The Pseudo-Spin Symmetry in Realistic Nuclei

J. Meng[a], S. Yamaji[a], A. Arima[a], K. Sugawara-Tanabe[b], and P. Ring
[a] Cyclotron Laboratory, RIKEN, Hirosawa 2-1, Wako-shi Saitama, 351-01 JAPAN
[b] Otsuma Women's University, Tama, Tokyo 206,Japan

Based on the Dirac equation, the mechanism behind the pseudo-spin symmetry is studied. In the lower component of the Dirac equation, the quality of the pseudo-spin symmetry is shown to be conneted with the competition between the centrifugal barrier and the pseudo-spin orbital potential, which is mainly decided by the derivative of the difference between the scalar and the vector potential. Based on the standard Relativistic Mean Field (RMF) theory, the pseudo-spin symmetry and its energy dependence in realistic nuclei is discussed.

submitted to Phys. Rev. Lett.

The RPA Strength Function in the Presence of Thermal Fluctuations

R. Rossignoli[a] and P. Ring
[a] Departamento de Física, Universidad Nacional de La Plata, C.C.67, 1900 La Plata, Argentina

A fully microscopic derivation of the RPA strength function at finite temperature in the presence of thermal fluctuations is presented, starting from the path integral representation of partition function and the ensuing static path approximation. The treatment of repulsive terms in the interaction and the strength for zero energy are also examined. Comparison with exact results in a solvable model indicates that a good description of the energy weighted moments of the strength function is obtained, particularly in transitional regions, where the improvement over conventional thermal RPA results is significant.

submitted to Nucl. Phys. **A**

A New Parameterization for the Lagrangian Density of Relativistic Mean Field Theory

G. A. Lalazissis, J. König, and P. Ring

A new parameterization for an effective non-linear Lagrangian density of relativistic mean field (RMF) theory is proposed, which is able to provide a very good description not only for the properties of stable nuclei but also for those far from the valley of beta-stability. In addition the recently measured superdeformed minimum in the ^{194}Hg nucleus is reproduced with high accuracy.

published in Phys. Rev. **C55** (1997) 540-543

Proton Drip-Line Nuclei in Relativistic Hartree-Bogoliubov Theory

D. Vretenar[a], P. Ring, and G. A. Lalazissis[b]
[a] Physics Department, Faculty of Science, University of Zagreb, Croatia
[b] Department of Theoretical Physics, Aristotle University of Thessaloniki, Greece

Ground-state properties of spherical even-even nuclei $14 \leq Z \leq 28$ and $N = 18, 20, 22$ 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. Binding energies, two-proton separation energies, and proton *rms* radii that result from fully self-consistent RHB solutions are compared with experimental data. The model predicts the location of the proton drip-line. The isospin dependence of the effective spin-orbit potential is discussed, as well as pairing properties that result from the finite range interaction in the *pp* channel.

submitted to Phys. Rev. **C**