

Perturbative refit of Skyrme parametrization with nuclear tensor for fission calculations

Interest on the impact of nuclear tensor force on nuclear properties has been on the rise in the past decade. Within the Skyrme mean-field framework, some new parametrizations have been proposed. Among them are the SLy5+tensor (SLy5+T) [1] and SIII+tensor (SIII+T) [2] in which tensor term was added perturbatively. In another work of Ref. [3], a family of TIJ Skyrme parametrization was introduced whereby all coupling constants entering the energy-density-functional (EDF) were refitted. The impact of nuclear tensor on nuclear properties have also been extensively explored in other studies for e.g. [4, 5] using Skyrme interaction and [6, 7] using the Gogny interaction. On the other hand, the impact of nuclear tensor in fission process is rather limited. To the best of our knowledge, there are two studies by [8] and [9] within the Fayans and Gogny EDF, respectively. We, on the other hand, chose to investigate the impact of nuclear tensor on fission barriers within a Skyrme-Hartree-Fock-plus-BCS framework. Some parametrizations were proposed in which the nuclear tensor component was perturbatively added on top of the SkM* parametrization usually used for fission calculations. A refit of the spin-orbit coefficient was also considered. In this talk, I will share current findings on the performance of these parametrizations on ground-state properties of some plutonium isotopes and fission barriers of ^{240}Pu .

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Field of your work

Theoretical nuclear physics

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