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Combined fit above 0.1 EeV to the cosmic-ray spectrum and composition measured with the Pierre Auger Observatory

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We fit the cosmic-ray spectrum measured with the Pierre Auger Observatory's surface detectors above an energy of 10^{17} eV, along with composition information inferred from the depth of shower maximum measured with its fluorescence detectors above an energy threshold of $10^{17.8}$ eV. We consider astrophysical scenarios with two distinct extragalactic source populations: one dominating the flux above a few EeV, and the other dominating at lower energies, with representative nuclei injected at the sources with power-law spectra and rigidity-dependent cutoffs. The high-energy population exhibits a hard source injection spectrum and a relatively heavy composition, while the low-energy population has a softer spectrum and a lighter composition. Extending the fit down to the low energies considered here shows the potential to test the energy region towards the Galactic to extragalactic transition with the data of the Pierre Auger Observatory.

Collaboration(s)

Pierre Auger Collaboration

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