

Radio detection of cosmic rays with LOFAR

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LOFAR is a multipurpose radio telescope which can be used for radio detection of cosmic rays while running astronomical observations at the same time. The core of LOFAR contains 2300 antennas within an area of four square kilometer. This high density makes it an ideal location for a detailed study of the radio signal of extensive air showers in the energy range 10^{16} - 10^{18} eV.

We present the first analyses of high quality LOFAR events for which the lateral distribution of the radio signal can be studied in 2D. For each event dedicated simulation sets for proton and iron primaries have been produced. The radio and particle data are fitted simultaneously to the simulation. The data shows excellent agreement with simulation, indicating that the complicated emission mechanism is now well-understood. Moreover, the depth of the shower maximum (X_{\max}) can be inferred with an accuracy that is comparable to the fluorescence detection technique.

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