PLANETARY AND SOLAR RADIO EMISSION STUDIES WITH THE LONG WAVELENGTH ARRAY

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Abstract

Sub-arcminute resolution and sub-Jy sensitivity below 100 MHz is now being obtained on a routine basis with the 74 MHz system on the NRAO Very Large Array (VLA). These dramatic improvements result from the development and application of self-calibration and field-based calibration techniques. The VLA 74 MHz breakthrough has inspired an emerging suite of new low frequency instruments, most notably the Long Wavelength Array (LWA), an electronic array planned to operate in the 20–80 MHz frequency range. It will have a collecting area approaching one square kilometer at its lowest operating frequencies, and provide milliJansky sensitivity and a few arcseconds resolution across its observing band. The LWA will surpass, by 2–3 orders of magnitude, the imaging power of previous interferometers in its frequency range, and thus open a window on one of the most poorly explored regions of the electromagnetic spectrum. The LWA's scientific objectives include

1. Planetary and Solar radio emission;
2. The acceleration of particles, from relatively low energy particles accelerated in supernova remnants to the highest energy particles yet detected; and
3. Cosmic evolution, including a search for the first supermassive black holes and the assembly of large scale structure as traced by clusters of galaxies.

Because the LWA will explore such a poorly investigated region of the spectrum, the potential for new discoveries, including new classes of sources or physical phenomena is high. We will present illustrations of the LWA's power for Solar and planetary radio imagine as well as results from the design-and-development phase of the LWA, including a description of ongoing prototyping activities, initial configuration/station studies, and our plans for a staged evolution of the LWA in the southwest U.S.

Basic research in radio astronomy at the Naval Research Laboratory is supported by the Office of Naval Research.

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