** ?**Size/arcmin:** 40**Type:** S**Radio:** Faint shell.**References:**

Whiteoak &amp; Green 1996, A&amp;AS, 118, 329. MOST at 843 MHz (43"×49": S&gt;2).

**G296.1-0.5****RA:** 11<sup>h</sup>51<sup>m</sup>10<sup>s</sup>**Dec:** -62°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 H<sub>II</sub> regions.**Optical:** Detected.**X-ray:** Irregular, incomplete shell.**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 &amp; 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 &amp; Markert 1994, ApJ, 431, 819. ROSAT observations.

Whiteoak &amp; Green 1996, A&amp;AS, 118, 329. MOST at 843 MHz (43"×48": S&gt;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 &amp; Sezer 2012, MNRAS, 419, 1603. Suzaku observations.



**G296.5 + 10.0**

PKS 1209–51/52

**RA:** 12<sup>h</sup>09<sup>m</sup>40<sup>s</sup>**1-GHz flux/Jy:** 48**Size/arcmin:** 90×65**Dec:** –52°25′**Spectral index:** 0.5**Type:** S

Has been called G296.5+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 H $\alpha$ .  
 Kellett *et al.* 1987, *MNRAS*, 225, 199. EXOSAT of the west of the remnant, including the compact source.  
 Kesteven & Caswell 1987, *A&A*, 183, 118. MOST at 843 MHz (44″×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″×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±3 Jy), 4.8 GHz (4′.5: S=23.3±3 Jy) and 8.4 GHz (3′.0: 18.8±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′.7×4′.0) for H $\alpha$  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′.8×3′.3), including polarisation.  
 Araya 2013, *MNRAS*, 434, 2202. Fermi observations.  
 Halpern & Gotthelf 2015, *Apj*, 812, 61. Two epoch Chandra observations for pulsar proper motion.  
 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.  $\gamma$ -ray observations.

**G296.7 – 0.9****RA:** 11<sup>h</sup>55<sup>m</sup>30<sup>s</sup>**1-GHz flux/Jy:** 3**Size/arcmin:** 15×8**Dec:** –63°08′**Spectral index:** 0.5**Type:** S**Radio:** Bilateral shell.**X-ray:** Brighter to SE.**References:**

- Schudel *et al.* 2002, *ASPC*, 271, 391. ROSAT observations.  
 Robbins *et al.* 2012, *MNRAS*, 419, 2623. ATCA at 1.4 GHz (33″×45″: S=2.5±0.2 Jy), plus MOST at 843 MHz (43″×49″), plus other observations.  
 Prinz & Becker 2013, *A&A*, 550, A33. XMM-Newton observations.

Green *et al.* 2014, PASA, 31, 42. Radio observations at 843 MHz (45'' $\times$ 50'').

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### G296.8–0.3

1156–62

**RA:** 11<sup>h</sup>58<sup>m</sup>30<sup>s</sup>**Dec:** –62°35'**1-GHz flux/Jy:** 9  
**Spectral index:** 0.6**Size/arcmin:** 20 $\times$ 14  
**Type:** S**Radio:** Shell, brighter to the NW.**X-ray:** Detected.**Distance:** H $\alpha$  absorption gives 9.6 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 $\alpha$  observations, plus review of flux densities.

Sánchez-Ayaso *et al.* 2012, Ap&SS, 337, 573. XMM-Newton and IR observations.

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### G298.5–0.3

**RA:** 12<sup>h</sup>12<sup>m</sup>40<sup>s</sup>**Dec:** –62°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.

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### G298.6–0.0

**RA:** 12<sup>h</sup>13<sup>m</sup>41<sup>s</sup>**Dec:** –62°37'**1-GHz flux/Jy:** 5?  
**Spectral index:** 0.3**Size/arcmin:** 12 $\times$ 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.  $\gamma$ -ray observations.

Bamba *et al.* 2016, PASJ, 68, S5. Suzaku observations.

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**G299.2–2.9****RA:** 12<sup>h</sup>15<sup>m</sup>13<sup>s</sup>  
**Dec:** –65°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.**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.  
 Part *et al.* 2014, ApJ, 792, L20. Chandra observations.

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**G299.6–0.5****RA:** 12<sup>h</sup>21<sup>m</sup>45<sup>s</sup>  
**Dec:** –63°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″×48″:S=1.1 Jy).

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**G301.4–1.0****RA:** 12<sup>h</sup>37<sup>m</sup>55<sup>s</sup>  
**Dec:** –63°49′**1-GHz flux/Jy:** 2.1?  
**Spectral index:** ?**Size/arcmin:** 37×23  
**Type:** S**Radio:** Faint, incomplete shell, with possible extension to southwest.**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×48″:S=2.3 Jy).

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**G302.3+0.7****RA:** 12<sup>h</sup>45<sup>m</sup>55<sup>s</sup>  
**Dec:** –62°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″×49″:S=3.2 Jy).  
 Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant.

**G304.6 + 0.1**

Kes 17

**RA:** 13<sup>h</sup>05<sup>m</sup>59<sup>s</sup>**1-GHz flux/Jy:** 14**Size/arcmin:** 8**Dec:** -62°42′**Spectral index:** 0.5**Type:** S**Radio:** Incomplete shell.**X-ray:** Detected.**Distance:** Possible limit of > 9.7 kpc from H<sub>I</sub> 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<sub>I</sub> 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.  
 Anderson *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.  $\gamma$ -ray observations.  
 Washino *et al.* 2016, *PASJ*, 68, S4. Suzaku observations.

**G306.3 – 0.9****RA:** 13<sup>h</sup>21<sup>m</sup>50<sup>s</sup>**1-GHz flux/Jy:** 0.16?**Size/arcmin:** 4**Dec:** -63°34′**Spectral index:** 0.5?**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.

**G308.1 – 0.7****RA:** 13<sup>h</sup>37<sup>m</sup>37<sup>s</sup>**1-GHz flux/Jy:** 1.2?**Size/arcmin:** 13**Dec:** -63°04′**Spectral index:** ?**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<sup>h</sup>41<sup>m</sup>30<sup>s</sup>**Dec:** –63°44′**1-GHz flux/Jy:** 0.4?**Spectral index:** ?**Size/arcmin:** 12×6?**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.

**References:**

Schudel *et al.* 2002, ASPC, 271, 391. ROSAT observations.

Prinz & Becker 2012, A&A, 544, A7. ATCA at 1.4 GHz (53″×64″: S=0.33 Jy) and 2.5 GHz (29″×35″: S=0.24 Jy), plus Chandra and other observations.

Hui *et al.* 2012, ApJ, 750, 7. XMM-Newton and other observations.

De Horta *et al.* 2013, MNRAS, 428, 1980. ATCA at 1.4 GHz (54″×65″) and 2.5 GHz (29″×35″), plus other observations.

