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Nuclear Structure studies at the borders of stability

We have performed theoretical calculations to describe the structure of nuclei at the extremes of stability, using the nonadiabatic quasiparticle approach. We reproduce the experimental half-life for proton radioactivity in 121Pr assuming J =7/2- as decaying state, showing for the first time clear evidence for partial rotation alignment in a proton emitting nucleus1.
Recent findings suggest the departure from axial deformation in the region of proton emitting nuclei. Our calculation for 145Tm3, giving the energy spectra of parent and daughter nuclei, half-life and fine structure, confirmed a large triaxiality. Similarly, we have studied decay of 141Ho 2, the only known nucleus for which fine structure in proton emission from both ground and isomeric states was observed. The interpretation of the data pointed out to the breaking of axial symmetry in this emitter.
The present studies provide new theoretical tools to access nuclear
structure properties far from the stability domain.
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