

CHEMICAL COMPOSITION OF PRIMARY COSMIC RAYS WITH ENERGIES AROUND THE KNEE REGION OBSERVED AT MT. CHACALTAYA

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The chemical composition of primary cosmic rays around the knee region has been investigated with an air shower array at Mt. Chacaltaya. In 1987 ~ 1991, we examined observed equi-intensity curves comparing with a Monte Carlo simulation where the primary composition is assumed to be a mixture of protons and Fe nuclei, and obtained the composition of primary cosmic rays as a mixture of two components. Moreover, in 1995 ~ 1997, we made a measurement of air Čerenkov light as well as air shower particles. From an analysis of the arrival time distribution of Čerenkov light, we obtained the composition as a mixture of proton, He, CNO, Si-Mg, Fe groups. Both the results show that the average mass number of primary nuclei, $\langle \ln A \rangle$, gradually increases up to ~ 2 around the knee region and up to ~ 3 around 10^{16} eV. In 1999, we improved our array to lower observable energy of air showers. Furthermore, five detectors are installed in the array to measure the lateral distribution of air Čerenkov light. Now we examine the chemical composition of primary cosmic rays above 5×10^{12} eV more precisely with air Čerenkov light data and a updated equi-intensity curve analysis. This result will be reported.