

## ASKAP's Phased Array Feeds for Radio Astronomy

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CSIRO has built Phased Array Feeds (PAFs) to demonstrate fast astronomical surveys with a wide field of view for the Square Kilometre Array. We are installing PAFs at the foci of 36 parabolic reflector antennas to form the Australian Square Kilometre Array Pathfinder (ASKAP) radio telescope.

The ASKAP PAFs are a 94 port  $\times$  2 polarisation version of a planar connected “chequerboard” array (Hay and O’Sullivan, Radio Science, 43, no. 6, 2008). They operate over 0.7 GHz to 1.8 GHz and, together with digital beamformers, enable each 12 m diameter ASKAP antenna to observe a 30 deg<sup>2</sup> field of view and survey the sky extremely rapidly.

This presentation will review astronomical performance demonstrated with Mark I ASKAP PAFs installed on six ASKAP antennas to form the Boolardy Engineering Test Array (BETA, Hotan et al., PASA, 2014). It will also present early performance measurements of the Mk. II PAFs now being installed on 30 ASKAP antennas.

The Mk. II PAF (Hampson et al., ICEAA, 2012) is designed to deliver significant improvements to noise performance, operability, and maintainability over the Mk. I PAF. The Mk. II uses RF-over-fibre to transport all signals back to the central building, vastly reducing the complexity of electronics and support systems located in the antenna pedestal.

At the time of writing, CSIRO had installed four Mk. II PAFs on ASKAP antennas and commissioned their associated digital receivers, beamformers, and correlator hardware in the central building at the Murchison Radio-astronomy Observatory. The commissioning team has demonstrated the basic end-to-end functionality of this system by making a synthesis image of the radio source PKS B1934-638.

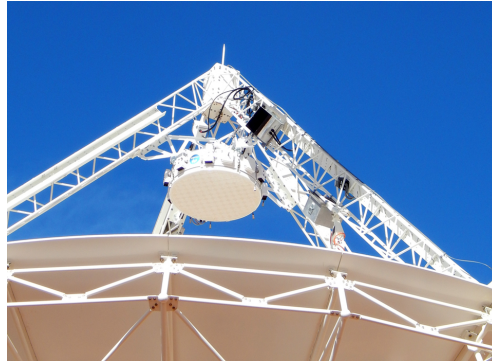


Figure 1: The first Mk II PAF on ASKAP antenna 29 at the Murchison Radio-astronomy Observatory

*This scientific work uses data obtained from the Murchison Radio-astronomy Observatory. We acknowledge the Wajarri Yamatji people as the traditional owners of the Observatory site.*