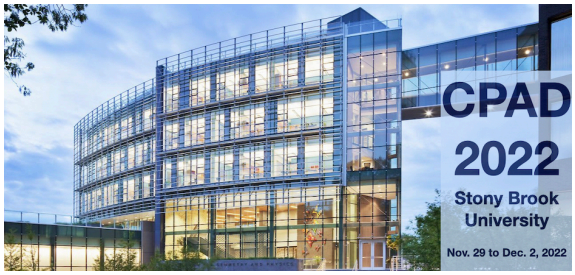

Contribution ID: **22** Type: **Contribution Talk**

Performance of novel VUV-sensitive Silicon Photo-Multipliers for nEXO

Wednesday, 30 November 2022 16:00 (20 minutes)

Liquid xenon time projection chambers are promising detectors to search for neutrinoless double beta decay ($0\nu\beta\beta$), due to their response uniformity, monolithic sensitive volume, scalability to large target masses, and suitability for extremely low background operations. The nEXO collaboration has designed a five-tonne time projection chamber that aims to search for $0\nu\beta\beta$ of \ce{^{136}Xe} with projected half-life sensitivity of 1.35×10^{28}~yr. To reach this sensitivity, the design goal for nEXO is $\leq$1\% energy resolution at the decay Q-value (2458.07 $\pm$ 0.31~keV). Reaching this resolution requires the efficient collection of both the ionization and scintillation produced in the detector. The nEXO design employs Silicon Photo-Multipliers (SiPMs) to detect the vacuum ultra-violet, 175 nm scintillation light of liquid xenon. In this talk, we will show results on the characterization of the newest vacuum ultra-violet sensitive SiPMs by Fondazione Bruno Kessler, the VUVHD3 devices specifically designed for nEXO. We will also present measurements on new test samples of previously characterised Hamamatsu VUV4 Multi Pixel Photon Counters (MPPCs). Various SiPM and MPPC parameters, such as dark noise, gain, direct crosstalk, correlated avalanches and photon detection efficiency were measured as a function of the applied over voltage and wavelength at liquid xenon temperature (163~K). The results from this study are also used to provide updated estimates of the achievable energy resolution at the decay Q-value for the nEXO design.

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