


The MROI Fast Tip-Tilt/ Narrow-field Acquisition System (FTT/NAS) project

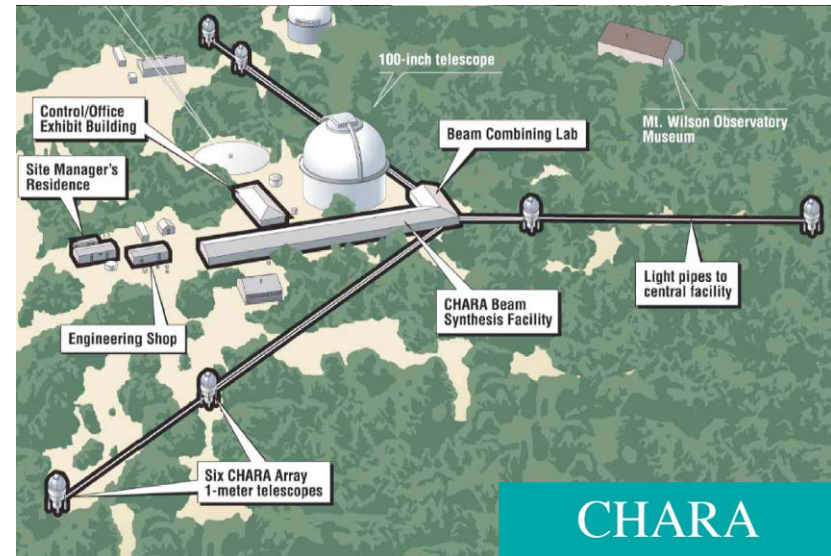


The MROI team
Cavendish Laboratory


Goals of today's presentation

- Background and context
 - What's it all about
- What:
 - The FTT/NAS system
- How:
 - Organization
- What now:
 - Near term goals and tasks
- Questions

There are a number of optical/infrared arrays

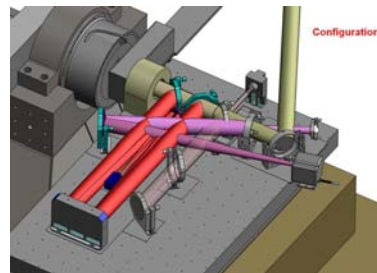
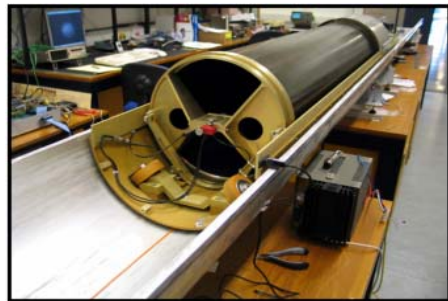
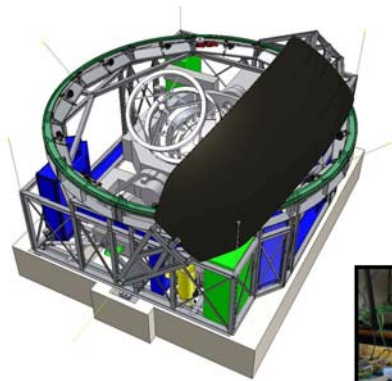


Our vision is to build the world's best



Much better sensitivity
Best imaging capability
Highest observing efficiency

Where are we today?



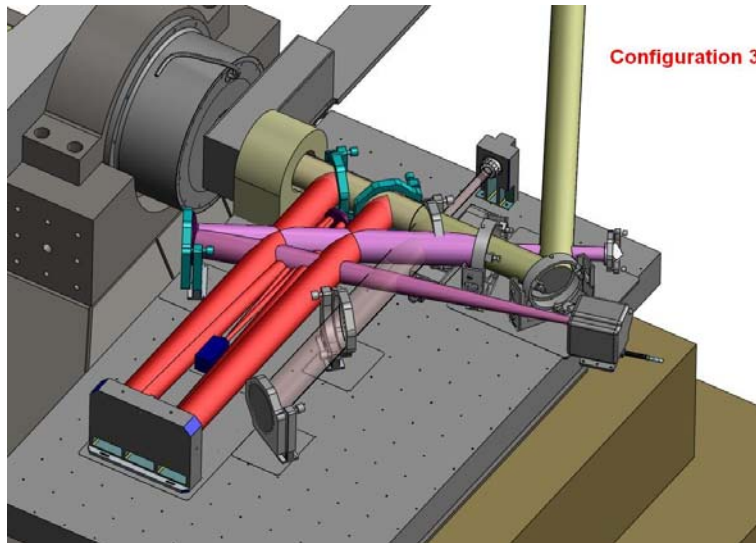
Where are we today?



