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Photon Propagation in a Scintillator and How It Affects Light Efficiency TIM RAMOS, ANDREW WHITBECK, Texas Tech University, PHOTON PROPAGATION/LIGHT EFFICIENCY RESEARCH TEAM — Scintillators are materials that have the capability to convert high energy radiation such as beta-particles or gamma rays into visible light. Scintillators have a property such that when these particles strike it, photons are emitted inside the scintillator which can be detected by a photodetector such as a silicon photomultiplier or a photomultiplier tube. The light being produced is called scintillation light. Our work studies the nature of photons moving in a scintillator. We have developed a simulation toolkit for analyzing light collection efficiency with respect to the dimensions of the scintillator, the refractive index of the scintillator, a random line generator (charged particle path), and whether an air gap exists. This poster will present a diagram and flow chart of a python-based numerical simulation of light propagation in a scintillator. We will also present some first-principles calculations and of how light efficiency is collected under certain conditions, which serve as a validation of our simulations. Finally, we will discuss results of polishing actual scintillators and taking light measurements of them.

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