Relativistic Hartree-Bogoliubov Description of the Deformed Ground-State Proton Emitters

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Ground-state properties of deformed proton-rich odd-Z nuclei in the region $59 \leq Z \leq 69$ are described in the framework of Relativistic Hartree Bogoliubov (RHB) theory. One-proton separation energies and ground-state quadrupole deformations that result from fully self-consistent microscopic calculations are compared with available experimental data. The model predicts the location of the proton drip-line, the properties of proton emitters beyond the drip-line, and provides information about the deformed single-particle orbitals occupied by the odd valence proton.

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Relativistic Hartree-Bogoliubov Description of the Deformed N = 28 Region

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Ground-state properties of neutron-rich $N \approx 28$ nuclei are described in the framework of Relativistic Hartree Bogoliubov (RHB) theory. The model uses the NL3 effective interaction in the mean-field Lagrangian, and describes pairing correlations by the pairing part of the finite range Gogny interaction D1S. Two-neutron separation energies and ground-state quadrupole deformations that result from fully self-consistent RHB solutions, are compared with available experimental data. The model predicts a strong suppression of the spherical $N = 28$ shell gap for neutron-rich nuclei: the $1f7/2 \to fp$ core breaking results in deformed ground states. Shape coexistence is expected for neutron-rich Si, S and Ar isotopes.
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Relativistic Mean Field Approach and the Pseudo-Spin Symmetry

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Based on the Relativistic Mean Field (RMF) approach the existence of the broken pseudo-spin symmetry is investigated. Both spherical RMF and constrained deformed RMF calculations are carried out employing realistic Lagrangian parameters for spherical and for deformed sample nuclei. The quasi - degenerate pseudo-spin doublets are confirmed to exist near the fermi surface for both spherical and deformed nuclei.

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