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Large Area SiPMs for Ton-scale $0\nu\beta\beta$

nEXO is a 5 tonne monolithic liquid xenon (LXe) time projection chamber (TPC) planned to search for the neutrinoless double beta decay of Xe-136 with an estimated half-life sensitivity of $\sim 10^{28}$ years at 90% C.L.. Scintillation light from events in the detector will be collected with 4.5 m^2 of Silicon Photomultipliers (SiPMs), which over the last decade have matured substantially and have become a preferred alternative to traditional light detection solutions. Their key features are low radioactive background, single-photon resolution, low bias voltage and geometrically efficient scaling to large areas. In this talk I will discuss techniques that were developed by nEXO to fully characterize the performance of the devices and integrate them into large area arrays that meet stringent requirements in terms of radio-purity and LXe purity. In addition, I will show how more dedicated simulation tools, such as GPU-accelerated ray tracing software, can be powerful in evaluating and optimizing the detector design based on R&D input.

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