

CHARGE EXCHANGE NUCLEAR EXCITATIONS AND BETA DECAY WITHIN THE SELF CONSISTENT DEFORMED QRPA

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Spin-isospin nuclear excitations play a crucial role in astrophysics where they govern beta-decay, electron and neutrino capture processes, hence stellar evolution and nucleosynthesis. These excitations are studied here within the fully self-consistent proton-neutron quasiparticle random-phase approximation using the finite-range Gogny interaction [1]. Axially symmetric deformations are consistently taken into account, both in the description of the ground states and spin-isospin excitations. We focus in particular on the Gamow-Teller excitations. A comparison of the predicted strength distributions to the existing experimental data is presented and the role of nuclear deformation analyzed.

The Gamow-Teller strength is used to estimate the beta-decay half-life of nuclei for which experimental data exist. A satisfactory agreement with experimental half-lives is found and justifies the additional study of the exotic neutron-rich $N=82$, 126 and 184 isotonic chains of relevance for the r-process nucleosynthesis. We also show the comparison between our theoretical predictions and the experimental half-lives for the much studied isotopic chains of Kr, Sr, Zr and Mo which are strongly deformed.

[1] *M. Martini, S. Péru, S. Goriely, Phys. Rev. C 89, 044306 (2014).*