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Sensitivity of the Reaction Cross Section Calculation in the Glauber Theory Framework to the Parameters of Random Number Generation JOHN WILSON, Western Kentucky University — To extract the nuclear size information, the experimentally measured interaction cross-section is compared to cross-sections calculated in the framework of Glauber theory or in its various approximations. These calculations are usually performed using a Monte Carlo technique. In the presented paper, we discuss the sensitivity of the reaction and interaction cross sections' calculation to the parameters of the Metropolis-Hasting algorithm which is used to produce nucleon coordinates distributed according to the chosen nuclear density distribution. We evaluate generated sequence of the random nucleon coordinates using lag-1 autocorrelation, correlation of multiple data sets, and running first and second moments. We show that an non-optimal Metropolis-Hasting proposal distribution increases uncertainty of the cross section calculation. The obtained dependence of the accuracy of the determined nuclear density parameters on the various statistical diagnostics of the Metropolis-Hasting for the various types of nuclear density distributions is also discussed.

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