

Abstract Submitted
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Analysis of GEANT4 Physics List Properties in the 12 GeV MOLLER Simulation Framework¹ CHRISTOPHER HAUFE, College of William and Mary, MOLLER COLLABORATION — To determine the validity of new physics beyond the scope of the electroweak theory, nuclear physicists across the globe have been collaborating on future endeavors that will provide the precision needed to confirm these speculations. One of these is the MOLLER experiment - a low-energy particle experiment that will utilize the 12 GeV upgrade of Jefferson Lab’s CEBAF accelerator. The motivation of this experiment is to measure the parity-violating asymmetry of scattered polarized electrons off unpolarized electrons in a liquid hydrogen target. This measurement would allow for a more precise determination of the electron’s weak charge and weak mixing angle. While still in its planning stages, the MOLLER experiment requires a detailed simulation framework in order to determine how the project should be run in the future. The simulation framework for MOLLER, called “remoll”, is written in GEANT4 code. As a result, the simulation can utilize a number of GEANT4 coded physics lists that provide the simulation with a number of particle interaction constraints based off of different particle physics models. By comparing these lists with one another using the data-analysis application ROOT, the most optimal physics list for the MOLLER simulation can be determined and implemented.

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