

Current status of ALMA and existing mm/submm interferometers

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The Atacama Large Millimeter/submillimeter Array (ALMA) is an international astronomy facility which is under construction in the Atacama desert in Northern Chile as a partnership between East Asia, Europe, and North America in cooperation with the Republic of Chile. ALMA will be composed of the “12-m array” and the Atacama Compact Array (ACA). The 12-m array will be composed of up to 64 12-m antennas. By reconfiguring antennas, the 12-m array can cover the baseline lengths from 15-m to 18 km. The ACA has 4 12-m antennas and 12 7-m antennas and will fill short antenna spacings in the U-V coverage which will not be sampled with the 12-m array. All antennas will be equipped with Front Ends covering the frequency range from 84 GHz to 950GHz. The Back End and correlators can process the broad band signal of 16GHz/baseline with 4096 spectral channels. With unprecedented spatial resolution and spectral line capabilities, ALMA is expected to enable transformational research in various areas of millimeter and submillimeter astronomy, such as the detailed structure of proto-planetary disks, detection of high redshift galaxies, and evolution of matter in the Universe.

As of February 2008, seven 12-m antennas are being assembled at the Operation Support Facility (OSF) located at 2900m altitude. Surface adjustment using radio holography is underway and the pointing accuracy is being evaluated using an optical pointing telescope mounted on a 12-m antenna. Front Ends, Back Ends, and correlators have been developed, manufactured and assembled at the various facilities of the ALMA partners. The Front Ends are being assembled in three Front End Integration Centers located in North America, Europe, and East Asia. Computing software is being developed by an international team. The first fringe between two 12-m antennas is expected to be achieved at the OSF in November 2008.

The existing mm/submm interferometers, CARMA, IRAM, NMA, and SMA, are already being used extensively for astronomical research. The exciting scientific results they have obtained, together with the technical developments achieved for those projects are what has made ALMA possible. The current status of ALMA and those existing interferometers will be reviewed.