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Nuclear physics constraints on the equation of state of dense matter

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The determination of the equation of state (EoS) of dense matter is a challenge in nuclear astrophysics, and particularly for the modelling of compact obects such as supernovae and neutron stars (NSs). Indeed, a consistent description of the different states of matter encountered in these stellar objects spanning a wide range of densities, temperatures, and isospin asymmetries is a difficult task. The EoS is however important in compact-star modelling since it allows to relate the prediction of astrophysical observables to microphysical properties of dense matter. In particular, for old (mature), slowly rotating, and isolated NSs, this connection indeed mainly relies on the knowledge of the EoS.

In this contribution, I will give a brief introduction on the dense-matter EoS, and specifically on the EoS for NSs. Various constraints will be discussed, focussing on those coming from nuclear physics (theory and experiments). The prediction of NS observables obtained with different EoSs (with their associated uncertainties) will be discussed in connection with recent (multi-messenger) astrophysical observations.

Primary author: FANTINA, Anthea (Grand Accélérateur National d'Ions Lourds (GANIL))

Presenter: FANTINA, Anthea (Grand Accélérateur National d'Ions Lourds (GANIL))

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