BIWEEKY CALENDAR OF THE ALMA PROJECT at NRAO
10 August - 24 August 2009

********** THIS FORTNIGHT**********
ALMA Interferometry Continues

Please see:
http://www.nrao.edu/news/newsletters/enews/enews_2_8/enews_2_8.shtml#alma

Interferometry continued with the first two ALMA antennas at the Operations Support Facility (OSF) in northern Chile, with refinements to the baseline and to the system. Total power tests occurred on the third antenna, soon to include spectral line pointing using a second single baseline correlator that was delivered from the NRAO Technology Center in Virginia. This instrument had been used at the ALMA Test Facility last year.

The majority of the parts for sixteen ALMA antennas are now at the OSF. The Early Science array is projected to consist of sixteen antennas; it will most likely consist of an array of the antennas now present in Chile.

At its highest operating frequencies, ALMA performance is constrained by the atmosphere and by antenna performance. With three antennas under ALMA testing and thirteen more at the OSF in line for acceptance, a focus of activity has been to ensure that the antennas perform well. To achieve this, both antenna surface accuracy and pointing must be very well understood. Teams from the Joint ALMA Observatory (JAO) and from the ALMA Executives have performed a variety of tests on accepted antennas and on those still in the contractor areas that will soon move through acceptance. An ALMA transporter will soon move an antenna from the OSF to the 5000m Array Operations Site (AOS) for the first high-altitude trials. Preparation for this event has driven a number of activities at the AOS. The water vapor radiometers delivered by ESO were characterized at the OSF and at the AOS, for example, and they have been mounted on two ALMA antennas, where testing continues.

Another example has been the installation of equipment in the AOS Technical Building. A major technical challenge for ALMA has been the provision of a stable Local Oscillator (LO) signal over the wide range of ALMA operating frequencies, keeping the relative phase sufficiently stable after delivery of the signal to different antennas that may be separated by several kilometers. The specification for phase drift is that it be maintained within 2 parts in 1010! This is the job of the Central LO, the first unit of which, capable of providing signals to 16 antennas, has been installed at the 5000m ALMA site.

For the LO, a reference frequency is generated as the difference between two laser signals generated in the infrared portion of the spectrum, at 1.5 microns. The frequency of one laser, the slave, is varied to produce the desired frequency at the antenna when mixed with the frequency of a master laser, both of which are located in the Array Operations Site Technical Building. The phase stable laser difference signal is used to phase-lock a signal generated locally at the antenna that in turn drives the signal for the mixers in the Front End. The phase drift and phase noise must be kept within stringent limits. The phase stability at the antenna is guaranteed by phase locking on the optical fringe, so the number of optical wavelengths must be kept constant over the round trip in the optical fiber. This effectively keeps the electrical length of the fibers, laid underground from the central building to each distant antenna, constant, and so guarantees a constant propagation delay and stable phase at each antenna even at the shortest wavelength (0.32mm) used by ALMA.

The first racks of the ALMA Central LO, which handle sixteen antennas, successfully underwent Provisional Acceptance In-House (PAI) at the NRAO Technology Center on June 24, 2009. The performance of the first unit was verified, and it was packed and shipped to the ALMA site. Upon arrival, the racks were assembled and cabled by W. Grammer, J. Meadows, J. Shelton, and J. Castillo, working in the oxygenated atmosphere of the AOS Technical Building. Bill Shillue, J.F. Cliche, Jason Castro, and Yoshi Masui have conducted on-site testing. Rodrigo Brito has provided invaluable logistical and technical assistance on-site to both teams. Recently the testing team verified passage of an 84 GHz LO signal between the newly installed racks and antenna pad No. 106, just outside the building, onto which an antenna will be moved during September. The lasers have tuned and locked reliably and the phase correction system is working well.

Integration into the ALMA computing system is also going well, allowing monitoring

of phase drift data from San Pedro and, eventually, worldwide. The system will next undergo Provisional Acceptance on Site (PAS) and will be used for interferometry at the AOS in the coming months.

Figures at the link given above include:
Figure 1. Two antennas constructed by Vertex ride on ALMA transporters at the Operations Support Facility (OSF) in Chile. An antenna constructed by Mitsubishi Electric Corporation (MELCO) is in the background. These three antennas have been conditionally accepted by ALMA and will participate in the first phase closure tests at the high-elevation Array Operations Site (AOS). Â© ALMA (ESO/NRAO/NAOJ)

Figure 2. The ALMA Central Local Oscillator has been successfully installed at the 5000m AOS Technical Building. Photo: W. Grammer.

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Past issues of this Calendar may be viewed at
http://www.cv.nrao.edu/~awootten/mmaimcal/ALMACalendars.html

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General Happenings
Photos of activity may be found at NRAO eNews:
http://www.nrao.edu/news/newsletters/

Sky: Venus is rising with Orion while Mars and Aldebaran precede it in the morning sky. Jupiter is near opposition, in Capricorn and in fact occulting the 6th magnitude star 45 Cap on Aug 3 as seen from Europe or North America. From South America or Europe a faint penumbral eclipse of the moon may be perceived around a midtime 0f 0:39 August 6th UT.

A calendar of NAASC events may be found at:
http://www.cv.nrao.edu/naasc/alma_calendar.shtml

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DAILY CALENDAR (Times EDT/EST ) see
https://wikio.nrao.edu/bin/view/ALMA/AlmaCalendar

********** UPCOMING EVENTS **********

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| Sep 2-3 | CSV Review, Santiago |
| Sep 21-25 | Assembly, Gas Content & Star Formation History of Galaxies |
| Sep 28-30 | IRAM 30th |
| Oct 4 | Spectral Line workshop, Koln |
| Nov 11-12 | ALMA Board face-to-face meeting, Santiago |
| Nov 16- | Annual ALMA External Review, Santiago |

********** TECHNICAL NEWS **********

**********ALSO OF INTEREST**********

The deadline for submission of observing proposals on IRAM telescopes, both the interferometer and the 30m, is 17 September 2009, 17:00 CEST (UT + 2 hours). The scheduling period extends from 1 Dec 2009 - 31 May 2010. Proposals should be submitted through our web-based submission facility by following the links from our new website
http://www.iram-institute.org
to Science users and then Proposals.
This page also gives links to the proposal templates and to detailed information on time estimates, special observing modes, technical information and references for both the IRAM interferometer and the IRAM 30m telescope.

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* Nobeyama 45-m telescope call for proposals *
Deadlines:
 General program (1st): 2009-09-01 (Tue) 6:00UT
  scheduled during Jan to Mar 2010
 General program (2nd): 2009-12-10 (Thu) 6:00UT
  scheduled during Mar to May 2010
 Short program (<20 hr): 2009-12-22 (Tue) 6:00UT
  scheduled during Mar to Apr 2010
Details will soon be posted at:
 http://www.nro.nao.ac.jp/~nro45mrt/prop/index-e.html

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Please send information for upcoming calendars by Friday evening of the preceding biweekly period to Jennifer Neighbours or Al Wootten via e-mail (jneighbo at nrao.edu or awootten at nrao.edu).

The calendar will be issued between late Friday and sometime on Monday by e-mail to all NRAO scientific staff members and anyone else interested.

A specific mailing list, alma-info, has been created for anyone wishing
to receive it.
Past issues are available at
http://www.cv.nrao.edu/~awootten/mmaimcal/ALMACalendars.html