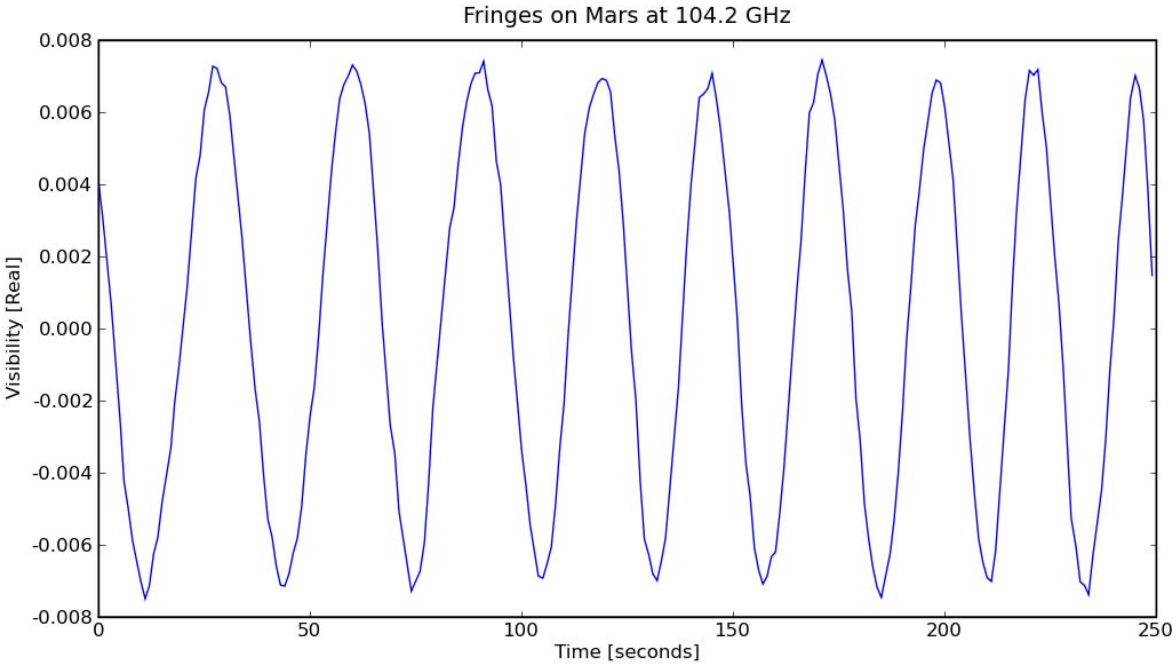
First astronomical fringes at OSF, in manual mode.

30 April 2009

On 30 April the first astronomical fringes were obtained at the OSF using full ALMA production- or engineering-quality hardware. Here is a plot of a single channel of the correlator output as a function of time, when observing Mars.



The "fringe" was created by the movement of the planet through the response pattern of the interferometer. It can be seen that stability is encouragingly good even at this early stage.

