Contribution ID : **27** Type : **not specified**

Beyond mean-field description of exotic structure and decay of proton-rich nuclei in A near 70 region

Wednesday, 23 February 2011 12:20 (40)

The interest for the investigation of the proton-rich medium mass nuclei exceeds the frontier of nuclear structure and dynamics. Apart from displaying some rather interesting nuclear structure effects, the superallowed $0^+ \longrightarrow 0^+$ Fermi β decay of these nuclei is a valuable tool in probing many properties of the weak interaction. Nuclei at or near the N=Z line are of particular interest as micro-laboratory for high precision tests of the Standard Model. The isospin symmetry breaking is also responsible for the mirror energy differences induced by electromagnetic and charge-dependent strong interactions. Anomalies have been experimentally identified in the excitation energy of the analog states in the A≅70 mass region. The properties of these nuclei are important for the rp process and the understanding of the nucleosynthesis. The simulation of many astrophysical objects requires the knowledge of properties and decay rates of nuclei near the proton drip line. Relevant for the Gamow-Teller (GT) beta decay of the waiting point nuclei could be the GT strength distributions for the low-lying excited states whose thermal population may result in a significant reduction of the effective lifetime at the high temperatures of X-ray bursts. Shape coexistence and mixing, isospin mixing, significant neutron-proton pairing correlations competing with the like-nucleon ones, and competition between proton and neutron alignment have been identified as the main characteristic features of nuclei near the N=Z line in the A≅70 mass region. The self-consistent treatment of exotic phenomena dominated by their interplay represents a challenge for the nuclear many-body models. Presently, the realistic description of tiny effects in this mass region aiming to testing the fundamental interactions and symmetries as well as the required theoretical predictions concerning the nuclear properties relevant for astrophysical scenarios are still open problems. We shall present a self-consistent description of coexistence phenomena in the A≅70 region within the beyond mean-field complex Excited Vampir variational approach using realistic effective interactions in large model spaces and the mentioned problems will be illustrated.

Summary

Primary author(s) : PETROVICI, Alexandra (National Institute for Physics and Nuclear Engineering)

Presenter(s) : PETROVICI, Alexandra (National Institute for Physics and Nuclear Engineering)

Session Classification : Wednesday February 23rd, 2011. 11:40 - 14:00