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Silicon Photomultiplier charaterization[1] LEONEL MUNOZ, LEO OSORNIO, Hartnell Comm Coll, ADAM PARA, Fermilab — Silicon Photo Multiples (SiPM's) are relatively new photon detectors. They offer many advantages compared to photo multiplier tubes (PMT's) such as insensitivity to magnetic field, robustness at varying lighting levels, and low cost. The SiPM output wave forms are poorly understood. The experiment conducted collected waveforms of responses of Hamamatsu SiPM to incident laser pulse at varying temperatures and bias voltages. Ambient noise was characterized at all temperatures and bias voltages by averaging the waveforms. Pulse shape of the SiPM response was determined under different operating conditions: the pulse shape is nearly independent of the bias voltage but exhibits strong variation with temperature, consistent with the temperature variation of the quenching resistor. Amplitude of responses of the SiPM to low intensity laser light shows many peaks corresponding to the detection of 1,2,3 etc. photons. Amplitude of these pulses depends linearly on the bias voltage, enabling determination of the breakdown voltage at each temperature. Poisson statistics has been used to determine the average number of detected photons at each operating conditions.

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