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Beyond mean-field approach to shape coexistence phenomena in the A= 60-90 region

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The investigation of shape coexistence phenomena dominating the structure of A= 60 - 90 nuclei requires the framework of beyond mean-field approaches.
We use the {\it complex} Excited Vampir variational approach to describe self-consistently the properties of proton-rich nuclei in this mass region.
We study dynamical aspects of exotic nuclear structure using realistic effective interactions and rather large model spaces.
Large scale beyond mean-field calculations accounting the properties of experimentally accessible nuclei allow to predict characteristics that are beyond the experimental reach. Recent interesting results include the anomalous behaviour of Coulomb energy differences (CED) for the mass A=70 compared with CED evolution for A$\simeq$ 80 nuclei, predictions concerning shape isomers and the influence of their Gamow-Teller β decay on the half-life of the waiting point nuclei in the X-ray bursts environment, and the importance of the model space within a self-consistent large scale calculation of the Gamow-Teller strengths.

Summary

We present a self-consistent variational treatment of coexistence phenomena dominating the structure and dynamics of proton rich nuclei in the A= 60-90 mass region within the {\it complex} Excited Vampir approach.
Shape coexistence and mixing, isospin mixing, competition between neutron-proton and like-nucleon pairing correlations are responsible for exotic phenomena in medium mass nuclei near the N=Z line. The self-consistent treatment of exotic structure and decay dominated by their interplay is still an open problem.
Results include: Coulomb energy differences for pairs of analog nuclei with A=70, 82, 86 up to medium spins, predictions on the influence of possible shape isomers in ^{68}Se on the half-life in the X-ray bursts environment, discussion on the 'quenching' issue within a beyond mean-field approach.

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