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Corrections to the eikonal description of elastic scattering and breakup of halo nuclei

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In the mid-80s, the development of Radioactive-Ion Beam (RIB) has enabled the study of nuclei away from stability. Indeed, these very short-lived nuclei cannot be studied through usual spectroscopic techniques but information about their structure can be deduced from reaction measurements. To conduct a precise analysis, an accurate reaction model coupled to a realistic description of the nuclei are required. The eikonal model provides reliable results at high enough energies, i.e. above 60A MeV, while having a short computational time. Since facilities, such as HIE-ISOLDE at CERN and ReA12 at MSU, aim to accelerate RIBs up to 10A MeV, extending the range of validity of the eikonal model to these energies would be of great interest. In this work, we study two corrections to the eikonal model in the framework of elastic scattering and breakup reactions of halo nuclei. These corrections improve the treatment of the Coulomb and nuclear interactions during the collision. The first is based on a semi-classical approach [1,2] while the second combines the partial-wave expansion and the eikonal model [3]. Considering the case of the one-neutron halo projectile 11Be impinging on a 12C target at 10A MeV, we show that both corrections lead to elastic scattering cross sections in excellent agreement with full CDCC calculations. The extension of these corrections to breakup observables seems, however, less successful. By showing the success and limitations of these corrections, we pinpoint more precisely the flaws of the eikonal approximation at low energy. This will hopefully pave the way towards a more efficient correction to the eikonal model at such energies.

[1] C. E. Aguiar, F. Zardi, and A. Vitturi, Phys. Rev. C 56, 1511 (1997).
[2] C. Hebborn and P. Capel, Phys. Rev. C 96, 054607 (2017).
[3] J. M. Brooke, J. S. Al-Khalili, and J. A. Tostevin, Phys. Rev. C 59, 1560 (1999).

Summary

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