Green *et al.* 2014, PASA, 31, 42. Radio observations at 843 MHz (45″×50″).

**G308.8–0.1****RA:** 13<sup>h</sup>42<sup>m</sup>30<sup>s</sup>**Dec:** –62°23′**1-GHz flux/Jy:** 15?**Spectral index:** 0.4?**Size/arcmin:** 30×20?**Type:** C?

Incorporates previous catalogued remnant G308.7+0.0.

**Radio:** Bright ridge in north, and arc to south.

**Point sources:** Pulsar near centre of remnant.

**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′: S=6.5 Jy).

Caswell *et al.* 1981, MNRAS, 195, 89. FIRST at 1415 MHz (50″).

Wilson 1986, ApJ, 302, 718. Lack of detection with Einstein.

Caswell *et al.* 1992, ApJ, 399, L151. MOST at 843 MHz (43″×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.

**G309.2–0.6****RA:** 13<sup>h</sup>46<sup>m</sup>31<sup>s</sup>**Dec:** –62°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.

**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″×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 ( $24'' \times 23''$ :  $S=5.2 \pm 0.2$  Jy).  
 Rakowski *et al.* 2001, ApJ, 548, 258. ASCA and ROSAT observations.  
 Rakowski *et al.* 2006, ApJ, 649, L111. Observations of central source.  
 Safi-Harb *et al.* 2007, ApJ, 659, 407. Observations of central source.

### 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:**  $25 \times 19$   
**Type:** S

**Radio:** Distorted shell.

**Point sources:** Steep radio spectrum source near the centre of the remnant.

#### 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.

### 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?

**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.

### 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

**Radio:** Asymmetric shell.

#### References:

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**

Kes 20A

**RA:** 14<sup>h</sup>00<sup>m</sup>00<sup>s</sup>**Dec:** –62°17′**1-GHz flux/Jy:** 6?**Spectral index:** ?**Size/arcmin:** 12**Type:** S**Radio:** Arc in E, in complex region.**References:**

Whiteoak &amp; Green 1996, A&amp;AS, 118, 329. MOST at 843 MHz (43''×49'': S=6.9 Jy).

Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.**G311.5–0.3****RA:** 14<sup>h</sup>05<sup>m</sup>38<sup>s</sup>**Dec:** –61°58′**1-GHz flux/Jy:** 3?**Spectral index:** 0.5**Size/arcmin:** 5**Type:** S**Radio:** Shell, not well resolved.**X-ray:** Detected.**References:**

Shaver &amp; Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3') and Parkes 64-m at 5 GHz (4').

Caswell &amp; Barnes 1985, MNRAS, 216, 753. Molonglo at 408 MHz (3').

Whiteoak &amp; Green 1996, A&amp;AS, 118, 329. MOST at 843 MHz (43''×49'': S=2.9 Jy).

Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.Pannuti *et al.* 2014, AJ, 147, 55. ASCA observations.**G312.4–0.4****RA:** 14<sup>h</sup>13<sup>m</sup>00<sup>s</sup>**Dec:** –61°44′**1-GHz flux/Jy:** 45**Spectral index:** 0.36**Size/arcmin:** 38**Type:** S**Radio:** Irregular, incomplete shell.**X-ray:** Weak emission in W.**Point sources:** Nearby  $\gamma$ -ray sources and pulsars.**Distance:** H<sub>i</sub> absorption suggests > 6 kpc and possibly > 14 kpc.**References:**

Caswell &amp; Barnes 1985, MNRAS, 216, 753. Molonglo at 408 MHz (3': S=56 Jy).

Whiteoak &amp; Green 1996, A&amp;AS, 118, 329. MOST at 843 MHz (43''×49'': S&gt;19), plus Parkes 64-m at 4.5 GHz (S=30±2 Jy) and 8.55 GHz (S=17±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''×49'').Case & Bhattacharya 1999, ApJ, 521, 246. Nearby  $\gamma$ -ray sources.Doherty *et al.* 2003, MNRAS, 339, 1048. ATCA at 1.4 GHz (25'') plus H<sub>i</sub> absorption, and Chandra observations.

**G312.5–3.0**

**RA:** 14<sup>h</sup>21<sup>m</sup>00<sup>s</sup>  
**Dec:** –64°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)

Kane & Vaughan 2003, MNRAS, 344, 625. ATCA at 1.4 GHz (129″×116″) and 2.4 GHz (75″×67″).

**G315.1+2.7**

**RA:** 14<sup>h</sup>24<sup>m</sup>30<sup>s</sup>  
**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 $\alpha$  observations.

**G315.4–2.3**

**RA:** 14<sup>h</sup>43<sup>m</sup>00<sup>s</sup>  
**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.

**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.

Kaasta *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 ( $43'' \times 48'' : S > 22$ ).  
 Rosado *et al.* 1996, A&A, 315, 243. Optical kinematics.  
 Bamba *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.  $\gamma$ -ray 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.  $\gamma$ -ray 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.  $\gamma$ -ray observations.  
 Tsubone *et al.* 2014, in EFXU, p72. Suzaku observations.  
 Broersen *et al.* 2014, MNRAS, 441, 3040. XMM-Newton observations.  
 Arnaud *et al.* 2016, A&A, 586, A134. Planck flux densities at 30, 44 and 70 GHz.  
 Ajello *et al.* 2016, ApJ, 819, 98.  $\gamma$ -ray observations, and ATCA H $\alpha$  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).

### G315.4–0.3

**RA:**  $14^{\text{h}}35^{\text{m}}55^{\text{s}}$

**Dec:**  $-60^{\circ}36'$

**1-GHz flux/Jy:** 8

**Spectral index:** 0.4

**Size/arcmin:**  $24 \times 13$

**Type:** ?

**Radio:** Irregular non-thermal emission, with H $\alpha$  region superposed in E.

**Optical:** Detected.

#### 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 ( $43'' \times 49'' : S = 3.1$  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 $\alpha$  observations.

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**G315.9–0.0****RA:** 14<sup>h</sup>38<sup>m</sup>25<sup>s</sup>  
**Dec:** –60°11′**1-GHz flux/Jy:** 0.8?  
**Spectral index:** ?**Size/arcmin:** 25×14  
**Type:** S

Has been called G315.8–0.0.

**Radio:** Faint, distorted shell, with elongated trail to pulsar.**Point sources:** Pulsar at end of radio trail.**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.

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**G316.3–0.0**

(MSH 14–57)

**RA:** 14<sup>h</sup>41<sup>m</sup>30<sup>s</sup>  
**Dec:** –60°00′**1-GHz flux/Jy:** 20?  
**Spectral index:** 0.4**Size/arcmin:** 29×14  
**Type:** S**Radio:** Distorted shell, with possible ‘blowout’.**X-ray:** Detected.**Distance:** H<sub>I</sub> absorption data suggests > 7.2 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<sub>I</sub> absorption.Milne & Dickel 1975, *AujPh*, 28, 209. Parkes 64-m at 5 GHz (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.  $\gamma$ -ray observations.

