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Comparisons of pion simulations for the MOLLER experiment[1]
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— The MOLLER experiment at Jefferson Lab will measure the parity-violating asymmetry in Møller scattering, the scattering of electrons from electrons. A precise measurement of this parity-violating asymmetry will allow us to determine the weak charge of the electron with a precision that improves over the E158 experiment at SLAC. The experiment will scatter electrons from a 11 GeV beam from atomic electrons in a liquid hydrogen target. The detected particles will include inelastically produced pions, which will be a background to our measurements. In this work we investigate the validity and accuracy of two available pion physics models in order to estimate the uncertainty in the size of the pion background in the simulation. Currently there are two methods of pion models implemented. The LUND model is based on the Pythia event generator and has been used with success in simulations for the SoLID experiment. The Wiser model is based on data from previous pion scattering experiments. Comparison of the rates, cross sections, particle momentum, scattering angles, and other parameters show that both models produce consistent results for the parameters that were studied in this work, within the range of energies and scattering angles of interest to the MOLLER experiment.

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