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Geometries and PMT Configurations for nEXO Outer Detector Simulations

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The nEXO experiment pursues the goal of observing or verifying neutrinoless double beta decay by placing 5000kg of liquid xenon enriched to 136Xe within a cryostat, and limiting backgrounds as much as possible. To limit the cosmogenic backgrounds, the cryostat is immersed in a large water tank several kilometres underground. Despite these efforts, cosmic muons can still cause reasonable background at this depth, therefore it is important to be able to identify which muons pass close enough to cause detection issues. Some of this can be achieved by tagging cosmic muons passing through the water tank using the ˜125 photomultiplier tubes (PMTs) in order to register the Cherenkov radiation caused by the muons. An important step in building the outer detector (OD) is using simulations to optimize the geometry of these PMT's. This process includes using Fusion 360 to design both realistic and simplified geometry files of various PMT arrangements that are then used in Chroma ray tracing simulations to test their efficiency. In this presentation, we will show these geometries, along with some of the processes and results of the simulations run using them.

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