32nd URSI GASS, Montreal, 19-26 August 2017

The NOrthern Extended Millimeter Array (NOEMA)

R. Neri* [(1)] on behalf of the NOEMA project team[(1)]
(1) IRAM, 300 rue de la piscine, F-38406 Saint-Martin-d'Hères, http://www.iram-institute.org

1. Extended Abstract

We report on NOEMA, the largest millimeter/submillimeter-wave interferometer project of the northern hemisphere. With twelve 15-meter antennas, 2SB receivers with 8 GHz IF per sideband and polarization, and baselines up to 1.6 kilometers, NOEMA will offer ten times the sensitivity and four times the spatial resolution that was possible with the Plateau de Bure interferometer. With a budget of 45 million euros, the NOEMA project is managed by IRAM, is based on technology and expertise developed at IRAM, and is funded jointly by the CNRS (France) and the Max-Planck Gesellschaft (Germany).

The NOEMA project is divided into two phases. Phase 1 includes the construction and delivery of four additional antennas to the existing six, the development and installation of dual polarization 2SB receivers for broadband operation (32 GHz) in the 3mm, 2mm and 1mm wavelength bands, and the construction of a broadband correlator with full frequency coverage in each sideband and polarization. The new correlator allows for large spectral surveys with up to 128 high-resolution windows in parallel to providing low-resolution coverage over the full bandwidth (32 GHz), and incorporates FPGA technology to take advantage of flexible correlator configurations. Phase 1 is progressing according to schedule and will achieve completion in 2017. The Phase 2 extension program includes the construction of two additional antennas, the delivery of a second correlator for dual band operation (2x 32 GHz), a receiver upgrade to perform observations at 0.8mm (up to 373 GHz), the possibility to phase up antennas for VLBI experiments, and the baseline extensions to 1.6 km for high contrast imaging down to a spatial resolution of 0.1". Phase 2 is planned to start in 2018 and to achieve completion in 2019.

NOEMA was designed to deliver vastly enhanced observing capabilities for thousands of researchers across the world. The 12-element array will ultimately provide sensitivities close to ALMA, the world's largest millimeter/submillimeter-wave interferometer, and offer high quality imaging capabilities. NOEMA and the IRAM 30-meter telescope together, will provide a unique combination of cutting-edge technology to help researchers address astronomical key questions as those related to the molecular complexity of star- and planet-formation processes in the Milky Way, structure formation and galaxy evolution in the Universe, and along the way help researchers understanding the link between the formation of complex organic molecules in space and the emergence of life on Earth.

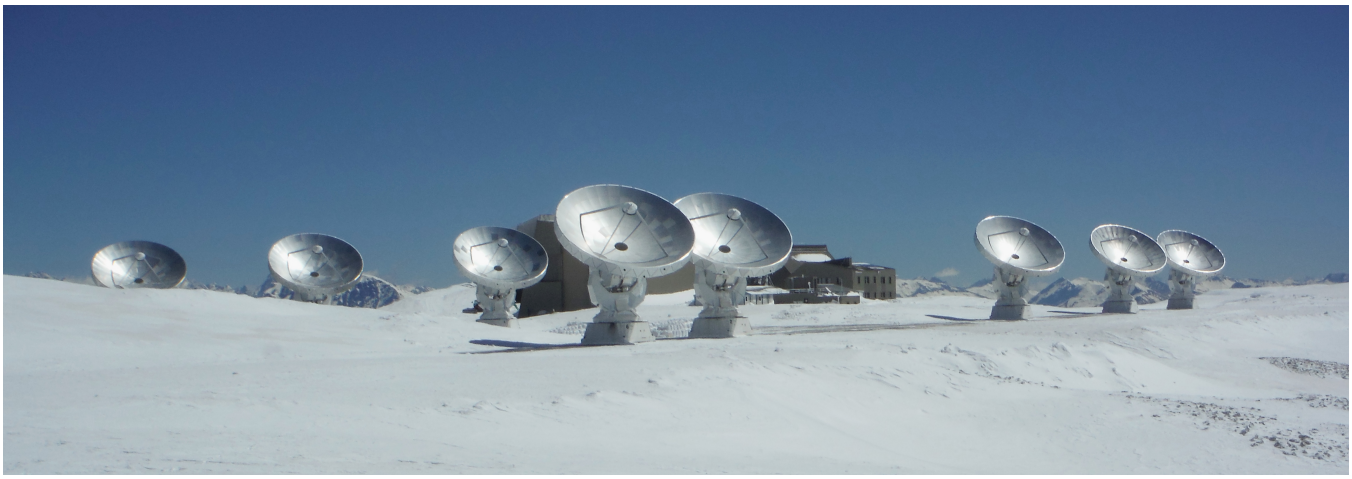

Figure 1. View of the NOEMA observatory as seen from southwest. The antennas are arranged in the most compact configuration of the interferometer. In the background are the hangar and the living quarters. The NOEMA observatory is located in the French Alps at an altitude of 2550 meters above sea level. NOEMA is operated by IRAM, an international research institute supported by the CNRS (France), MPG (Germany) and IGN (Spain).