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High energy cosmic ray detections with the standalone radio trigger system at the Owens Valley Radio Observatory Long Wavelength Array

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Radio observations of cosmic ray air showers can characterize cosmic ray mass composition, via precise Xmax measurements, at the energies of the likely shift from Galactic to extragalactic sources. Advantages over other methods include lower cost instrumentation and the ability to operate in a range of weather conditions. However, detecting cosmic rays via their radio emission alone amid radio frequency interference (RFI), without reference to an alternate particle detector, is a significant challenge. The Owens Valley Radio Observatory Long Wavelength Array (OVRO-LWA) cosmic ray detection system uses a multistage RFI rejection process including FPGA and CPU processing to address this challenge and operate in the presence of RFI. The OVRO-LWA is a multi-use array of 352 dual-polarization dipole antennas operating at ˜30—80 MHz. The array recently completed a major upgrade, including the addition of the cosmic ray detection system, which operates simultaneously with the other radio astronomy observing modes. Detections of cosmic ray candidates began in 2024. The dense antenna spacing of the OVRO-LWA offers the opportunity for testing and developing new Xmax reconstruction techniques, such as interferometric reconstruction. This presentation will describe the cosmic ray detection system, present the sample of cosmic ray candidates, and discuss plans for the future.

Collaboration(s)

OVRO-LWA Collaboration

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