
A new measurement on the energy spectrum of primary cosmic rays in the energy region $10^{14} - 10^{16}$ eV, with GRAPES-3 experiment

S.K. Gupta¹, Y. Hayashi², Y. Ishida², N. Ito², Atul Jain¹, A.V. John¹, S. Kawakami², H. Kojima³, T. Matsuyama², D.K. Mohanty¹, P.K. Mohanty¹, S.D. Morris¹, T. Nonaka², A. Oshima², K.C. Ravindran¹, M. Sasano², K. Sivaprasad¹, B.V. Sreekantan¹, S. Tamaki², H. Tanaka², S.C. Tonwar¹, K. Viswanathan¹ and T. Yoshikoshi²

(1) *Tata Institute of Fundamental Research, Mumbai 400005, India*

(2) *Graduate School of Science, Osaka City University, Osaka 558-8585, Japan*

(3) *Nagoya Women's University, Nagoya 467-8610, Japan*

(The GRAPES Collaboration)

Abstract

The GRAPES-3 extensive air shower (EAS) array consists of 256 densely packed unshielded 'electron' detectors with inter-detector spacing of only 8 m. The array configuration is hexagonally symmetric. Showers collected during the period, 2000-2002, with a simple trigger requiring only a 3-fold coincidence between signals from detectors from 3 nearby rows, have been analysed for various shower parameters. A shower size spectrum has been constructed using this large data base over the shower size range, 10^5 - 10^7 . The spectral steepening is clearly seen at shower size $\sim 6 \times 10^5$ particles corresponding to primary energy $\sim 3 \times 10^{15}$ eV. Results from detailed Monte Carlo simulations have been used to convert the observed size spectrum to primary cosmic ray energy spectrum. We present here details of the experiment, analysis procedure and the energy spectrum for various assumed models for primary composition at energies $\sim 10^{15}$ eV.