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Investigation of the Effect of Temperature on Silicon Photomultplier for Cosmic Ray Detectors[1] DANIEL RUIZ CASTRUITA, FATIMA RAMIREZ, Hartnell Community College, STEFAN RITT, Paul Scherrer Institute — The silicon photomultiplier (SiPM) is an extremely sensitive light detector capable of measuring very dim light and single photons. Its high gain comes from operating at slightly above the breakdown voltage, which is also accompanied by high dark count rate. At this conference, we describe our investigation of using SiPM, the multipixel photon counters (MPPC) from Hamamatsu, as possible readout detectors in a cosmic ray scintillating detector array. Our investigation, includes implementation of a novel design that automatically adjusts for the bias voltage to the MPPC detectors to compensate for changes in the ambient temperature. We present results in using short pulses as test input waveforms for unity gain amplifiers (TI LMH6559) constructed to maintain the detector signal integrity over long length of cable. Furthermore, we describe our investigations for the MPPC detector characteristics at different bias voltages and temperatures. Our experimental setup consists of a 5 Giga sample/second waveform digitizer, the DRS4, triggered to capture the MPPC detector waveforms, in coincidence with a cosmic ray telescope. Analysis of the digitized waveforms, accomplished using the CERN package PAW, would be presented.

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