Observing the A-team with the ELWA

Frank K. Schinzel*[1], Paul Demorest[1], Kevin Stovall[1], Jayce Dowell[2], and Greg B. Taylor[2]

[1] National Radio Astronomy Observatory, Socorro, NM 87801, USA
[2] University of New Mexico, Albuquerque, NM 87131, USA

Over the past decade low frequency astronomy has seen a renaissance around the globe. In New Mexico this renaissance began with the first light of the Long Wavelength Demonstrator Array (LWDA) in 2007 at the Very Large Array (VLA). The LWDA was replaced by the first station of the Long Wavelength Array (LWA1) in 2011, an array consisting of 256 cross-polarization dipoles operating in a frequency range of 10 to 88 MHz. In 2016, a second LWA station saw first light, situated at the Sevilleta National Wildlife Refuge, North of Socorro and 70 km northeast of LWA1. In the meanwhile, at the VLA, the low band system was upgraded with a new wide-bandwidth receiver, operating below 1 GHz. This brought both the 4m and the P-band dipoles onto a single band. It has long been known that the 4m band dipoles on the VLA dishes interfered with cm-wavelength observations. Thus a new non-interfering dipole design was implemented, the so-called modified J-pole feeds (MJP), which have now been fully deployed at all 28 VLA antennas and are undergoing commissioning. The operating range of the new 4m band system at the VLA is from about 50 MHz – 88 MHz, while the most sensitive part of the system falls in the upper range of 72–80 MHz. In 2016, leveraging the VLA 4m-band and the two LWA stations, first successful attempts were made combining the two systems in joint interferometric observations, eventually allowing arcsecond resolution imaging at the highest sensitivity in this band. From this the Expanded Long Wavelength Array (ELWA) concept arose.

The combination of existing low-frequency infrastructure will allow early scientific imaging observations at tens of arcsecond in resolution and will provide a platform for development and commissioning of new calibration and imaging algorithms while slowly more LWA aperture array stations are added and longer baselines are incorporated. After demonstration of the feasibility of the ELWA concept, a proposal to the Mid-Scale Innovations Program was awarded in 2018 to make the ELWA available to the community within the next three years. The goal is to provide this mode within the existing VLA observations framework which will allow for scheduling, observing, archiving, and data retrieval no different than from other standard VLA observations. In my talk I will present the current capabilities of this observing mode together with results from ELWA observations during the last VLA A configuration in 2018 of three A-team sources Virgo A, Hydra A, and Taurus A.