

## THE ALMA PHASING SYSTEM: A NEW CAPABILITY FOR HIGH ANGULAR RESOLUTION AND HIGH SENSIVITY ASTRONOMY

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An international team has designed, built and integrated a system to phase-up the ALMA array, making it effectively operate as a large single dish whose output can be captured with high speed recorders. This ALMA Phasing System (APS) effectively performs an adaptive optics function by aligning the phases of each ALMA dish and summing their signals coherently. New hardware installed at ALMA includes a new hydrogen maser time standard, a suite of Mark 6 VLBI recorders, enhancements to the 64-Antenna Correlator and an optical link between the correlator at the ALMA high site and the recorders at the low site. The APS required a new Phasing Interface Card (PIC) to be installed in the ALMA correlator to export the summed signal formatted for VLBI recording. Software enhancements include modifications to the TelCal program to provide real-time phase feedback to phase the antennas as well as extension of the ALMA control software. Both the hardware and software were designed to conform to the existing ALMA infrastructure, preserving the “look and feel” of the existing system.

The APS enables a wide range of science projects that require ultra high angular resolution through using ALMA as an element in global mm wavelength VLBI arrays. It also turns ALMA into a sensitive mm wavelength pulsar observatory for the Southern skies. Ongoing commissioning efforts have demonstrated successful intercontinental VLBI fringe detections in both Bands 3 (3mm) and 6 (1.3mm).

This talk will describe the design and status of the phasing system and discuss the science possibilities of a phased ALMA.