SiPM Simulation Study with GosSiP RONALD MUSSER, AMIT BASHYAL, JOSHUA MEDFORD, YING WUN YVO NG, TIMOTHY WATSON, ANDREW WHITE, JAEHOON YU, University of Texas at Arlington — Silicon Photomultipliers (SiPMs) are photon detection devices that can detect down to single photon events. SiPMs can be an important advancement on typical Photomultiplier Tubes (PMTs) that are used in PET imaging in the medical field and have been used in detectors in high energy particle physics experiments. However, these devices are still relatively new and there is still much to learn about their behavior, in particular under a cryogenic temperature such as that in Liquid Argon Time Projection Chamber. In order to understand SiPMs in detail, this study used simulation software called GosSiP. With GosSiP, the behaviors of various types of SiPMs were examined with variations in multiple characteristic parameters such as photo-detection efficiency (PDE), device gain, crosstalk probability and many others. The information from this study will then be used in future experiments, in particular, the Long Baseline Neutrino Experiment at Fermi National Accelerator Laboratory to examine the optimal coupling of SiPMs with a scintillator inside the Liquid Argon Time Projection Chamber.

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