Scientific Commissioning Plan

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Scientific Commissioning Overview

- EVLA antennas undergo Electronics acceptance tests and Operations acceptance tests and are then added to the array for astronomy
- There are two levels of commissioning carried out by scientific staff:

1. Scientific staff work closely with electronics, hardware, and software personnel to verify that new antennas added to the array produce valid data; these tests are led by Rick Perley

Staffing of EVLA commissioning effort

- FTE breakdown of Scientific Services for 2008 (note: does not include Rick Perley, or scientists in EVLA computing)

	2007	2008
EVLA Commissioning	1.8	2.7
VLBA Development	0.7	1.1
VLA Science Support	1.0	1.0
VLBA Science Support	0.8	0.8
VLA/VLBA User Support	1.2	1.2
VLA/VLBA Joint Science Support (AIPS, scheduling)	2.4	2.4
Software Support (CASA, E2E)	2.0	2.7
Science Programs (student programs, colloquia) + New Initiatives	0.6	0.6
Scientific Research	3.9	5.4
Management & Planning	0.6	0.6
Total	15	18.5

Scientific Commissioning and Performance Evaluation Tests

2. Evaluation of antenna, receiver, and system performance to establish whether the requirements specified in the Project Book have been met
   - These tests have not yet started
   - One commissioning postdoc (Brigette Hesman) began end of FY07, one assistant scientist (Emmanuel Momjian) starts in November 2007 to lead the performance evaluations, one assistant scientist currently under offer with a start date in 2009 for scientific commissioning of the correlator

Project Book Requirements

- The Project Book specifies target performances for:
  - Pointing (blind and referenced)
  - Accuracy of collimation offsets
  - Tracking stability
  - Subreflector positioning
  - Antenna slew and settle time
  - Antenna electrical performance (efficiencies, shapes, feed alignment, squint)
  - T_{sys} and overall sensitivity in each receiver
  - Complex gain stability of each receiver
  - Linearity of power gain
  - Cross-polarization response
  - Bandpass amplitude and phase stability
  - Bandpass amplitude and phase structure

Performance Tests

- Tests for each of the Requirements have been outlined in a memo from October 2005 (Chandler, Carilli, & Perley) but not yet implemented
  - The commissioning postdoc and assistant scientist will be developing these tests beginning October 1, 2007
  - Many of the antenna performance tests will be handed to VLA Operations Division to be included in standard start-up procedures
  - Others of these tests (such as bandpass stability and shape) will require the correlator, or at least the prototype correlator, before they can be carried out

Performance Tests, cont.

- Pointing (blind and referenced)
- Accuracy of collimation offsets
- Tracking stability
- Subreflector positioning
- Antenna slew and settle time

} To be handed to Operations

- Antenna electrical performance (efficiencies, shapes, feed alignment, squint)
- T_{sys} and overall sensitivity in each receiver
- Complex gain stability of each receiver
- Linearity of power gain
- Cross-polarization response
- Bandpass amplitude and phase stability
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} Require WIDAR correlator

Correlator Commissioning

- On-the-sky tests for the prototype correlator are scheduled to begin Q3 2008
- Carried out in parallel with system integration
- Coincides with the move to D configuration
  - We are considering extending D config. as needed to ensure sufficient time for the correlator on-the-sky tests
  - We are considering other adjustments to the configurations to accommodate commissioning
- Current FTEs allocated to testing of electronics, etc., will transfer to correlator as needed in 2008

Correlator Commissioning

- After acceptance of the prototype hardware basic correlator set-ups will be commissioned by NRAO staff
  - a “continuum” mode with full polarization to cover the full bandwidth of each receiver with the minimum number of channels
  - a “spectral line” mode for observations of multiple lines within a band
    - Galactic
    - Extra-galactic

