



ID de Contribution: 41

Type: **Invited talk**

## The equation of state of dense matter and nuclear physics constraints

*jeudi 25 novembre 2021 15:00 (45 minutes)*

The exceptional progress of multi-messenger astronomy on different astrophysical sources of dense matter has very recently led to quantitative measurements of various properties of neutron stars, such as the correlation between mass and radius from X-ray timing with NICER and the tidal polarizability from gravitational wave LIGO/Virgo data. These observations, together with the plethora of upcoming data, are expected to unveil in the next future exciting open questions such as the structure and degrees of freedom of baryonic matter in extreme conditions, and in particular the presence of phase transitions and the existence of deconfined matter in the core of neutron stars.

This direct connection between astrophysical measurements and the microphysics of dense matter is due to the well-known fact that, under the realm of general relativity, there is a one-to-one correspondence between any static observable and the dense matter equation of state. However, the task is complicated by the uncertainty on the effective energy functional, and similar equations of state can be obtained under different hypotheses on the underlying microphysics.

To identify the observables pointing towards more exotic constituents, it is important to quantitatively evaluate the space of parameters and observables compatible with the nucleonic hypothesis. We will review the different theoretical and experimental constraints that can be used to restrict the space of parameters, and show that both nuclear observables in the sub-saturation and super-saturation regime are needed to achieve a quantitative description of static astrophysical observables that will be challenged by the upcoming measurements.

**Auteur principal:** Prof. GULMINELLI, Francesca (LPC Caen, France)

**Orateur:** Prof. GULMINELLI, Francesca (LPC Caen, France)

**Classification de Session:** Nuclear EoS and Astrophysics

**Classification de thématique:** Nuclear EoS and Astrophysics: The equation of state of dense matter and nuclear physics constraints