Practical Aspects of Focal Plane Array Testing

Lessons from an FPA Test-bed at CSIRO, Marsfield

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A test-bed to study Focal Plane Array (FPA) systems has been built at the CSIRO Radiophysics laboratory at Marsfield in Sydney. Called the New Technology Demonstrator (NTD) Interferometer, it was developed by a team from CSIRO, many of whom are now involved in the design of the Australian Square Kilometre Array Pathfinder (ASKAP) \cite{1}.

The test-bed consists of two 14 m antennas, one fitted with a single horn and the other employing an 8×8 array of Vivaldi elements, which was designed by the Dutch astronomy organization ASTRON. The primary weighting used for beamforming was the maximum sensitivity or gain (G) on system temperature (T).

This presentation will concentrate on some of the practical aspects of evaluating the test-bed’s operational performance, including:

**Dealing with a high level of radio frequency interference (RFI):** Filters were fitted to the system to reduce intermodulation distortion products and the operational frequencies were restricted.

**Choice of reference source:** A number of choices of reference (calibration) sources were explored including geostationary and LEO satellites as well as astronomical sources.

**G, T and G/T measurement:** Methods for absolute and relative G/T determination were explored and uncertainty estimates were calculated.

**Radiation patterns:** Methods to determine aperture illumination from short radiation pattern cuts were explored.

Lessons from both the design and evaluation of the “NTD Interferometer” have contributed to the development of a second test-bed at Parkes and the design of ASKAP.


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