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**G317.3–0.2****RA:** 14<sup>h</sup>49<sup>m</sup>40<sup>s</sup>  
**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 $\alpha$  observations.

**G318.2 + 0.1**

**RA:** 14<sup>h</sup>54<sup>m</sup>50<sup>s</sup>  
**Dec:** -59°04'

**1-GHz flux/Jy:** >3.9?  
**Spectral index:** ?

**Size/arcmin:** 40×35  
**Type:** S

**Radio:** Faint shell, with central H $\alpha$  region.

**X-ray:** Sources within remnant.

**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43''×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.

**G318.9 + 0.4**

**RA:** 14<sup>h</sup>58<sup>m</sup>30<sup>s</sup>  
**Dec:** -58°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.

**References:**

Whiteoak 1990, Nature, 347, 157. MOST at 843 MHz (43''×51'').

Whiteoak 1993, ApJ, 415, 701. MOST at 843 MHz (43''×51'' : S = 4.8±0.6 Jy), Parkes 64-m at 4.5 GHz (4'.7 : S = 3.7±0.2 Jy) and 8.4 GHz (2'.8 : S = 3.0±0.4 Jy) including polarisation, and ATCA at 1.4 GHz and 4.8 GHz (11''×13'') of core.

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43''×50'' : S = 4.8 Jy).

Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

**G320.4 - 1.2**

**RA:** 15<sup>h</sup>14<sup>m</sup>30<sup>s</sup>  
**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 $\alpha$  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 $\alpha$  absorption indicates 5.2 kpc.

**References:**

Caswell *et al.* 1975, A&A, 45, 239. Parkes H $\alpha$  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).

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 expansion.

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 compact source.  
 Milne *et al.* 1993, *MNRAS*, 264, 853. Parkes 64-m at 4.8 GHz (4'5 : S = 37±7 Jy) and 8.4 GHz (3'0 : S = 24±4 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 association.  
 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''×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 observations.  
 Gaensler *et al.* 1999, *MNRAS*, 305, 724. ATCA at 1.4 GHz (24''×21''), plus H $\alpha$  observations, and 5.3 GHz (15''×10'').  
 Sako *et al.* 2000, *Apj*, 537, 422. Possible high energy  $\gamma$ -ray detection of pulsar.  
 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 (4'0×2'7), plus H $\alpha$  observations.  
 Aharonian *et al.* 2005, *A&A*, 435, L17.  $\gamma$ -ray 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.  $\gamma$ -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.

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### G320.6–1.6

**RA:** 15<sup>h</sup>17<sup>m</sup>50<sup>s</sup>

**Dec:** −59°16'

**1-GHz flux/Jy:** ?

**Spectral index:** ?

**Size/arcmin:** 60×30

**Type:** S

**Radio:** Faint shell, overlapping G320.4–1.2 in W.

**Optical:** Detected.

**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''×50'' : S > 9.3).  
 Stupar & Parker 2011, *MNRAS*, 414, 2282. H $\alpha$  observations.

**G321.9–1.1**

**RA:** 15<sup>h</sup>23<sup>m</sup>45<sup>s</sup>  
**Dec:** –58°13′

**1-GHz flux/Jy:** >3.4?  
**Spectral index:** ?

**Size/arcmin:** 28  
**Type:** S

**Radio:** Faint shell.

**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×51″:S>3.8).  
 Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

**G321.9–0.3**

**RA:** 15<sup>h</sup>20<sup>m</sup>40<sup>s</sup>  
**Dec:** –57°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:** Compact, probably thermal source at S edge.

**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″×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″×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.  
 Acero *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

**G322.1+0.0**

**RA:** 15<sup>h</sup>20<sup>m</sup>49<sup>s</sup>  
**Dec:** –57°10′

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

**Size/arcmin:** 8×4.5?  
**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″0×4″9).

**G322.5–0.1**

**RA:** 15<sup>h</sup>23<sup>m</sup>23<sup>s</sup>  
**Dec:** –57°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″×51″:S=2.0±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:**  $15^{\text{h}}28^{\text{m}}42^{\text{s}}$

**Dec:**  $-56^{\circ}21'$

**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 ( $43'' \times 52''$ :  $S = 4.2$  Jy).

Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.

### G326.3 – 1.8

**RA:**  $15^{\text{h}}53^{\text{m}}00^{\text{s}}$

**Dec:**  $-56^{\circ}10'$

**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 $\alpha$  absorption.

Milne *et al.* 1979, MNRAS, 188, 437. FIRST at 1415 MHz ( $0'.8$ :  $S > 95$ ) and Parkes 64-m at 14.7 GHz ( $2'.2$ :  $S = 69 \pm 8$  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 ( $44'' \times 53''$ ).

Milne *et al.* 1989, PASA, 8, 187. MOST at 843 MHz ( $43'' \times 52''$ :  $S = 153 \pm 40$  Jy), and Parkes 64-m at 8.4 GHz ( $3'$ :  $S = 68 \pm 5$  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 ( $43'' \times 52''$ :  $S > 130$ ).

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 ( $8''.5 \times 6''.4$ :  $S > 60$  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.

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.  $\gamma$ -ray observations.

**G327.1–1.1**

**RA:** 15<sup>h</sup>54<sup>m</sup>25<sup>s</sup>  
**Dec:** –55°09′

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

**Size/arcmin:** 18  
**Type:** C

**Radio:** Shell, with off-centre core.

**X-ray:** Diffuse, with core.

**References:**

Milne & Dickel 1974, *AujPh*, 27, 549. Parkes 64-m at 2.7 GHz (8′.4 : S = 10 ± 15% 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.  
 Acero *et al.* 2011, *ICRC*, 7, 185.  $\gamma$ -ray 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.

**G327.2–0.1**

**RA:** 15<sup>h</sup>50<sup>m</sup>55<sup>s</sup>  
**Dec:** –54°18′

**1-GHz flux/Jy:** 0.4  
**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, and 843 GHz (43″ × 53″ : S = 0.5 ± 0.1 Jy) and SGPS at 1.4 GHz (S = 0.3 ± 0.1 Jy).

**G327.4+0.4**

**RA:** 15<sup>h</sup>48<sup>m</sup>20<sup>s</sup>  
**Dec:** –53°49′

**1-GHz flux/Jy:** 30?  
**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 $\alpha$  absorption indicates 4.3 to 5.4 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, *AJPh*, 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'' :  $S=32.2\pm 6$  Jy), and Parkes 64-m at 8.4 GHz (3' :  $S=9.4\pm 0.8$  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 (2'0×1'8), plus Hi.

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.  $\gamma$ -ray observations.

