Contribution ID: **168** Type: **Invited Talk - Parallel Session**

Self-consistent description of deformed proton drip-line nuclei

Thursday, 25 June 2015 17:25 (25 minutes)

Click here to download the template: <a href="https://agenda.infn.it/materialDisplay.py?mater Word , <a href="https://agenda.infn.it/materialDisplay.py?materialId=2&confId=5235">Lat

Lidia S. Ferreira1, Enrico Maglione2 and Peter Ring3
1 CeFEMA, and Departmento de Fisica,
Instituto Superior Tecnico, Universidade de Lisboa,
Av Rovisco Pais, 1049 001, Lisboa, Portugal
2 Dipartimento di Fisica e Astronomia \G. Galilei",
Via Marzolo 8, I-35131 Padova, Italy
and Istituto Nazionale di Fisica Nucleare, Padova, Italy
3Physik-Department der Technischen Universitat Munchen, D-85748 Garching, Germany l
Contact e-mail:fidia@ist.utl.pt

Covariant density functional theory (CDFT) has provided a framework to develop successful microscopic descriptions of nuclear structure[1]. An important feature of these relativistic meanfield approaches, relies on the fact of requiring only a small number of parameters adjusted to reproduce bulk properties of finite nuclei since they are derived from Lorentz invariant density functionals that consistently connect the spin and spatial degrees of freedom in the nucleus. They are valid over the entire periodic table, and have successfully been able to describe ground state properties in finite spherical and deformed nuclei over the entire nuclear chart, from light nuclei to super-heavy elements, and from the neutron drip line where halo phenomena are observed to the proton drip line. Single particle configurations and spectroscopic factors have also been successfully derived for nuclei at the limits of stability.
Applications to exotic decays have also been presented [2]. Fully self-consistent relativistic description of proton emission from spherical nuclei, based on relativistic density functionals derived from meson exchange and point coupling models, reproduced well the experimental data and could identify the existence of correlations and configuration mixing effects.
We have generalize our model, and performed a fully relativistic self-consistent calculation to describe decay from deformed nuclei. The proton wave function was obtained exactly from the solution of the Dirac equation in a deformed mean field, with outgoing wave boundary condition, therefore, with the correct asymptotic behaviour. The experimental data was reproduced, and the nuclear structure properties of the emitter identified.
In this work, the theoretical procedure will be presented, and the comparison with the data discussed.

1. D. Vretenar, A. V. Afanasjev, G. A. Lalazissis, and P. Ring, Phys. Rep. 409 (2005) 101.
2. L. S. Ferreira, E. Maglione, and P. Ring, Phys. Lett. B 701 (2011) 508.

Primary authors: Prof. MAGLIONE, Enrico (Dep Fisica, Univ Padova); Prof. FERREIRA, Lidia S. (CeFEMA, Dep Fisica, IST, Univ Lisboa, Portugal); Prof. RING, Peter (Dep Fisica, Univ Munchen)

Presenter: Prof. FERREIRA, Lidia S. (CeFEMA, Dep Fisica, IST, Univ Lisboa, Portugal)

Session Classification: Reactions and Structure - Unstable Nuclei

Track Classification: Reactions and Structure - Unstable Nuclei