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Cosmic Ray Observation at Mount Chacaltaya for beyond the Knee Region

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Abstract content

We have installed a new air shower array at Mount Chacaltaya (5,200m above sea level) to observe primary cosmic rays with energies greater than 10ˆ15 eV. In our previous experiments, we measured energy spectrum and nuclear composition of primary cosmic rays around the knee region. Above all, we obtained the cosmic ray composition with three independent techniques, namely from the equi-intensity cuts, the arrival time distributions of Cherenkov lights associated with air showers, and the lateral distributions of Cherenkov photons around the shower axis. All the results from these experiments are in agreement and show that the average mass of cosmic ray nuclei increases with energies below and above the knee, and dominated by heavier nuclei as iron at 10ˆ16 eV. This result is consistent with the confinement and rigidity dependent acceleration models, and suggests that the cosmic ray origins are supernova remnants of massive population as Wolf-Rayet stars. It is of quite interest whether the mass of cosmic ray nuclei continues to increase with energies, or decreases by contributions of lighter components expected from the extra-galactic cosmic ray models. In this paper, we describe the characteristics of the new array and preliminary results from the first observation.

If this papers is presented for a collaboration, please specify the collaboration

The BASJE Collaboration

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 4 (HE part 1), pages 127-130

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