

CERENKOV-ASSISTED READOUT OF IONIZATION CALORIMETERS FOR SPACE-BASED AND BALLOON-BORNE COSMIC RAY STUDIES

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Calorimeters for energy measurement of cosmic rays are quite limited in the amount of mass that can be used when these devices are deployed in space-based and balloon-borne missions. Therefore it is of primary importance to achieve the physics goals of these experiments that the maximum amount of information is extracted from each event that occurs in the detector. We describe a technique that distinguishes the electromagnetic energy fraction of each shower by detection of Cerenkov light in quartz fibers in addition to the usual ionization readout. The combination of these two readout methods allows event-by-event correction for leakage in thin calorimeters with improvements to resolution that are so far only limited by the amount of light obtained in the quartz, a restriction that should become less important at high particle energies. Results of ground-based beam tests with accelerators and plans for future flight testing of this technique are summarized.