Facilities, Equipment, Other

The work described in the UC Berkeley portion of this collaborative proposal will take place at two locations: 1) U. California, Berkeley, 2) NRAO Green Bank, WV.

University of California, Berkeley

The UC Berkeley Radio Astronomy Laboratory (RAL) is located adjacent to the UC Berkeley Astronomy Department. It provides access to digital and radio-frequency test equipment necessary for the detailed characterization and performance testing of components of the antenna feed, the analog system, and the digital correlator. Such items include network analyzers (HP8753, HP8754, E5230A), frequency synthesizers covering all frequencies up to 26 GHz (e.g. Agilent E8247), including multiple at lower bands, digitizing oscilloscopes (e.g. HP54502 and Lecroy 9360), power meters (e.g. Agilent E4418b), spectrum analyzers (e.g. Agilent E4407b), noise generators, RF filters, attenuators, amplifiers, soldering stations, machine tools, and other miscellaneous electronic and general laboratory equipment.

RAL hosts the Simulink/Xilinx System Generator programming environment targeting the Field-Programmable Gate Array processors on which the proposed correlator work is based, and also provides access to several computer-aided design software packages. AutoCAD Inventor is used for three-dimensional mechanical drawings. Optotek MMICAD is used for circuit simulation, Orcad Capture and Altium for circuit design, and Ansys HFSS and Mentor Graphics IE3D are used for electromagnetic simulations.

The RAL has a multiple large laboratory areas on campus that will host the UC Berkeley development activities. It also provides use of an off-site observatory (Leuschner) near the campus, which will host of one of the three small outreach/education arrays budgeted in this proposal. The RAL collaborates with the Berkeley Wireless Research Center and the Space Sciences Laboratory as well as other groups around the Berkeley campus who have additional high-end digital test equipment and software for digital signal processing. These facilities are all made available to members of the UC Berkeley Astronomy Department, the RAL, and the Collaboration for Astronomy Signal Processing and Electronics Research (CASPER).

NRAO Green Bank, West Virginia

The 500 sq. ft. Galford Meadow field station, located on the NRAO Green Bank, WV Observatory site, will be made available to this project, in coordination with on-going PAPER activities at the same location. It houses a work area and sufficient space to deploy additional BAOBAB instrumentation, and includes power, cooling, and internet access. This site is positioned within the National Radio Quiet Zone, and is an ideal venue for very sensitive radio frequency measurements due to its remoteness from large urban areas and its exceptional laboratory infrastructure. A large amount of outdoor space is available adjacent to the station (amid the PAPER antenna array) for the deployment of BAOBAB antennas. Electromagnetic enclosures are used to house all instrumentation to prevent self-interference as well as interference with Observatory telescopes, in strict adherence to the radio emissions control policy of the Observatory's Interference Protection Group (IPG).

In addition to the field station, NRAO will provide access to the Jansky laboratory facilities for work space during deployments, and use of the on-site acechoic chamber and test equipment

for testing all deployed electronics for compliance with RFI regulations. BAOBAB will passively benefit from the routine site maintenance that is already provided in association with the PAPER experiment.