Abstract Submitted
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A Novel High Rate Readout System for a High Efficiency Cosmic Ray Veto for the Mu2e Experiment STEN HANSEN, Fermi National Accelerator Laboratory, MU2E COLLABORATION — The Mu2e Cosmic Ray Veto must veto cosmic-ray muons over an area of $335\,m^2$ with an overall efficiency of about 99.99% in the presence of high background rates from beam-induced neutrons and gammas. It consists of 5,376 rectangular scintillator extrusions up to 7 m long with embedded 1.4 mm wavelength-shifting fibers coupled to $2\times2\,mm^2$ silicon photomultiplier (SiPM) diodes. A custom readout system has been designed and prototypes have been built and tested. It consists of: (1) small circuit board, the Counter Mother Board, situated on the ends of the scintillator counters, which provides a bias distribution network, a temperature sensor, flasher LEDs, and passive SiPM pulse shaping; (2) a Front End Board which digitizes, zero-suppresses, and stores in on-board memory signals from up to 64 Counter Mother Boards, provides bias to the SiPMs, pulses to the LEDs, and a measurement of the SiPM currents; and (3) a Readout Controller which collects data from the Front End Boards via Category 6 Ethernet cables, which also deliver 48V power to the Front End Boards using the power over Ethernet standard. The data collected in the controllers is formatted appropriately and transmitted over 3.125 Gb/s optical fibers to the trigger and data acquisition system

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