

Scintillation Detector for the Measurement of Ultra-Heavy Cosmic Rays on the Super-TIGER Experiment

Abstract: We discuss the design and construction of the scintillation detectors for the Super-TIGER experiment. Super-TIGER is a large-area (5.4m²) balloon-borne experiment designed to measure the abundances of cosmic-ray nuclei between $Z=10$ and $Z=56$. It is based on the successful TIGER experiment that flew in Antarctica in 2001 and 2003. Super-TIGER has three layers of scintillation detectors, two Cherenkov detectors and a scintillating fiber hodoscope. The scintillation detector employs four wavelength shifter bars surrounding the edges of the scintillator to collect the light from particles traversing the detector. PMTs are optically coupled at both ends of the bars for light collection. We report on laboratory performance of the scintillation counters using muons. In addition we discuss the design challenges and detector response over this broad charge range including the effect of scintillator saturation.