### G327.4 + 1.0

**RA:** 15<sup>h</sup>46<sup>m</sup>48<sup>s</sup>  
**Dec:** -53°20'

**1-GHz flux/Jy:** 1.9?  
**Spectral index:** ?

**Size/arcmin:** 14  
**Type:** S

**Radio:** Asymmetric shell.

#### References:

Whiteoak & Green 1996, *A&AS*, 118, 329. MOST at 843 MHz (43''×54'' :  $S=2.1$  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 (2'0×1'8), plus Hi.

### G327.6 + 14.6

**RA:** 15<sup>h</sup>02<sup>m</sup>50<sup>s</sup>  
**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 $\alpha$  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 2.2 kpc.

#### References:

van den Bergh 1976, *ApJ*, 208, L17. Optical observations.

Dickel & Milne 1976, *AJPh*, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8'4) and 5 GHz (4'4).

Becker *et al.* 1980, *ApJ*, 240, L33. X-ray spectroscopy.

Schweizer & Middleditch 1980, *ApJ*, 241, 1039. Possible stellar remnant.

Pye *et al.* 1981, *MNRAS*, 194, 569. Einstein observations.

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''×20'').

Kirshner *et al.* 1987, *ApJ*, 315, L135. Broad H $\alpha$  optical component.

Kesteven & Caswell 1987, *A&A*, 183, 118. MOST at 843 MHz (44''×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 ( $44'' \times 66''$ :  $S = 17.5 \pm 1.5$  Jy).
- Long *et al.* 1988, *Apj*, 333, 749. Optical proper motion for distance.
- Jones & Pye 1989, *MNRAS*, 238, 567. EXOSAT observations.
- Leahy *et al.* 1991, *Apj*, 374, 218. HEAO-1 X-ray spectra.
- 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.
- Tanimori *et al.* 1998, *Apj*, 497, L25.  $\gamma$ -ray detection.
- 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 ( $4'.7 \times 3'.0$ ) for H $\alpha$ , 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.
- Korreck *et al.* 2004, *Apj*, 615, 280. Far-uv observations.
- Aharonian *et al.* 2005, *A&A*, 437, 135.  $\gamma$ -ray limit.
- Winkler *et al.* 2005, *Apj*, 624, 189. HST absorption towards background sources.
- Kalemci *et al.* 2006, *Apj*, 640, L55.  $\gamma$ -ray limit upper limit.
- 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 $\alpha$  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.
- Bamba 2008, *PASJ*, 60, S153. Suzaku observations.
- Dyer *et al.* 2009, *AJ*, 137, 2956. GBT and VLA observations at 1.4 GHz.
- Winkler *et al.* 2011, *Apj*, 742, 80. Multi-epoch UV spectroscopy of the Schweizer--Middleditch star.
- Miceli *et al.* 2012, *A&A*, 546, A66. XMM-Newton observations.
- Miceli *et al.* 2013, *A&A*, 550, A80. XMM-Newton observations.
- Broersen *et al.* 2013, *A&A*, 552, A9. XMM-Newton observations of NW knot.
- 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 $\alpha$  spectroscopy.
- Miceli *et al.* 2014, *Apj*, 782, L33. XMM-Newton observations of SW.
- Acero *et al.* 2015, *A&A*, 580, A74.  $\gamma$ -ray limit.
- Sparls *et al.* 2015, *Apj*, 815, L9. Polarised optical line observations.
- Li *et al.* 2015, *MNRAS*, 453, 3953. XMM-Newton observations.

Arnaud *et al.* 2016, A&A, 586, A134. Planck flux densities at 4 frequencies between 30 and 100 GHz.

Xing *et al.* 2016, ApJ, 823, 44.  $\gamma$ -ray observations.

Li *et al.* 2016, MNRAS, 462, 158. XMM-Newton observations.

### G328.4 + 0.2

(MSH 15–57)

**RA:** 15<sup>h</sup>55<sup>m</sup>30<sup>s</sup>

**Dec:** –53°17′

**1-GHz flux/Jy:** 15

**Spectral index:** 0.0

**Size/arcmin:** 5

**Type:** F

**Radio:** Amorphous emission, with central bar.

**X-ray:** Detected at high energies.

**Distance:** H<sub>I</sub> 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±0.1 Jy) and 4.5 GHz (2′′0×1′′5:S=12.5±0.2 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<sub>I</sub>.

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±0.4 Jy), plus XMM-Newton observations.

### G329.7 + 0.4

**RA:** 16<sup>h</sup>01<sup>m</sup>20<sup>s</sup>

**Dec:** –52°18′

**1-GHz flux/Jy:** >34?

**Spectral index:** ?

**Size/arcmin:** 40×33

**Type:** S

**Radio:** Diffuse shell, in complex region.

#### 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 (2′0×1′8), plus H<sub>I</sub>.

Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.

### G330.0 + 15.0

Lupus Loop

**RA:** 15<sup>h</sup>10<sup>m</sup>00<sup>s</sup>

**Dec:** –40°00′

**1-GHz flux/Jy:** 350?

**Spectral index:** 0.5?

**Size/arcmin:** 180?

**Type:** S

**Radio:** Low surface brightness loop with H<sub>I</sub> 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 ( $8'.4 : S = 120 \pm 30\%$  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 $\alpha$  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<sup>h</sup>01<sup>m</sup>06<sup>s</sup>  
**Dec:**  $-51^{\circ}34'$

**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 $\alpha$  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 ( $52'' \times 47''$ ), and MOST at 843 MHz ( $43'' \times 55''$ ).  
 Whiteoak & Green 1996, *A&AS*, 118, 329. MOST at 843 MHz ( $43'' \times 55'' : S = 4.7$  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 ( $2'.0 \times 1'.8$ ), plus H $\alpha$ .  
 Torii *et al.* 2006, *PASJ*, 58, L11. ASCA detection.  
 Park *et al.* 2009, *ApJ*, 695, 431. XMM-Newton and Chandra observations.  
 Abramowski *et al.* 2014, *MNRAS*, 441, 790.  $\gamma$ -ray upper limit.

### G332.0 + 0.2

**RA:** 16<sup>h</sup>13<sup>m</sup>17<sup>s</sup>  
**Dec:**  $-50^{\circ}53'$

**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 ( $44'' \times 57''$ ).  
 Whiteoak & Green 1996, *A&AS*, 118, 329. MOST at 843 MHz ( $43'' \times 55'' : S = 8.9$  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 ( $2'.0 \times 1'.8$ ), plus H $\alpha$ .  
 Acero *et al.* 2016, *ApJS*, 224, 8.  $\gamma$ -ray observations.

