

Abstract Submitted
for the FWS14 Meeting of
The American Physical Society

Investigation of Self Triggered Cosmic Ray Detectors using Silicon Photomultiplier¹ ADRIAAN KNOX, ROMMEL NIDUAZA, Hartnell Community College student — The inexpensive silicon photomultiplier (SiPM) is a highly sensitive light detector capable of measuring single photons. Since it operates slightly above the breakdown voltage it also exhibits high dark count rates. We describe our investigation of SiPM, the multi-pixel photon counters (MPPC) made by Hamamatsu, as readout detectors for plastic scintillators. We discuss the results of using MPPC scintillation detectors in self triggered mode for detecting cosmic ray particles. Plastic scintillator sheets embedded with blue to green wavelength shifting fibers were optically coupled to the MPPC which detected the scintillation light. Amplified MPPC signals were fed to discriminators, whose output pulse widths were set to 25nsec to minimize random coincidences, and the threshold for passing signal amplitudes was adjusted accordingly to give a reasonable coincidence count rate. Moreover, the detector waveforms were digitized using a 5 Giga sample/second waveform digitizer, the DRS4, and triggered with the coincidence logic to capture the MPPC waveforms. Offline analysis of the digitized waveforms was accomplished using the CERN package PAW. The results of our analysis and its application in a 4 detector cosmic ray array would also be discussed.

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Date submitted: 27 Aug 2014

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