

# Characterization of Photon readouts and Scintillators for Direct Dark Matter Search

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As a precursor to setting up a Dark Matter (DM) direct search experiment involving scintillators at low temperatures, we have investigated the change in characteristic properties of the photon readout channel. Silicon Photomultiplier (SiPM), known for its high gain, miniature size, and low mass was studied. Leakage current of SiPM was found to have sensitive dependence on the temperature and also a shift in the operating bias was observed. Photon response to a temperature-stabilized light-emitting diode (LED) pulsar was used to study the SiPM bias compensation as a function of temperature, from ambient to about 30 K. We find that the voltage compensation, though reported to be linear within a small temperature range, is fairly nonlinear when operated over such a wide temperature range. Using the voltage compensation data, we have studied the temperature dependence of the light output of some doped and un-doped scintillators which can serve as potential detectors for direct DM search.

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