

ATA Optics and Feed

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Abstract

The final design for the reflector optics and feed for the Allen Telescope Array have been selected, and prototype models have been constructed and tested. The frequency coverage of the system is 0.5 - 11.5 GHz, and the feed is a dual linearly polarized log-periodic zig-zag antenna to achieve that bandwidth. The mirror system is an off-set Gregorian with a metal shroud half surrounding the feed between the primary and secondary. The primary is 6.1m and the secondary 2.4m. Spillover to the ground is very small in this design. The low cost of this small antenna matches the receiver cost reasonably well for best economy. Measurements show the feed match to be no worse than -16db at any frequency, and its cross polarization is about -25db. There is no evidence of the sharp drop-outs in transmission at certain frequencies that sometimes plagues log periodic antennas. The principal novel feature of this feed design is that there is a metal pyramid within the feed that provides space for the low noise wide-band amplifier of the system. The balanced feed output is coupled to the LNA through a wide-band tapered microstrip balun. The small primary provides a large field of view. The array is planned to be 350 elements for a total geometric collecting area of 10,000 square meters. At the Hat Creek Observatory, it will be used for both SETI and conventional astronomy. The element is also a possible prototype for the future Square Kilometer Array.