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The knee of the proton spectrum

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Using a LHAASO wide field of view Cherenkov telescope and the ARGO-YBJ resistive plate chamber array as 4300m a.s.l., the energy spectrum of cosmic hydrogen and helium nuclei (H&He) between 100 TeV and 3 PeV is measured. A clear knee feature is observed around 630 TeV in the spectrum with an energy resolution of about 25%. Below 300 TeV, the data from direct charge measurements provide rather precise measurements of fluxes of H, He and other heavier nuclei. In this paper, we discuss the knee feature of the pure proton spectrum indicated by the newly published H&He spectrum. We also estimate the systematic errors of the spectrum measurement with a mixture of nuclei. We propose a way to minimize the systematic error in measurement of the knee feature of the cosmic ray spectrum.

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