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P2.45: SiPM characterization for the SBC dark matter search

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In the continuing search for dark matter, new and more complex technologies have been developed with increasing accuracy and background requirements. The Scintillating Bubble Chamber (SBC) detector combines two proven technologies: bubble chambers and liquid argon scintillator experiments. In order to reach the ultimate projected goal, a Seitz threshold of 100eV is required and therefore the scintillation system needs to be well understood.
This system consists of a liquid argon (LAr) scintillator doped with on the order of 100ppm of Xe, with the light collection accomplished using 32 Hamamatsu VUV4 silicon photomultipliers (SiPMs). One of the requirements of the scintillation detection system is the ability to veto single photoelectron (pe) signals. Distinguishing scintillation pe pulses from dark noise and correlated avalanches requires a well understood model of the pe gain, dark noise rate, μ, and the number of correlated avalanches, N_{CA}, as a function of temperature and over-voltage. This talk will discuss the efforts of the SiPM characterization chamber consisting of a temperature-variable RF shield inside a vacuum chamber with 10mK temperature stability from 233K to 293K. A preliminary overview on the analysis to extract the pe gain, breakdown voltage, μ and N_{CA} in a 5us window will also be discussed.

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