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Multiple-scattering effects in nucleus-nucleus reactions with Glauber theory SHINYA HATAKEYAMA, Department of Physics, Hokkaido University, Sapporo 060-0810, Japan, SHUICHIRO EBATA, Meme Media Laboratory, Hokkaido University, Sapporo, 060-0813, Japan, WATARU HORIUCHI, MASAAKI KIMURA, Department of Physics, Hokkaido University, Sapporo 060-0810, Japan
— A study of new unstable nuclei has become possible in new radioactive beam facilities. In order to understand the relationship between reaction observables and nuclear structure, we need reaction theory which exactly reflects the nuclear structure. The Glauber theory is a powerful tool of analyzing high energy nuclear reactions. The theory describes the multiple scattering processes, whereas the optical limit approximation (OLA), which is widely used, ignores those processes. Those effects are expected to play an important role in the nuclear collision involving unstable nuclei (see for example Phys. Rev. C **54**, 1843 (1996)). Here we apply the Glauber theory to nucleus-nucleus reactions. The wave functions are generated by the Skyrme-Hartree-Fock method and are expressed in a Slater determinant that allows us to evaluate the complete Glauber amplitude easily. We calculate total reaction cross sections, elastic cross sections and differential elastic cross sections for $^{16\sim24}$O, $^{40\sim70}$Ca, ^{56,58}Ni, $^{100\sim140}$Sn, $^{190\sim214}$Pb on proton, ^{4}He, ^{12}C targets and compare with experimental data. The Glauber theory gives much better description than the OLA, especially at larger scattering angles.

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