Contribution ID: **48** Type: **not specified**

Energy spectrum and composition constraints on the transition from Galactic to extragalactic cosmic rays

Tuesday 11 October 2016 11:05 (20 minutes)

Current data on the cosmic ray spectrum and composition from the knee to the GZK range provide important information and reveal interesting features, which shed new light about the transition from Galactic to extragalactic cosmic rays. A general description and understanding of this transition it shown to be possible within a simple framework involving only two components, a Galactic one with protons accelerated up to $\sim 10^{17}$ eV, and an extragalactic one, with a maximum energy of the protons rarely exceeding 10ˆ19 eV at the source, and a softer spectrum for protons compared to all heavier nuclei. This latter feature is shown to be expected if the acceleration occurs in an environment with high photon density. We review the main features of this model and show its quantitative agreement with the available data.

Presentation type

oral

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Session Classification: Oct.11AM2