The VLA Low Band System: A new tool for Exploring the Low-Frequency Sky, including the Radio Transient Universe

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The VLA to Jansky Very Large Array (hereafter VLA) upgrade resulted in the loss of low-frequency capabilities. The Naval Research Laboratory (NRL) and the National Radio Astronomy Observatory (NRAO) have collaborated to develop new VLA "Low Band" (LB) receivers capable of accessing the frequency range 60 to 480 MHz. Initially, the LB receivers will utilize the existing feeds, increasing the 74 MHz and 330 MHz bandwidths from 1.5 MHz to 16 MHz and 40 MHz to 240 MHz, respectively. The new receiver includes two expansion channels for future broadband feed development. This system will have significant improvement in performance due to lower receiver noise temperature, broader bandwidths, and access to the WIDAR correlator, and should be fully operational and available to the community in 2013.

A proposed follow-on, the Low-Band Commensal (LBC) system, would offer a unique opportunity to continuously survey the low-frequency sky in parallel with normal VLA cassegrain-based microwave observations. The LBC would initially survey at 330 MHz during all regular cassegrain VLA observations, and gradually encompass the range 60 – 480 MHz contingent upon broad-band feed development. Because the LBC system will "always be on", it will be possible to build up a large database of observations which can be mined for a variety of exploratory science. An exciting LBC scientific frontier is radio transients, and we will discuss transient search strategies from sources such as tidal disruption events, flaring magnetars, and merging binary neutron stars.

Any dipole-based array sharing the same sky as the VLA can form a dedicated beam to follow the LBC field-of-view. Two of these well suited for transient observations are the first station of the Long Wavelength Array (LWA1) and the Low Frequency All Sky Monitor (LoFASM). In particular, we will discuss an ongoing program to coincidentally detect radio transients and gravity-wave bursts with LWA1 and the Laser Interferometer Gravitational-Wave Observatory (LIGO) Scientific Collaboration (LSC).