

## **NTD and xNTD Project Reports for ATUC (June 2006)**

### **NTD**

The NTD project is on schedule to meet its overall objectives by 30 June 2007 (completion of MNRF funding). The remaining part of the project mainly consists of developing a clear understanding of the behaviour of Vivaldi feeds and the development of what is considered to be a more appropriate design to meet the high dynamic range, frequency range and polarisation requirements for the xNTD and SKA. Our analysis to date indicates that the performance required for the xNTD could be better obtained using a feed approach based on a periodically loaded linear connected array. This approach requires that the design of the LNA needs to be closely integrated with the feed design. The NTD project aims to develop a 5 x 5 prototype tile for further development in the xNTD.

The development of the 2-element interferometer (using 2 refurbished 13.7 m antennas from ex-Fleurs) being used at Marsfield for the above-mentioned FPA work is progressing as planned. The first dish was commissioned in April, the second dish was operational in May and we have recently obtained our first fringes from the interferometer. We have been delayed in mounting the THEA tile because the laboratory testing of the THEA tile indicated problems from the greater than expected interference from the SBS analog TV signal at 527 MHz creating intermodulation problems in our passband above 1 GHz. This resulted in our having to modify the front-end circuits of the THEA tile with the inclusion of filters and replacement of a buffer amplifier. After some more single-feed tests with the interferometer during June we expect to mount the THEA tile into the East antenna in July. Meanwhile, considerable progress is being made with the investigation of alternative feed and LNA designs. John O'Sullivan is leading this research project.

### **xNTD**

From 1 July 2006 all the NTD and xNTD projects will be part of a new Theme in the ATNF known as the "xNTD and SKA Phase 1". This is a result of CSIRO's new Science Investment Program (SIP). During the recent few months considerable planning for this theme has taken place. The xNTD has been divided into 8 projects;

- xNTD System Design, Integration and Infrastructure
- NTD
- xNTD Antennas and Control
- xNTD Smart Feeds
- xNTD Digital Systems
- xNTD Receivers
- xNTD Computing
- xNTD Signalling and Data Transport

The Australian SKA Project Office (ASPO) project will also be incorporated within the theme.

Draft Project Plans for all of the above have been submitted to the ATNF Project Review Board (PRB) for approval, and will be finalised and discussed in detail with the PRB in mid-June.

As a result of the new Theme we will be appointing some new positions. The xNTD project plans have identified positions and job descriptions. These include a full-time Theme Leader, a second Project Manager, 4 software engineers, and 3 engineers for

the digital, receiver and data transmission areas. We are in the process of advertising and selection for these positions.

A discussion paper “Science with the xNTD” has been produced by the xNTD Project Scientist Simon Johnston. This available at  
[http://www.atnf.csiro.au/projects/ska/newdocs/xntd\\_science31.pdf](http://www.atnf.csiro.au/projects/ska/newdocs/xntd_science31.pdf)

The xNTD team has also been working with Michelle Storey in developing the NCRIS Radio Astronomy Investment Plan. The xNTD figures prominently in that proposal. The project plan for xNTD has been developed with the NCRID funding in mind, and has mitigation strategies in place to deal with possible outcomes arising from the results of the NCRIS funding proposals. The xNTD Science case, as outlined in Simon Johnston’s paper has been used in the preparation of all of these plans and proposals.

Some members of the xNTD team have joined others in San Diego this week for discussions resulting from the successful funding from the NSF for the LFD. Included in these discussions will be how the xNTD and LFD can best benefit and share the infrastructure needed at Mileura. Various options for possible use of the NCRIS funding will also be on the agenda

Incorporated into the xNTD project plans is the commissioning and science from the xNTD. Ray Norris has been leading some preliminary discussions in this area, and it is hoped that experience gained, and lessons learned, in commissioning other instruments eg the ATCA, will be used to advantage for xNTD.

Colin Jacka  
5 June 2006