Contribution ID: **20** Type: **not specified**

Neutron star crust from Bayesian-constrained unified EoS with ab initio input

Wednesday 1 October 2025 16:30 (20 minutes)

The nuclear equation of state (EoS) governs the structure of neutron stars and can be constrained by linking information from astrophysical observations, ab initio nuclear theory, and heavy-ion collisions within a Bayesian framework. In this work, we extend a unified meta-modeling approach to the EoS by implementing low-density corrections informed by energy density functionals calibrated to ab initio neutron matter results. This extension ensures improved consistency with nuclear theory in the dilute regime, which is essential for reliable predictions of crustal properties. We analyze the consequences for the crust-core transition density and pressure, crustal composition, and the fraction of the moment of inertia residing in the crust. These results underscore the need for complementary theoretical and experimental constraints across a wide density range, providing a more robust foundation for interpreting multimessenger observations of neutron stars with increasing precision.

Author: BURRELLO, Stefano (Istituto Nazionale di Fisica Nucleare)

Co-authors: Dr FANTINA, Anthe Francesca (GANIL); GULMINELLI, Francesca (Unicaen/LPC/Ensicaen); Dr ANTONELLI, Marco (LPC - CNRS); COLONNA, Maria (Istituto Nazionale di Fisica Nucleare)

Presenter: BURRELLO, Stefano (Istituto Nazionale di Fisica Nucleare)

Session Classification: Short contributions (II)