Contribution ID: **39** Type: **not specified**

Equation of State for Neutron Stars based on a microscopic energy density functional : from the outer crust to the core

Wednesday, 26 March 2014 17:00 (20 minutes)

Within a microscopic approximation the structure of Neutron Stars is usually studied by modelling the homogeneous nuclear matter of the core by a suitable Equation of State, based on a many-body theory, and the crust by a functional based on a more phenomenological approach. We present here the first calculation of Neutron Star overall structure by adopting for the core an Equation of State derived from the Brueckner-Hartree-Fock theory [1] and for the crust the so-called Barcelona-Catania-Paris-Madrid (BCPM) Energy Density Functional which is based on the same Equation of State, and which is able to provide accurately the binding energy of nuclei throughout the mass table [2]. The outer core is treated in the standard manner with the nuclear masses computed at the Hartree-Fock plus BCS level. The inner crust calculation is performed in the Wigner-Seitz approximation using the self-consistent Thomas-Fermi method, which is able to describe not only spherical droplets but also pasta configurations such as rods, slabs and spherical and cylindrical bubbles. Preliminary results about this new microscopic Equation of State have been reported in Ref. [3].

[1] M. Baldo, C. Maieron, P. Schuck and X. Vinas, Nucl. Phys. A736, 241 (2004).
[2] M. Baldo, L. Robledo, P. Schuck and X. Vinas, Phys. Rev. C87, 064305 (2013).
[3] M. Baldo, G. F. Burgio, M. Centelles, B. K. Sharma and X. Vin˜as, arXiv 1308.2304, to be published in Phys. Atom. Nucl.

Primary author: Prof. VINAS, Xavier (Universitat de Barcelona)

Co-authors: Dr SHARMA, B K (Universitat de Barcelona); Dr BURGIO, Fiorella (INFN Sezione di Catania); Dr BALDO, Marcello (INFN Sezione di Catania); Dr CENTELLES, Mario (Universitat de Barcelona)

Presenter: Prof. VINAS, Xavier (Universitat de Barcelona)

Session Classification: Evening session - Parallel B