FACILITIES, EQUIPMENT & OTHER RESOURCES

University of Arizona: Steward Observatory

Steward Observatory (SO) has a large technical staff with many years of experience in the design and construction of state-of-the-art telescopes and instrumentation for use from optical (e.g. MMT, Magellan, and Large Binocular Telescope) to millimeter/submillimeter wavelengths, such as the Heinrich Hertz Telescope (HHT). This expertise will be augmented by Instrument Team members with extensive experience in the development and deployment of terahertz instrumentation during the science operations of HEAT at Ridge A. Given that HEAT is already successfully operating at Ridge A and a successful servicing misson is under our belt, no difficultities in integration and operation are expected.

In 1992, Co-PI Walker established a laboratory (the Steward Observatory Radio Astronomy Laboratory, SORAL) for the development of state-of-the-art submillimeter-wave receiver systems. The PI-Kulesa, was trained in this group. SORAL possess all the equipment (spectrum analyzers, network analyzer's, vacuum pumps, cryogenic support facilities, etc.) needed to maintain HEAT. In addition, the Arizona Radio Observatory utilizes similar equipment both at the 10-meter HHT and in the university ARO laboratory. We also have ^{4}He, ^{3}He, and closed-cycle cryostats, a full receiver testbed, local oscillator sources (including a Coherent/DEOS FIR laser), and an antenna test range which allows us to characterize a wide range of receiver systems. A Kern micromilling machine with 5 micron machining accuracy was purchased for Supercam and is available for precision machining work.

A number of Local Oscillator (LO) units are available for HEAT's HEB receivers. Two units from Virginia Diodes (VDI) at 810 GHz (for [CI]) and 1900 GHz (for [CII]) are available from other concluded efforts and both are capable of pumping broadband spiral-antenna-fed HEB modules.

Two suitable mixers from the STO-2 project could be made available for HEAT as backup mixer modules. These mixers already have the performance needed by this project and have proven themselves in the lab and after STO-2's flight in January 2016, will be maintained for possible future flights.

SORAL has licenses for CST Microwave Studio, Solidworks, and Altium Designer, should they be necessary for the support of HEAT. These programs are used to accurately model and optimize mixers and other crucial receiver components, produce solid models of mechanical structures, and design and simulate electronic circuits. In addition, we have licenses for optical design packages such as Zemax. All of these were used in the design and construction of HEAT and can be brought to bear on optimizing HEAT's science operations, as needed.