

A Systematic Study of Elastic Proton-nucleus Scattering

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The aim of this study is to develop a state of the art tool to disentangle proton and neutron densities in exotic nuclei from hadron (proton and neutron mainly) scattering observables, and the extension to charge-exchange reactions. We start by folding of the nuclear densities with effective (OBE) NN interaction to describe scattering observables, via an optical potential [1]. This has been shown to be suitable for kinetic energies in the range of 20 MeV to 1 GeV per nucleon, but has not been tested for exotic nuclei, which may have non standard nuclear densities (halos, etc). We examine uncertainties associated with the choice of the effective NN interaction and improve on the treatment of nuclear corrections, such as Pauli blocking. We would provide with reasonable models for the nuclear densities [2] when predictions of scattering observables are needed and study how a combination with electron scattering (conventional and parity violating [3]) can constrain neutron and proton densities derived from hadron-nucleus scattering.

References

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