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Adiabatically describing rare earths using microscopic deformations[1] GUSTAVO NOBRE, National Nuclear Data Center, Brookhaven National Laboratory, MARC DUPUIS, CEA, DAM, DIF, Arpajon, France, MICHAL HERMAN, DAVID BROWN, National Nuclear Data Center, Brookhaven National Laboratory — Recent works showed that reactions on well-deformed nuclei in the rare-earth region are very well described by an adiabatic method. This assumes a spherical optical potential (OP) accounting for non-rotational degrees of freedom while the deformed configuration is described by couplings to states of the g.s. rotational band. This method has, apart from the global OP, only the deformation parameters as inputs, with no additional fitted variables. For this reason, it has only been applied to nuclei with well-measured deformations. With the new computational capabilities, microscopic large-scale calculations of deformation parameters within the HFB method based on the D1S Gogny force are available in the literature. We propose to use such microscopic deformations in our adi- abatic method, allowing us to reproduce the cross sections agreements observed in stable nuclei, and to reliably extend this description to nuclei far from stability, describing the whole rare-earth region. Since all cross sections, such as capture and charge exchange, strongly depend on the correct calculation of absorption from the incident channel (from direct reaction mechanisms), this approach significantly improves the accuracy of cross sections and transitions relevant to astrophysical studies.

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