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A Fast GPU-Enabled Simulation-Based Energy Fitter for SNO+<sup>1</sup> MINJIE LEI, BEN LAND, WILLIAM HEINTZELMAN, JOSH KLEIN, University of Pennsylvania — The PEnergy fitter was developed for SNO+ to provide more accurate event energy reconstruction, achieving energy resolution comparable to the Poisson limit while automatically accounting for detector configuration changes and position-dependent variations in detector response. However, the simulation-based approach that leads to these advantages also adds significant additional computation time. Here, we present PEnergyC, an improved version of PEnergy that utilizes Chroma, a GPU accelerated photon Monte Carlo to speed up the photon tracking process in PEnergy simulations. This approach retains the basic design and functionality of the original fitter, while significantly improves its run time from 50s / 5 MeV event to 2s / 5 MeV event. The same approach can be adopted to improve other important processes that involve significant photon propagation tracing. The design and usage of the new fitter is described, and results of the simulated events fits in LAP/PPO and in water fill of SNO+ are presented and compared with those of the original PEnergy fitter and other conventional energy reconstruction fitters.

<sup>1</sup>A Fast GPU-Enabled Simulation-Based Energy Fitter for SNO+

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