- ❑ Original intent: deliver a 6-element array by 2009
 - Compromised by funding and management issues
- ❑ Current plan: deliver a 3-element array by 2012
 - Install infrastructure for ≥ 6 telescopes
 - No technical compromises, just fewer telescopes
 - Use results from this to secure funds for expansion post 2012
 - Majority of funds from NMT – possibility of some STFC support

The FTT/NAS system

- Ensures that the light beam collected by a telescope is sent down the beam relay pipes “in the right direction”
 - The FTT/NA system monitors the light
 - The active secondary mirror redirects it

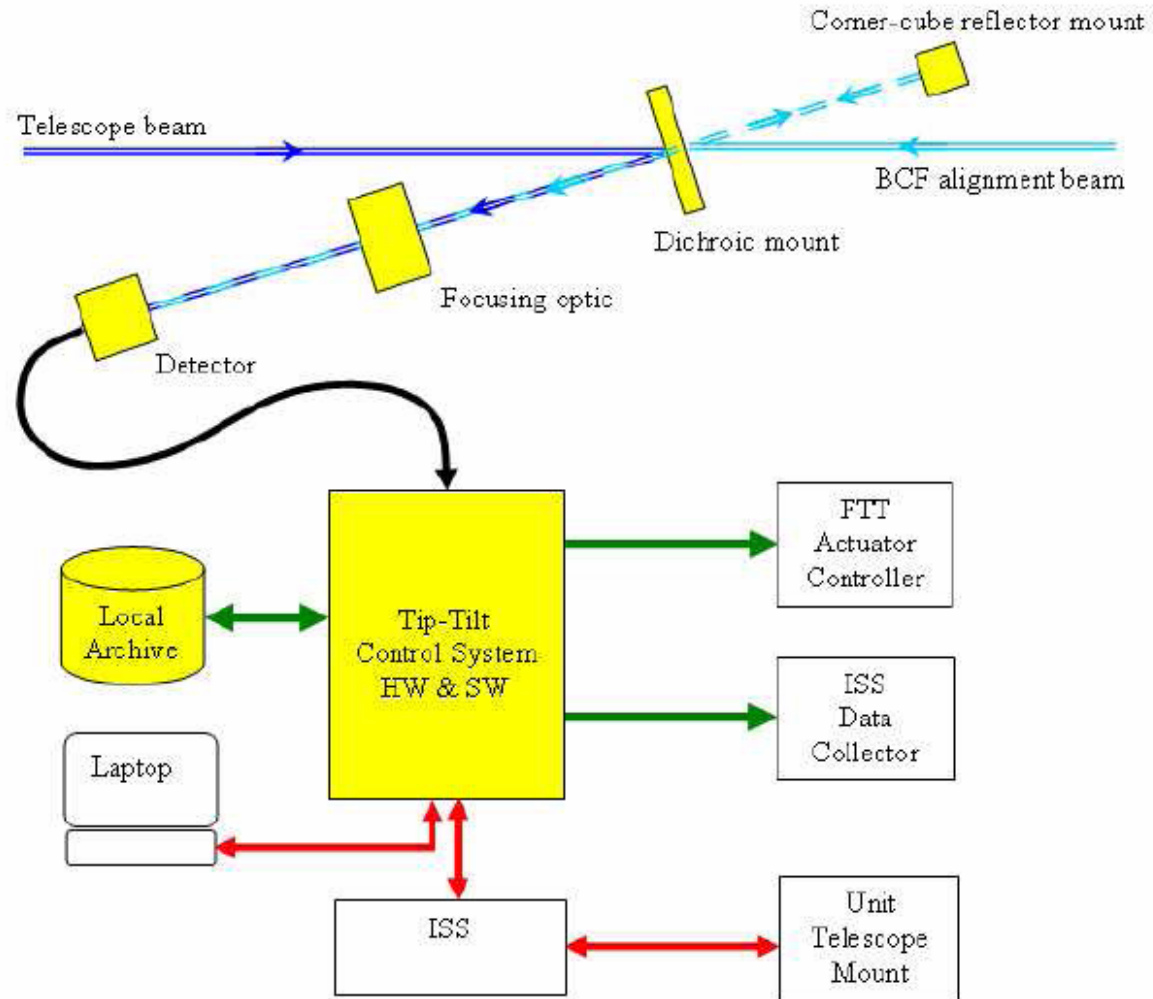


The FTT/NAS contract

- ❑ Only concerns the first FTT/NA system, which will be delivered in two phases
- ❑ Phase 1: Conceptual design, part of preliminary design & delivery of a “First Light Camera” (FLC) for UT commissioning and integration
 - April 2010 – March 2011 \$490k
 - March 2011 – June 2011 \$120k
- ❑ Phase 2: Re-work of design & delivery of production unit
 - June 2011 – March 2012 \$350k
- ❑ Currently NMT only has funds to pay for Phase 1
 - Expect funds for Phase 2 to be available in 2011

