The Expanded Long Wavelength Array (eLWA)

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The first station of the Long Wavelength Array (LWA1) is co-located with the Karl G. Jansky Very Large Array (VLA) in New Mexico. The core of this station comprises 256 cross-dipoles with a digital backend providing beam-forming and cross-correlation capabilities operating in the frequency range of 10 – 88 MHz. It has been in operation since 2011 and has produced a wide range of scientific results from pulsar detections, Solar and Jupiter flare studies, as well as ionospheric investigations, including the discovery of radio self-emission from meteor trails.

A second LWA1 like station was constructed during 2015 at Sevilleta National Wildlife Refuge North of Socorro, designated LWA-SV. It allows operation from 3 – 88 MHz with improved analog receivers, together with a newly developed digital backend using a combination of FPGAs and GPUs for beamforming and all-sky imaging. Observations with LWA1 or LWA-SV alone are primarily limited by the longest baselines of 110 m each, which makes them severely confusion limited. To move to resolutions of up to 10 arcseconds and reduce confusion noise from kJy to mJy levels a consortium between University of New Mexico, the National Radio Astronomy Observatory, Virginia Tech, and Harvard/Center for Astrophysics proposed the expanded Long Wavelength Array (eLWA) concept, leveraging existing facilities. Together with the new low frequency capabilities of the VLA, the eLWA will combine the two LWA stations with the new VLA 4-band system to form a single instrument operating commensally with the VLA and LWA stations.

Existing capabilities of LWA stations will be briefly introduced together with an outline for the proposed path of the eLWA as an intermediate step toward a full LWA spread across New Mexico and a commensal 4P-band system at the VLA. The different modes of observations that would be possible by this new instrument will be discussed. Results from the first successful fringe test observations of LWA1 with the VLA will be presented, together with results from commissioning of LWA-SV and fringe tests between LWA stations.