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Logarithmic Periodic Dipole Antennas for the Auger Engineering Radio Array

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The Pierre Auger Observatory constitutes the currently largest detector for measurements of ultrahigh energy cosmic rays through extended air showers. Radio signals originating from the shower development have been detected with suitable antennas in the 50MHz regime. The Auger Engineering Radio Array (AERA) is being established to exploit the radio technique at these high energies. The favoured antenna for the first phase of AERA is a logarithmic periodic dipole antenna (LPDA) especially designed to suit the demands of cosmic ray detection at the Auger site. This antenna is characterised by ultra broadband sensitivity in the frequency range

of 30MHz to 80MHz and allows polarisation sensitive measurements of radio signals from all incoming directions. Our characterisation of this LPDA antenna includes careful evaluation of the frequency range obtained by combining wire-based dipoles, stability and weather testing, quality assurance in the mass production process, and a benchmark measurement of the sensitivity obtained with the time dependence of the galactic radio background. For the final setup a fully calibrated radio detection system including antennas, filters and low noise amplifiers is required. We present our approach for this calibration in simulations and measurements.

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