Rest of the talk will deal with the Phase 1 contract only

FTT/NAS system components



Key challenges (i)

- Two primary functions:
 - **Target acquisition** (NAS & FLC)
 - **Fast tip-tilt correction** (FTT)
- Must work on 16th magnitude stars (in good seeing) and accommodate changes in seeing
- Must stay precisely aligned ($\sim 1\mu\text{m}$) for $\Delta T = 5^\circ\text{C}$
- Goal to operate down to ambient temperature of -10°C , and up to relative humidity of 90%

Key challenges (ii)

- ❑ Space and power dissipation constraints
- ❑ Complex software
 - Data streaming to MRO Interferometer Supervisory System (ISS)
 - Apply ISS-supplied dispersion & off-axis offsets to objective point

People and roles

- John Young
 - Project leader, software, point-of-contact with NMT
- Martin Fisher
 - Deputy project leader, systems engineering, point-of-contact with NMT
- David Sun
 - Mechanical engineering
- Bodie Seneta
 - Software (real-time), electronics
- David Buscher
 - Controls, software design
- Alex Rea
 - Software, optical analysis, PhD!
- Peter Doherty
 - Mechanical fabrication
- John Ely
 - Electronics layout and fabrication
- Chris Haniff
 - Optical analysis, system design, contracts
- Donald Wilson
 - Design scrutiny, testing plans

Schedule

ACTIVITY (April 2010 to March 2011)	APRIL	MAY	JUNE	JULY	AUGUST	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
Conceptual Design												
Derived Requirements		■	■									
Camera Evaluation	■	■	■									
Conceptual Design		■	■	■								
Conceptual Design Report & Review				■	■							
Preliminary Design												
Optical Design							■	■				
Preliminary Mechanical Design							■	■	■	■		
Electronic Design							■	■	■			
Test Design and Development							■	■	■			
Software Design and Development							■	■	■	■	■	■
Preliminary Testing										■	■	■
Systems Engineering							■	■	■	■	■	■
Preliminary Design Report												■

ACTIVITY (April 2011 to June 2011)	APRIL	MAY	JUNE
Optional Extension			
Integrated Testing	■	■	
First Light Camera Testing	■		
First Light Camera Install			■
Preliminary Design Report & Review		■	■

ACTIVITY (July 2011 to March 2012)	JULY	AUGUST	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
Final Design Phase									
Final Design & Production	■	■							
Software Development & Testing	■	■	■	■	■	■			
Manufacturing & Procurement	■	■	■	■					
Integrated Testing				■	■	■			
Factory Acceptance						■	■		
Delivery, Installation & Site Acceptance							■	■	■

Meeting structure (i)

We envision two types of meeting:

- Schedule tracking meetings
 - Fortnightly, all attend
 - Track progress against schedule
 - Collate material for monthly reports to NMT
 - Schedule next technical meetings
 - **Set near-term goals and resources to deploy**

- Technical meetings
 - Frequency: as needed, relevant people attend
 - **Focused discussion of design issues**
 - Supported by discussion material (slides/memo) prepared in advance
 - Once design decision made, combine discussion material and meeting minutes into design note soon after meeting

Meeting structure (ii)

- These arrangements are deliberately different from those for the delay line activity

- Designed to help us keep to schedule
 - Funding squeeze means we cannot accommodate significant delays
 - JSY/MF will track progress both formally (via schedule tracking meetings) and informally
 - If falling behind will aim to re-assign resources or change plan of attack

- Also aim to record design decisions as we go along
 - Want to make this an integral part of our procedures

Supporting resources

- Mailing list mro-fft@mrao.cam.ac.uk
 - Archived at <http://oberon.ra.phy.cam.ac.uk/lurker/>
 - Note mro-fft-archive@mrao.cam.ac.uk goes to archive only
- Wiki at <http://www.mrao.cam.ac.uk/research/OAS/pmwiki/>
 - Used as document repository
 - Upload completed documents (e.g. design notes) to wiki instead of attaching to email
 - See JSY for edit password and/or assistance
- Google Calendar
 - Will show meeting dates and project milestones
 - Please add your planned absences
 - Read-only version on wiki

Near-term goals (i)

- Bodie, Alex:
 - To coincide with camera loans:
Evaluation of Andor and Princeton EMCCD cameras:
 - Latency, frame rate, real-time driver proof-of-concept
- All:
 - Next 2 weeks: **Derived requirements**
 - Technical meetings
 - Analysis
- Alex:
 - Between camera loans:
Start simulations to determine latency requirement

Near-term goals (ii)

- All:
To start in 1 week: **Conceptual Design**
 - JSY/MF will allocate tasks

Questions



Any questions?