**G332.4–0.4**

RCW 103

**RA:** 16<sup>h</sup>17<sup>m</sup>33<sup>s</sup>**1-GHz flux/Jy:** 28**Size/arcmin:** 10**Dec:** –51°02′**Spectral index:** 0.5**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<sub>i</sub> absorption indicates 3.1 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<sub>i</sub> 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 & Allen 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<sub>i</sub> absorption to central source.  
 Russeil *et al.* 2005, *A&A*, 429, 497. H $\alpha$  observations.  
 Reach *et al.* 2006, *Aj*, 131, 1479. Spitzer observations.  
 Paron 2006, *PASA*, 23, 69. CO and HCO<sup>+</sup> 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.  
 Anderson *et al.* 2011, *Apj*, 742, 7. Spitzer observations.  
 Xing *et al.* 2014, *Apj*, 781, 64.  $\gamma$ -ray 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.

**G332.4 + 0.1****RA:** 16<sup>h</sup>15<sup>m</sup>20<sup>s</sup>**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 $\alpha$  observations.

**G332.5–5.6****RA:** 16<sup>h</sup>43<sup>m</sup>20<sup>s</sup>**Dec:** −54°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:**

Reynoso & Green 2007, MNRAS, 375, 92. ATCA at 1.4 GHz (40″:  $S=1.90\pm0.15$  Jy) and 2.4 GHz (90″:  $S=1.3\pm0.2$  Jy) including polarisation, and 843 MHz (43″×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 $\alpha$  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.

**G335.2 + 0.1****RA:** 16<sup>h</sup>27<sup>m</sup>45<sup>s</sup>**Dec:** −48°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.**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.

### 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:**  $14 \times 10$   
**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.  $H\alpha$  observations.

### G337.0–0.1

(CTB 33)

**RA:**  $16^{\text{h}}35^{\text{m}}57^{\text{s}}$   
**Dec:**  $-47^{\circ}36'$

**1-GHz flux/Jy:** 1.5  
**Spectral index:** 0.6?

**Size/arcmin:** 1.5  
**Type:** S

This entry refers to a small (1/5) SNR, not the larger previously catalogued G337.0–0.1. Has mistakenly 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 ( $43'' \times 58''$ :  $S=21$  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<sub>i</sub>, and 8.9 GHz ( $13'' \times 15''$ ) 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:**  $16^{\text{h}}39^{\text{m}}28^{\text{s}}$   
**Dec:**  $-47^{\circ}51'$

**1-GHz flux/Jy:** 1.5  
**Spectral index:** 0.4

**Size/arcmin:** 6  
**Type:** S

**Radio:** Shell, brighter in S.

**X-ray:** Extended emission.

**Distance:** H<sub>i</sub> 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 ( $43'' \times 58'' : S=2.0$  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 observations at 1.3 GHz ( $15'' : S=1.55 \pm 0.05$  Jy) and 5 GHz ( $15'' : S=0.93 \pm 0.02$  Jy), plus H $\alpha$  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:**  $16^{\text{h}}35^{\text{m}}55^{\text{s}}$   
**Dec:**  $-47^{\circ}20'$

**1-GHz flux/Jy:** 1.5?  
**Spectral index:** ?

**Size/arcmin:**  $3 \times 2$   
**Type:** ?

**Radio:** Not well defined.

**X-ray:** Detected.

**Distance:** Association with H $\alpha$  hole gives 14 kpc.

#### References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ( $43'' \times 59'' : S=1.6$  Jy)  
 Combi *et al.* 2005, A&A, 431, L9. ASCA and other observations.  
 Aharonian *et al.* 2006, ApJ, 636, 777.  $\gamma$ -ray observations of nearby source.  
 Combi *et al.* 2006, ApJ, 653, L41. XMM-Newton observations.

### G337.3 + 1.0

**RA:**  $16^{\text{h}}32^{\text{m}}39^{\text{s}}$   
**Dec:**  $-46^{\circ}36'$

**1-GHz flux/Jy:** 16  
**Spectral index:** 0.55

**Size/arcmin:**  $15 \times 12$   
**Type:** S

Kes 40

**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 ( $44'' \times 61''$ ).  
 Milne *et al.* 1989, PASA, 8, 187. MOST at 843 MHz ( $43'' \times 59'' : S=14.8 \pm 3.0$  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 ( $43'' \times 59'' : S=20$  Jy).  
 Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

**G337.8–0.1**

Kes 41

**RA:** 16<sup>h</sup>39<sup>m</sup>01<sup>s</sup>**1-GHz flux/Jy:** 18**Size/arcmin:** 9×6**Dec:** –46°59′**Spectral index:** 0.5**Type:** S**Radio:** Distorted shell.**X-ray:** Centrally brightened.**Distance:** H<sub>i</sub> absorption suggests 11 kpc.**References:**

Shaver & Goss 1970, *AJPA*, 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<sub>i</sub> 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<sub>i</sub>.  
 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.  $\gamma$ -ray observations.  
 Acero *et al.* 2016, *ApJS*, 224, 8.  $\gamma$ -ray observations.  
 Qiao *et al.* 2016, *ApJS*, 227, 26. OH maser observations.

**G338.1+0.4****RA:** 16<sup>h</sup>37<sup>m</sup>59<sup>s</sup>**1-GHz flux/Jy:** 4?**Size/arcmin:** 15?**Dec:** –46°24′**Spectral index:** 0.4**Type:** S**Radio:** Arc in NE, merging with thermal emission in S.**Optical:** Detected.**References:**

Shaver & Goss 1970, *AJPA*, 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<sup>h</sup>41<sup>m</sup>00<sup>s</sup>**1-GHz flux/Jy:** 7?**Size/arcmin:** 8**Dec:** –46°34′**Spectral index:** ?**Type:** C?**Radio:** Irregular shell, in complex region.**X-ray:** Central X-ray source and nebula.**Point sources:** Central pulsar.**Distance:** H<sub>i</sub> observations suggest 8 to 13 kpc.**References:**

Shaver & Goss 1970, *AJPA*, 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.  $\gamma$ -ray detection.  
 Aharonian *et al.* 2006, ApJ, 636, 777.  $\gamma$ -ray observations.  
 Landi *et al.* 2006, ApJ, 651, 190. X-ray observations.  
 Funk *et al.* 2007, ApJ, 662, 517. XMM-Newton observations.  
 Lemiére *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 ( $10'' \times 26''$ ), 610 MHz ( $5''.0 \times 12''.6$ ) and 1280 MHz ( $5''.0 \times 6''.4$ ), plus ATCA at 2.3 GHz ( $4''.3 \times 4''.8$ ).  
 Gotthelf *et al.* 2014, ApJ, 788, 155. NuSTAR observations.  
 Lemoine-Goumard *et al.* 2014, ApJ, 794, L16.  $\gamma$ -ray observations.  
 Abramowski *et al.* 2014, MNRAS, 439, 2828.  $\gamma$ -ray observations.  
*see also:* Abramowski *et al.* 2014, MNRAS, 441, 3640. Erratum.  
 Supan *et al.* 2016, A&A, 589, A51. SGPS Hi and other observations.

