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Optimization of MCMC algorithm for the calculation of interaction and reaction cross sections in the Glauber Theory framework JOHN WILSON, IVAN NOVIKOV, Western Kentucky University — To extract various parameters of a nuclear density distribution, the experimentally measured interaction cross-section is compared to cross-sections calculated in various theoretical approaches. The calculation of the interaction and reaction cross-section in the Glauber Theory framework are usually performed using a Monte Carlo technique. In the presented paper, we discuss the accuracy of the Markov Chain Monte Carlo (MCMC) approach to calculating the interaction and reaction cross-sections. Using various statistical diagnostics, we evaluate the "quality" of the random numbers generated by the Metropolis-Hastings algorithm which are utilized to calculate the cross-sections. The dependence of the accuracy of the determined nuclear density parameters on the "quality" of the Markov chains was obtained for the Woods-Saxon density distribution and the harmonic oscillator (OH) density distribution.

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