Abstract Submitted
for the DNP13 Meeting of
The American Physical Society

Implementation of a 256-channel aerogel RICH detector JESSE STRYKER, DAVID BLYTH, JASON HOLMES, RICARDO ALARCON, Arizona State University — A ring-imaging Cherenkov (RICH) detector has been constructed with the goal of testing the performance of aerogel tiles in RICH detectors. To test this, we designed a detector that can effectively identify cosmic rays in the range 0.5-2.5 GeV. Imaging is done by the proximity focusing technique, which uses multiple aerogel layers of increasing refractive index. Detection of the Cherenkov light is carried out by an array of flat-panel multi-anode PMTs, positioned along a common axis with the aerogel tiles. Effective particle separation requires low-noise, high quantum efficiency photomultiplier tubes. Four 64-channel Hamamatsu PMTs were chosen, resulting in a 16x16 (10cm x 10cm) detection grid. For each anode, the output charge is stored by its respective charge-integrator circuit. Data are acquired by means of multiplexing the signals from the PMTs. When triggering conditions are satisfied, the integrated charges from all anodes are consecutively digitized by an ADC. Using the ROOT framework, the waveforms for an event are converted into a 2-D array of pulse heights corresponding to the signal from each PMT channel. Relative pulse heights allow for subpixel resolution of the Cherenkov rings, which in turn allows for analysis of the particle and aerogel characteristics.

Jesse Stryker
Arizona State University

Date submitted: 26 Jul 2013 Electronic form version 1.4