



Contribution ID: 80

Type: Poster

Isospin dependence of Spin-Orbit splitting in relativistic and non-relativistic density functionals.

Thursday, 3 September 2015 16:30 (1h 30m)

One of the most important advantages of relativistic mean-field (RMF) models in nuclear physics is the fact that the large spin-orbit (SO) potential emerges automatically from the inclusion of Lorentz-scalar and -vector potentials in the Dirac equation [1]. It is therefore of great importance to compare the results of such models with those of non-relativistic models and with experimental data. In a recent experiment by Burgunder et al. [2] the isospin dependence of the level splitting between spin-orbit partners has been studied by (d,p) transfer reactions in several isotones with neutron number $N=21$. Inspired by this work we carried out an investigation following the self consistent approach of relativistic and non-relativistic energy density functionals describing these nuclei, in particular ^{40}Ca , ^{36}S and ^{34}Si . Concentrating on the first $7/2^-$, $3/2^-$, $1/2^-$ and $5/2^-$ neutron states, we calculate the SO splittings of the $2p$ and the $1f$ orbitals and compare them with the respective experimental results. Our first approach is to calculate the single particle energies using a Relativistic Hartree Bogolyubov code based on several modern nonlinear and density dependent covariant density functionals with various pairing schemes. In the second step we use several non-relativistic Skyrme and Gogny functionals to investigate the energy splitting for the same levels. Finally we study the influence of tensor forces and of particle vibrational couplings on these spin-orbit splittings.

Primary authors: KARAKATSANIS, Konstantinos (Department of Physics, Aristotle University Thessaloniki, Greece); Prof. RING, Peter (Physics Department, Technical University Munich, Garching, Germany)

Co-authors: Prof. LITVINOVA, Elena (Department of Physics, Western Michigan University, Kalamazoo, USA); Prof. LALAZISSIS, Georgios (Department of Physics, Aristotle University Thessaloniki, Greece)

Presenter: KARAKATSANIS, Konstantinos (Department of Physics, Aristotle University Thessaloniki, Greece)

Session Classification: Poster