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Measurement of the cosmic-ray nuclear composition using cherenkov detectors at Mount Chacaltaya

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Cosmic ray nuclear composition has a very important role to reveal the origin of cosmic rays. Especially, composition with energy around knee region must be related to the mechanisms of particle accelerations.

In the BASJE (Borivian Air Shower Joint Experiment) group, we constructed new large air shower array at Mount Chacaltaya (5,200m above sea level) to observe air showers with energies above 10^{15} eV, and has operated since 2010.

In addition, We installed 7 Cherenkov light detectors radially from the center of the air shower array with 50m intervals, and started to measure air shower development by the Cherenkov light emitted from air shower particles.

It is known that the longitudinal development of air shower strongly depends on the type of the primary nucleus, and the Cherenkov light emitted from air shower electrons is closely correlated to the air shower longitudinal development. Actually, we performed a Monte-Carlo simulation of Cherenkov light emissions from air showers and found that primary cosmic ray nuclei types can be distinguished by measuring lateral distributions and arrival timings (waveforms) of Cherenkov lights associated with air showers.

Since 2012, we have started operation of the Cherenkov detectors along with the air shower array. In this paper, we present the characteristics of the new detectors and preliminary results from the first observation.

Collaboration

– not specified –

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