### G338.5 + 0.1

**RA:**  $16^{\text{h}}41^{\text{m}}09^{\text{s}}$   
**Dec:**  $-46^{\circ}19'$

**1-GHz flux/Jy:** 12?  
**Spectral index:** ?

**Size/arcmin:** 9  
**Type:** ?

**Radio:** Circle of non-thermal emission in complex region, not well defined.

**Distance:** Hi 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 ( $43'' \times 59''$ :  $S=13$  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 Hi.  
 Abramowski *et al.* 2014, ApJ, 794, L1.  $\gamma$ -ray observations.

### G340.4 + 0.4

**RA:**  $16^{\text{h}}46^{\text{m}}31^{\text{s}}$   
**Dec:**  $-44^{\circ}39'$

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

**Size/arcmin:**  $10 \times 7$   
**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 ( $75'' \times 48''$ :  $S=9.8 \pm 0.9$  Jy) and 1.4 GHz ( $27'' \times 9''$ :  $S=3.6 \pm 0.1$  Jy).  
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ( $43'' \times 61''$ :  $S=5.9$  Jy).  
 Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.  
 Stupar & Parker 2011, MNRAS, 414, 2282. H $\alpha$  observations.

**G340.6 + 0.3**

**RA:** 16<sup>h</sup>47<sup>m</sup>41<sup>s</sup>  
**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<sub>i</sub> 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 (75"×48" : S = 9.2±0.9 Jy) and 1.4 GHz (27"×9" : S = 5.8±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<sub>i</sub>.

**G341.2 + 0.9**

**RA:** 16<sup>h</sup>47<sup>m</sup>35<sup>s</sup>  
**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.

**References:**

Frail *et al.* 1994, ApJ, 437, 781. VLA at 330 MHz (54"×116" : S = 3.0±0.1 Jy) and 1.4 GHz (21"×25" : S = 12.5±0.05 Jy).

Giacani *et al.* 2001, AJ, 121, 3133. VLA at 1.4 and 4.9 GHz (25") of pulsar wind nebula.

**G341.9 - 0.3**

**RA:** 16<sup>h</sup>55<sup>m</sup>01<sup>s</sup>  
**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 (35"×11" : S = 2.2±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<sup>h</sup>54<sup>m</sup>50<sup>s</sup>  
**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  $S_{408 \text{ MHz}} = 5 \text{ Jy}$ ,  $S_{5 \text{ GHz}} = 2 \text{ Jy}$  from previous maps.  
 Dubner *et al.* 1996, AJ, 111, 1304. VLA at 1.4 GHz (35''×11'').  
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43''×62'':  $S = 3.5 \text{ Jy}$ ).  
 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<sup>h</sup>50<sup>m</sup>43<sup>s</sup>  
**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'':  $S = 0.6 \text{ Jy}$ ).  
 Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

**G343.0–6.0**

**RA:** 17<sup>h</sup>25<sup>m</sup>00<sup>s</sup>  
**Dec:** –46°30′

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

RCW 114  
**Size/arcmin:** 250  
**Type:** S

**Radio:** Faint, poorly defined.

**Optical:** Filamentary shell.

**References:**

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.  $\gamma$ -ray observations.  
 Kim *et al.* 2010, ApJ, 709, 823. UV observations.

**G343.1–2.3**

**RA:** 17<sup>h</sup>08<sup>m</sup>00<sup>s</sup>  
**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.

**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 ( $56'' \times 111''$ :  $S=10.6$  Jy) and 1.4 GHz ( $22'' \times 27''$ ) 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 ( $70'' \times 47''$ ) including polarisation, and Chandra observations of pulsar wind nebula.  
 Aharonian *et al.* 2005, A&A, 432, L9.  $\gamma$ -ray limit.  
 Abramowski *et al.* 2011, A&A, 528, A143.  $\gamma$ -ray observations.

### G343.1–0.7

**RA:**  $17^{\text{h}}00^{\text{m}}25^{\text{s}}$   
**Dec:**  $-43^{\circ}14'$

**1-GHz flux/Jy:** 7.8  
**Spectral index:** 0.55

**Size/arcmin:**  $27 \times 21$   
**Type:** S

**Radio:** Shell, with smaller thermal shell adjacent.

#### References:

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ( $43'' \times 63''$ :  $S=8.5 \pm 0.6$ ), plus Parkes 64-m at 4.5 GHz ( $S=3.9 \pm 0.6$  Jy) and 8.55 GHz ( $S=2.4 \pm 0.5$  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.

### G344.7–0.1

**RA:**  $17^{\text{h}}03^{\text{m}}51^{\text{s}}$   
**Dec:**  $-41^{\circ}42'$

**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:**  $\text{H}\alpha$  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 ( $30'' \times 43''$ :  $S=1.7 \pm 0.1$  Jy).  
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ( $43'' \times 65''$ :  $S=2.5$  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.  
 Giacani *et al.* 2011, A&A, 531, A138. VLA and ATCA at 1.4 GHz ( $5''6 \times 8''$ ), ATCA at 5 GHz ( $10'' \times 13''$ ) and 8.4 GHz ( $5'' \times 10''$ ), plus XMM-Newton observations and  $\text{H}\alpha$  from SGPS.  
 Anderson *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.

**G345.7–0.2**

**RA:** 17<sup>h</sup>07<sup>m</sup>20<sup>s</sup>  
**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<sup>h</sup>10<sup>m</sup>19<sup>s</sup>  
**Dec:** –40°11′

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

**Size/arcmin:** 8  
**Type:** S

**Radio:** Irregular shell.

**X-ray:** Centrally brightened.

**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''×43'' : S=8.1±0.9 Jy).  
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43''×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.  
 Anderson *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.

**G347.3–0.5**

**RA:** 17<sup>h</sup>13<sup>m</sup>50<sup>s</sup>  
**Dec:** –39°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.

**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. High energy  $\gamma$ -ray detection.  
 Butt *et al.* 2001, ApJ, 562, L167. Associated  $\gamma$ -ray emission.  
 Ellison *et al.* 2001, ApJ, 563, 191. ATCA at 1.4 GHz (46''×36''), and ASCA observations.  
 Enomoto *et al.* 2002, Nature, 416, 823.  $\gamma$ -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.  $\gamma$ -ray 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.  $\gamma$ -ray 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  $\gamma$ -ray data.  
 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<sub>I</sub> and Suzaku observations.  
 Federici *et al.* 2015, A&A, 577, A12.  $\gamma$ -ray 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.  $\gamma$ -ray observations.  
 Tsuji & Uchiyama 2016, PASJ, 68, 108. Chandra observations of NW.