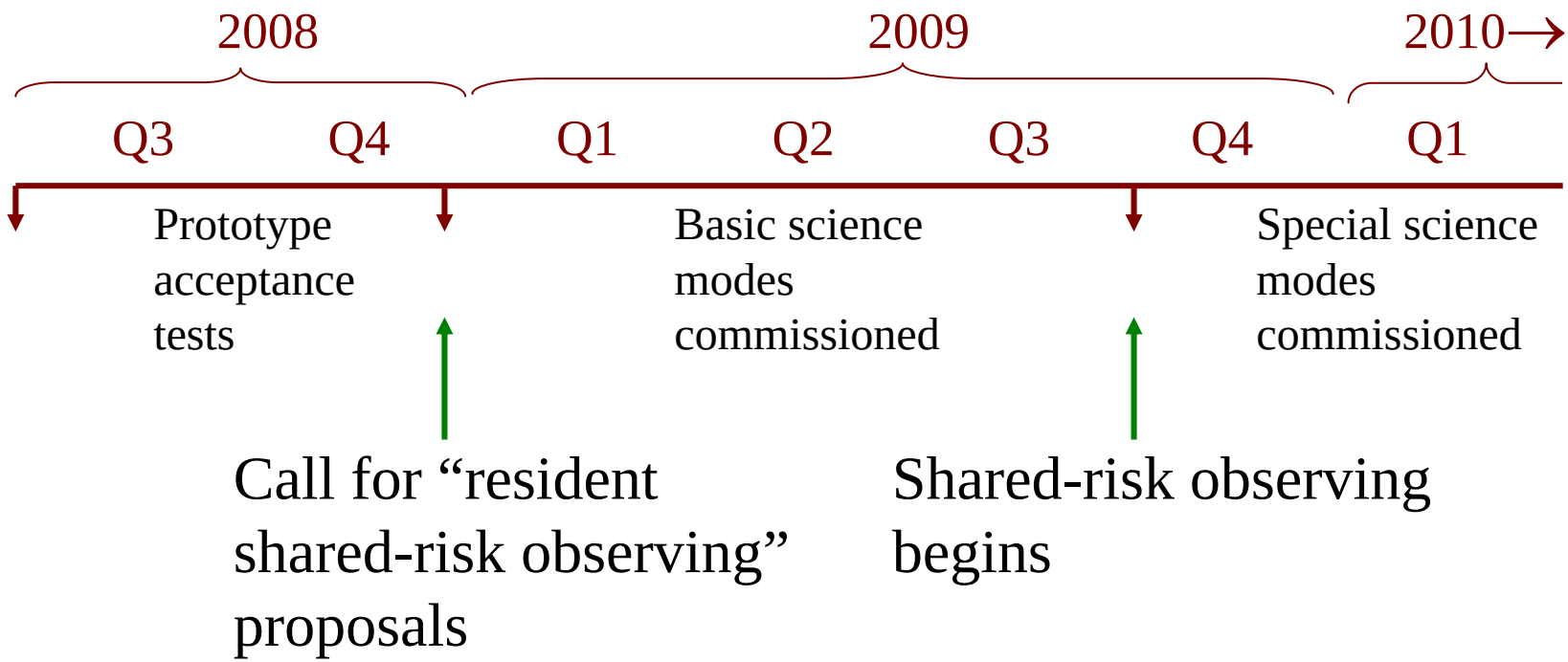
Correlator Commissioning

- Special modes will require experts from NRAO and the outside community to commission, e.g.:
  - pulsar gating
  - Solar observing
  - high time resolution
  - fast switching between correlator set-ups
- Timescales:
  - On-the-sky tests of the prototype, Q3 2008 to Q4 2008
  - Commissioning of basic modes, Q1 2009 to Q3 2009
  - Commissioning of special modes, Q4 2009 to Q4 2010

Commissioning and Early Science

- A 10-station, 1.5 GHz bandwidth prototype correlator is already 30% more sensitive for continuum observations than the full VLA
- The EVLA becomes very attractive for early science opportunities
- Combine the need for external experts to help with the correlator commissioning with a call for early science

Resident Shared-Risk Observing



- Timeline (including proposal call) is tied to the acceptance of the correlator hardware

Preliminary rules

- Observing time will be allocated based on
  - excellence of proposed science
  - ability of science to highlight capabilities of EVLA
  - residence of an expert team member for a minimum of 3 months to help with commissioning
    - students are welcome, but we need experienced radio astronomers
- Details of how NRAO staff can be part of this proposal call have yet to be defined
- The SAGE committee will be assisting with defining further the rules for this call