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Nucleon-induced cross-section predictions for deformed nuclei off-stability[1] GUSTAVO NOBRE, Brookhaven National Laboratory, MARC DUPUIS, STEPHANE HILAIRE, CEA/DAM, France, DAVID BROWN, Brookhaven National Laboratory, KAYLA CLEMENTS, University of Florida — Many applications such as astrophysics, nuclear waste management and reactor physics require cross sections and reaction rates that are either unknown or have a scarce availability of experimental data. Therefore, a more predictive approach is needed, encompassing the adoption of more fundamental structure models in the reaction calculations. The strong static deformations of such nuclei off stability limits the reliability of extrapolated global optical model potentials. In this work we address these issues for neutron-induced reactions by extending an adiabatic model that has already been successfully applied to stable deformed rare-earth nuclei to all of their known isotopes off stability. To obtain reliable values for quadrupole and hexadecapole deformation parameters in the cases where such measurements are impractical (or even impossible) we use microscopic Hartree-Fock-Bogoliubov calculations of nuclear densities using the Gogny D1S force, from which observables such as transition probabilities and deformation parameters can be extracted. With this method we were able to obtain reliable cross-section predictions for the whole rare-earth region, from neutron to proton driplines. We also investigate the consistent applicability of this approach to proton-induced reactions.

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