Contribution ID: **45** Type: **not specified**

Hybrid Nuclear Matter EOS with Color Superconducting Quark Phase: Bayesian Constraints from Observations

Wednesday 25 June 2025 17:55 (5 minutes)

We perform a Bayesian analysis of the equation of state (EOS) constraints using recent observational data, including pulsar masses, radii, and tidal deformabilities. Our focus is on a class of hybrid neutron star EOS that incorporates color superconducting quark matter, based on a recently developed nonlocal chiral quark model. The nuclear matter phase is described using a relativistic density functional approach within the DD2 class, while the phase transition between nuclear and quark matter is described using a Maxwell construction. Our analysis identifies a region within the two-dimensional parameter space, defined by the vector meson coupling and scalar diquark coupling, where the observational constraints are met with the highest probability (90% of the maximum). We present the overlap of this region with those where other properties are fulfilled:
1. Strong phase transition that produces a third family of compact stars.
2. Maximum mass of hybrid neutron star exceeds that of the purely nucleonic star.
3. Onset mass for quark deconfinement below one solar mass.

Primary author: AYRIYAN, Alexander (University of Wrocław)

Presenter: AYRIYAN, Alexander (University of Wrocław)

Session Classification: Poster session