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Recent measurement of the Telescope Array energy spectrum and observation of the shoulder feature in the Northern Hemisphere

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The Telescope Array (TA) is a hybrid cosmic ray detector deployed in 2007 in Millard County, Utah, USA, which consists of a surface detector of 507 plastic scintillation counters spanning a 700 km^2 area on the ground that is overlooked by three fluorescence detector stations. The High Resolution Fly's Eye (HiRes) experiment is a predecessor of TA, which consisted of two fluorescence detector stations operating from 1997 until 2006 from Dugway Proving Ground, Utah, USA, and which was the the first cosmic ray experiment with sufficient resolution and exposure to successfully observe the Greisen–Zatsepin–Kuzmin (GZK) suppression at $10^{19.75}$ eV. In this work, we present an updated TA energy spectrum result and a joint fit of independent spectrum measurements by the TA surface detector, TA fluorescence detector, and HiRes fluorescence detector to a broken power law function, which exhibits the ankle, GZK suppression, and the new shoulder feature initially seen by the Pierre Auger Observatory in the Southern Hemisphere. HiRes and TA observe the shoulder feature in the Northern Hemisphere at $10^{19.25}$ eV, with a statistical significance of 5.3 standard deviations.

Keywords

cosmic rays; energy spectrum; UHECR; ultrahigh energy;surface detector;telescope array;TA;high resolution fly's eye;HiRes;fluorescence detector; surface detector;

Collaboration

Telescope Array

other Collaboration

Subcategory

Experimental Results

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