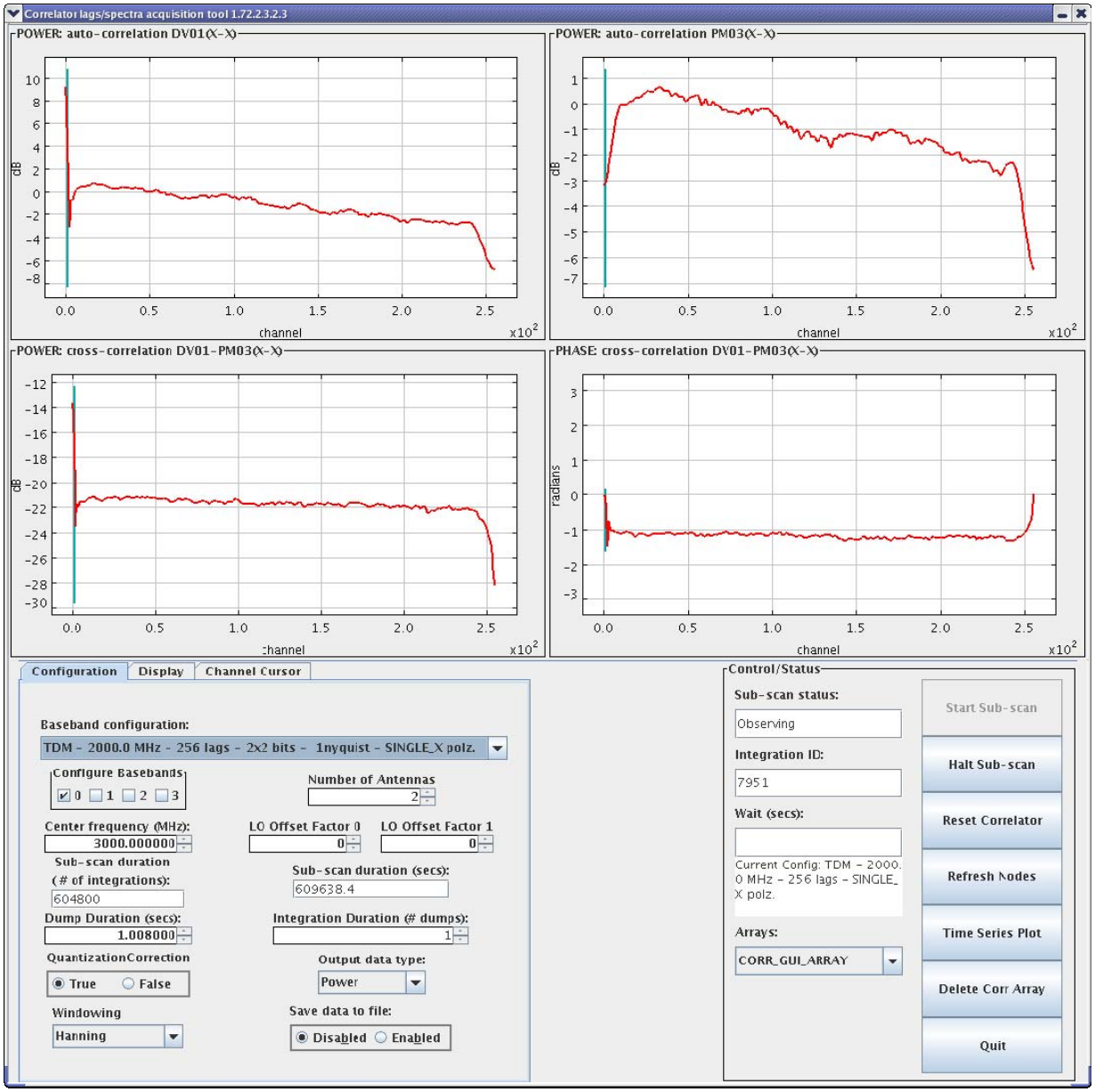
The hardware used included

- the PM03 Melco 12-m antenna,
- the DV01 Vertex 12-m antenna,
- engineering Front Ends (serial numbers #1 and #7 – data taken with Band 3),
- the full production Back End system, which includes LO Photonic Receivers and the Antenna and Data Receiver Articles,
- the 2-antenna test correlator which is a subset of the 64-antenna correlator,
- the OSF version of the laser local oscillator system, which again incorporates most of the key modules that will form the system to be installed at the AOS.

This successful short integration demonstrates full hardware connectivity and functionality. Work continues in CIPT and AIV toward verifying automatic computer control of delay and phase: key components of the target of stable and repeatable interferometry at the OSF.

While these results represent the successful work by almost everyone in the ALMA project, participating directly in the measurement were Joe McMullin, Gene Duvall, Dick Sramek, Darrell Emerson, Peter Napier, Lewis Knee, Norman Saez and Hector Alarcon.

Here is a screen shot of the full correlator output for a single one-second integration:



The top two windows are the spectral shapes of the signals from the two individual antennas. The bottom ones are the phase (right) and cross-correlated power (left), which is a little below one percent of the total. Mars will have been quite well resolved on this baseline.

Particularly encouraging are the flat phase and amplitude as a function of frequency.

Observing details: Center frequency: 104.02 GHz, Source: Mars at RA 00:24:40,
Local time: 11:03:23, LST: 01:07:54, Fringe rate (LO offset): -1.68 Hz,
Visibility amplitude: approx -21.5 dB

DV01 and PM03 pointing at Mars, 30 April 2009