

An Extensive Study of Correcting the Non-Linear Particle Density Measured by GRAPES-3 Scintillator Detectors

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SUMMARY

GRAPES-3 experiment is running with ~ 400 plastic scintillator detectors, where a photomultiplier tube (PMT) connected to each detector, operated at relatively high potential around 2000 V. These PMTs exhibits non-linearity and saturation in the observed particle densities. A technique is developed to correct the observed non-linearity and saturation. After correction this could give more reliable findings while shower parameters are to be determined and may give better results for high energy cosmic rays measurements. The technique is developed by using the spectral slope values of each particle density spectrum from each HG-PMT and extrapolated. This extrapolation gives the dependence of corrected density with the uncorrected density. This further gives the two model requirements for correcting the non-linearity and saturation region altogether. This correction technique gives the extended corrected densities ~ 3000 particles. This is also in good agreement with the observed particle densities in extended range by using LG-PMT attached to the same detector.