
Search for Correlated Air Showers with GRAPES-2 and GRAPES-3 Arrays

S.C. Tonwar¹, 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, 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

Various scenarios of early Universe have suggested the production of very heavy particles and matter aggregates such as strange quark nuggets with extremely high energies. Some of these objects may disintegrate when passing through the matter and fields in the neighborhood of the Solar system to spray the Earth with a shower of ultra-high ($\sim 10^{14} - 10^{15}$ eV) energy particles. Depending on the mechanism of the break-up, these particles may be incident on the Earth at widely separated locations, initiating air showers which could be detected with shower arrays operating at various places on the Earth.

We have searched for angle and time correlated showers with GRAPES-2 and GRAPES-3 arrays which are operating at Ooty in southern India with a separation of ~ 7 kilometers between them. Both the arrays are very compact with detection energy thresholds of less than 100 TeV. Details of the arrays, search procedures and results to date would be presented at the conference.