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### G348.5–0.0

**RA:** 17<sup>h</sup>15<sup>m</sup>26<sup>s</sup>  
**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'' $\times$ 53''), 1.4 GHz (18'' $\times$ 33'') and part at 5 GHz (2'' $\times$ 3''9).  
 Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43'' $\times$ 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.  
 Anderson *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 observations for upper limit.

**G348.5 + 0.1**

CTB 37A

**RA:** 17<sup>h</sup>14<sup>m</sup>06<sup>s</sup>**1-GHz flux/Jy:** 72**Size/arcmin:** 15**Dec:** -38°32′**Spectral index:** 0.3**Type:** S**Radio:** Shell, poorly define to S and W, overlapping G348.5-0.0 in E.**X-ray:** Brighter to W.**Distance:** H<sub>I</sub> absorption indicates 8.0 kpc.**References:**Clark *et al.* 1975, AujPA, 37, 75. Molonglo at 408 MHz (3′:S=97 Jy).

Milne &amp; 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<sub>I</sub> 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 &amp; Green 1996, A&amp;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 &amp; Mangum 2000, ApJ, 545, 874. CO observations.

Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.Aharonian *et al.* 2008, A&A, 490, 685.  $\gamma$ -ray observations.

Castro &amp; Slane 2010, ApJ, 717, 372. Fermi observations.

Anderson *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<sub>I</sub> 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.  $\gamma$ -ray observations.**G348.7 + 0.3**

CTB 37B

**RA:** 17<sup>h</sup>13<sup>m</sup>55<sup>s</sup>**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<sub>I</sub> absorption suggests 13 kpc.**References:**Clark *et al.* 1975, AujPA, 37, 75. Molonglo at 408 MHz (3′:S=34 Jy).

Milne &amp; 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<sub>I</sub> 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 &amp; Green 1996, A&amp;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.  $\gamma$ -ray detection.Aharonian *et al.* 2008, A&A, 486, 829.  $\gamma$ -ray 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 $\alpha$  observations.  
 Xin *et al.* 2016, ApJ, 817, 64.  $\gamma$ -ray observations.

### G349.2–0.1

**RA:** 17<sup>h</sup>17<sup>m</sup>15<sup>s</sup>  
**Dec:** –38°04′

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

**Size/arcmin:** 9×6  
**Type:** S

**Radio:** Elongated shell, adjacent to bright H $\alpha$  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<sup>h</sup>17<sup>m</sup>59<sup>s</sup>  
**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 $\alpha$  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 $\alpha$  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.  
 Anderson *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 $\alpha$  observations.  
 Yasumi *et al.* 2014, PASJ, 66, 68. Suzaku observations.  
 Abramowski *et al.* 2015, A&A, 574, A100.  $\gamma$ -ray observations.  
*see also:* Abramowski *et al.* 2015, A&A, 580, C1. Correction.  
 Ergin *et al.* 2015, ApJ, 804, 124.  $\gamma$ -ray 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).

Acerro *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

### G350.0–2.0

**RA:** 17<sup>h</sup>27<sup>m</sup>50<sup>s</sup>  
**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 $\alpha$  observations.

Karpova *et al.* 2016, MNRAS, 462, 3845. XMM-Newton observations.

### G350.1–0.3

**RA:** 17<sup>h</sup>21<sup>m</sup>05<sup>s</sup>  
**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 $\alpha$  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″ × 10″.4) and 4.8 GHz (15″ × 35″) and 15 GHz (5″ × 2″).

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 (11′.4 × 5′.6) plus XMM-Newton observations.

Lovchinsky *et al.* 2011, ApJ, 731, 70. Chandra and Spitzer observations.

Yasumi *et al.* 2014, PASJ, 66, 68. Suzaku observations.

**G351.0–5.4**

**RA:** 17<sup>h</sup>46<sup>m</sup>00<sup>s</sup>  
**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<sup>h</sup>22<sup>m</sup>27<sup>s</sup>  
**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±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.

**G351.7+0.8**

**RA:** 17<sup>h</sup>21<sup>m</sup>00<sup>s</sup>  
**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<sub>II</sub> region.

**Point sources:** Pulsar nearby.

**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±0.7 Jy) including H<sub>I</sub>.

**G351.9–0.9**

**RA:** 17<sup>h</sup>28<sup>m</sup>52<sup>s</sup>  
**Dec:** –36°16′

**1-GHz flux/Jy:** 1.8?  
**Spectral index:** ?

**Size/arcmin:** 12×9  
**Type:** S

**Radio:** Asymmetric shell.

**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×73″:S=2.0 Jy).

**G352.7–0.1****RA:** 17<sup>h</sup>27<sup>m</sup>40<sup>s</sup>**Dec:** –35°07′**1-GHz flux/Jy:** 4  
**Spectral index:** 0.6**Size/arcmin:** 8×6  
**Type:** S**Radio:** Distorted shell.**X-ray:** Detected.**Distance:** H<sub>I</sub> absorption indicates 6.8 to 8.4 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 ± 0.4 Jy).

Whiteoak &amp; Green 1996, A&amp;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<sub>I</sub> and XMM-Newton observations.Pannuti *et al.* 2014, ApJ, 782, 102. XMM-Newton and Chandra observations.

Sezer &amp; Gök 2014, ApJ, 790, 81. Suzaku observations.

**G353.6–0.7****RA:** 17<sup>h</sup>32<sup>m</sup>00<sup>s</sup>**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:** Detected.**Point sources:** Central X-ray source.**References:**Tian *et al.* 2008, ApJ, 679, L85. SGPS at 1.4 GHz (100″), plus 843 MHz (43″) and X-ray observations.

Halpern &amp; Gotthelf 2010, ApJ, 710, 941. XMM-Newton observations.

Tian *et al.* 2010, ApJ, 712, 790. XMM-Newton, Suzaku and CO observations.Abramowski *et al.* 2011, A&A, 531, A81.  $\gamma$ -ray 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.Yang *et al.* 2014, A&A, 567, A23.  $\gamma$ -ray limit.Fukuda *et al.* 2014, ApJ, 788, 94.  $\gamma$ -ray, SGPS H<sub>I</sub> and CO observations.Acero *et al.* 2015, A&A, 580, A74.  $\gamma$ -ray limit.

**G353.9–2.0****RA:** 17<sup>h</sup>38<sup>m</sup>55<sup>s</sup>**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 (3′.0×2′.7) and 1.4 GHz (42″×36″), plus 8.4 GHz (8′.4×6′.1) of central source only.

**G354.1+0.1****RA:** 17<sup>h</sup>30<sup>m</sup>28<sup>s</sup>**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.  $\gamma$ -ray observations.

