

Cosmic Ray Composition between 2 PeV and 2 EeV measured by the TALE Fluorescence Detector

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The Telescope Array (TA) cosmic rays detector located in the State of Utah in the United States is the largest ultra high energy cosmic rays detector in the northern hemisphere. The Telescope Array Low Energy Extension (TALE) fluorescence detector (FD) was added to TA in order to lower the detector's energy threshold, and has succeeded in measuring the cosmic rays energy spectrum down to PeV energies, by making use of the direct Cherenkov light produced by air showers. In this contribution we present the results of a measurement of the cosmic-ray composition using TALE FD data collected over a period of ~4 years. TALE FD data is used to measure the X_{max} distributions of showers seen in the energy range of $10^{15.3}$ - $10^{18.3}$ eV. The data distributions are fit to Monte Carlo distributions of {H, He, N, Fe} cosmic-ray primaries for energies up to 10^{18} eV. Mean X_{max} values are measured for the full energy range. TALE observes a light composition at the "Knee", that gets gradually heavier as energy increases toward the "Second-Knee". An increase in the X_{max} elongation rate is observed at energies just above $10^{17.3}$ eV indicating a change in the cosmic rays composition from a heavier to a lighter mix of primaries.

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Collaboration

Telescope Array

other Collaboration

Subcategory

Experimental Results

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