

PHAROS Conference 2019: the multi-messenger physics and astrophysics of neutron stars



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A new zero and finite temperature EOS for nucleonic and hyperonic matter from microscopic calculations

I will report on the calculation of a new equation of state (EOS) derived from Chiral Effective Field Theory (ChEFT) for nucleonic and hyperonic matter. A new feature of this EOS is the inclusion in a consistent way of the effect of hyperonic three-body forces.

I will focus in particular on the three-body force originating from the interaction between two nucleons and a Λ -hyperon ($NN\Lambda$). Such interaction has been recently derived in the framework of ChEFT at next-to-leading order (NLO). Using the many-body non relativistic Brueckner-Hartree-Fock (BHF) approach, I will discuss the calculation of the β -stable equation of state (EOS) of neutron star matter including realistic nucleon-nucleon (NN), nucleon-nucleon-nucleon (NNN), nucleon-hyperon (NY) and nucleon-nucleon-hyperon (NNY) interactions. I will show the resulting neutron stars structure. I will finally discuss the inclusion of thermal effects necessary for consistent binary neutron star merging simulations as well as for the study of core collapse supernovae.

Primary author(s) : Dr LOGOTETA, Domenico (University of Pisa)

Co-author(s) : Prof. BOMBACI, Ignazio (University of Pisa)

Presenter(s) : Dr LOGOTETA, Domenico (University of Pisa)