**G354.8–0.8****RA:** 17<sup>h</sup>36<sup>m</sup>00<sup>s</sup>**Dec:** –33°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″×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<sup>h</sup>31<sup>m</sup>20<sup>s</sup>**Dec:** –32°26′**1-GHz flux/Jy:** 5?**Spectral index:** ?**Size/arcmin:** 25**Type:** S**Radio:** Faint, incomplete shell.**References:**

Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×77″).  
Roy & Bhatnagar 2006, JPhCS, 54, 152. GMRT at 330 MHz (1′: S=8.9±1.3 Jy).  
Ajello *et al.* 2016, ApJ, 819, 44.  $\gamma$ -ray observations.  
Acero *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

**G355.6–0.0**

**RA:** 17<sup>h</sup>35<sup>m</sup>16<sup>s</sup>  
**Dec:** –32°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″×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±0.5 Jy).  
 Marquez-Lopez & Phillips 2010, MNRAS, 407, 94. Mid-IR observations.  
 Minami *et al.* 2013, PASJ, 65, 99. Suzaku observations.

**G355.9–2.5**

**RA:** 17<sup>h</sup>45<sup>m</sup>53<sup>s</sup>  
**Dec:** –33°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″×34″:S=5.0±0.3 Jy).  
 Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×77″).  
 Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.  
 Marquez-Lopez & Phillips 2010, MNRAS, 407, 94. Mid-IR observations.

**G356.2+4.5**

**RA:** 17<sup>h</sup>19<sup>m</sup>00<sup>s</sup>  
**Dec:** –29°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).  
 Bhatnagar 2000, MNRAS, 317, 453. GMRT at 327 MHz (3′×1′.5:S=8.1±1.7 Jy), and NVSS at 1.4 GHz.

**G356.3–1.5**

**RA:** 17<sup>h</sup>42<sup>m</sup>35<sup>s</sup>  
**Dec:** –32°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″×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:**  $11 \times 7$   
**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 ( $2'7 \times 4'8$ ).

Acerro *et al.* 2016, ApJS, 224, 8.  $\gamma$ -ray observations.

### G357.7–0.1

**RA:**  $17^{\text{h}}40^{\text{m}}29^{\text{s}}$   
**Dec:**  $-30^{\circ}58'$

**1-GHz flux/Jy:** 37  
**Spectral index:** 0.4

MSH 17–39  
**Size/arcmin:**  $8 \times 3?$   
**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 $\alpha$  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 ( $3''8 \times 10''9$ ) and 5 GHz ( $12'' \times 26''$ ).

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 ( $43'' \times 83''$ ).

Gray 1994, MNRAS, 270, 835. MOST at 843 MHz ( $43'' \times 84''$ ).

Stewart *et al.* 1994, ApJ, 432, L39. ATCA at 4.79 and 5.84 GHz ( $12'' \times 22''$ ) 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 ( $43'' \times 24''$ ).

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 ( $13''6 \times 11''4$ ), including H $\alpha$ , and 8.3 GHz ( $14''3 \times 6''8$ ) recombination line observation of H $\alpha$  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 $\alpha$  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.  $\gamma$ -ray observations.

### G357.7 + 0.3

**RA:** 17<sup>h</sup>38<sup>m</sup>35<sup>s</sup>  
**Dec:** -30°44'

**1-GHz flux/Jy:** 10  
**Spectral index:** 0.4?

**Size/arcmin:** 24  
**Type:** S

**Radio:** Non-thermal shell in complex region.

#### References:

Reich & Fürst 1984, A&AS, 57, 165. Effelsberg 100-m at 2.7 GHz (4'3 : S = 7±1.5 Jy), S<sub>5 GHz</sub> = 5.5±1.5 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. H<sub>2</sub> IR observations.

### G358.0 + 3.8

**RA:** 17<sup>h</sup>26<sup>m</sup>00<sup>s</sup>  
**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).  
 Bhatnagar 2000, MNRAS, 317, 453. GMRT at 327 MHz (2'2×1'3 : S = 2.5±1.3 Jy), and NVSS at 1.4 GHz.

### G358.1 + 1.0

**RA:** 17<sup>h</sup>37<sup>m</sup>00<sup>s</sup>  
**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±2.5 Jy).

**G358.5–0.9****RA:** 17<sup>h</sup>46<sup>m</sup>10<sup>s</sup>**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 &amp; Bhatnagar 2006, JPhCS, 54, 152. GMRT at 330 MHz (1':S=8.0±2.5 Jy).

**G359.0–0.9****RA:** 17<sup>h</sup>46<sup>m</sup>50<sup>s</sup>**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.**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 (43''×24'').*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 $\alpha$  observations.Ponti *et al.* 2015, MNRAS, 453, 172. XMM-Newton observations.Froebrich *et al.* 2015, MNRAS, 454, 2586. H $_2$  IR observations.**G359.1–0.5****RA:** 17<sup>h</sup>45<sup>m</sup>30<sup>s</sup>**Dec:** –29°57′**1-GHz flux/Jy:** 14**Spectral index:** 0.4?**Size/arcmin:** 24**Type:** S**Radio:** Non-thermal shell in complex region, crossed by the ‘snake’.**Optical:** Detected.**X-ray:** Centrally brightened.**Point sources:** Several compact radio sources near centre, OH masers around edge.**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 &amp; Fürst 1984, A&amp;AS, 57, 165. Effelsberg 100-m at 2.7 GHz (4'3:S=10±1.5 Jy) and 4.8 GHz (2'4:S=8.1±0.5 Jy).

Uchida *et al.* 1992, ApJ, 398, 128. VLA at 1.5 GHz (11''×10''), 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 (33'' $\times$ 31''), and 1.7 GHz for OH survey.

LaRosa *et al.* 2000, *AJ*, 119, 207. VLA at 333 MHz (43'' $\times$ 24'').  
*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'' $\times$ 4'' $\times$ 12'' $\times$ 8').

Aharonian *et al.* 2008, *A&A*, 483, 509. XMM-Newton and  $\gamma$ -ray 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.  $H\alpha$  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.  $H_2$  IR observations.

Hui *et al.* 2016, *MNRAS*, 457, 4262.  $\gamma$ -ray observations of region.

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### G359.1 + 0.9

**RA:** 17<sup>h</sup>39<sup>m</sup>36<sup>s</sup>  
**Dec:** -29°11'

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

**Size/arcmin:** 12 $\times$ 11  
**Type:** S

**Radio:** Shell, brightest in E.

#### References:

Gray 1994, *MNRAS*, 270, 847. MOST at 843 MHz (43'' $\times$ 88'':  $S=4.3$  Jy).  
 Roy & Bhatnagar 2006, *JPhCS*, 54, 152. GMRT at 330 MHz (1':  $S=4.3\pm 1.0$  Jy).  
 Law *et al.* 2008, *ApJS*, 177, 515. VLA at 1.4 GHz (10'' $\times$ 9'' $\times$ 15'' $\times$ 9':  $S=1.3\pm 0.5$  Jy).