

COSMIC RAY DETECTION FIRMWARE FOR THE UPGRADED OVRO-LWA

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High energy cosmic rays interacting with the atmosphere produce showers of radio emission, and detecting these cosmic rays from the radio showers alone (without relying on particle detector triggers) allows larger samples of events for new population composition studies. Air showers are detected as impulsive events (tens of nanoseconds duration) arriving across an array of antennas. Event detection as well as initial RFI flagging must occur on the FPGAs, in order to save raw time series data. The Owens Valley Long Wavelength Array made self-triggered radio detections of cosmic-ray air showers (Monroe et al. 2019 in prep) using 256 irregularly-spaced dipole antennas with 60 MHz bandwidth centered around 55 MHz and maximum baselines of 1.5 km. Over the next two years, an upgrade to 352 antennas with up to 2.6 km baselines and new signal processing infrastructure will expand the capabilities of the array, including the development of a new observing mode for detecting cosmic ray air showers commensally alongside the other science operations. I will present the preliminary digital signal processing design for the upgraded cosmic ray detection system.