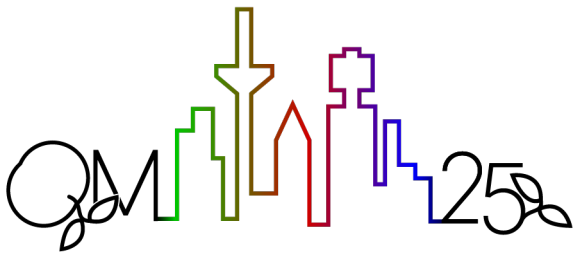

Contribution ID: **1108** Type: **Poster**

”Quark Matter in Neutron Stars? Bayesian analysis of hybrid EoS constraints from recent observations”

We present a Bayesian analysis of equation of state (EOS) constraints using recent observational data for masses, radii and tidal deformability of pulsars and a class of hybrid neutron star EOS with color superconducting quark matter on the basis of a recently developed nonlocal chiral quark model.
The nuclear matter phase is described within a relativistic density functional model of the DD2 class and the phase transition is obtained by a Maxwell construction.
We find the region in the two-dimensional parameter space spanned by the vector meson coupling and the scalar diquark coupling, where the observational constraints are fulfilled with the highest (90% of maximum) probability.
We present the overlap of this region with those where other properties are fulfilled:
1) the phase transition is strong ($\Delta\epsilon/\epsilon_{\rm crit} > 2/3$),
2) the maximum mass of the hybrid neutron star is larger than that of the purely nucleonic star,
3) the onset mass for quark deconfinement is below $M_{\rm sun}$.
We discuss whether the obtained parameter range of the nonlocal chiral quark model for color superconducting quark matter is compatible with the nucleon and omega meson masses in vacuum and saturation properties of nuclear matter, once the model is developed beyond the mean field level.
We show that the finite temperature extension of the hybrid EOS within the Matsubara formalism leads to thermal twin stars as a characteristic feature shared with hybrid EOS models providing an explosion mechanism for massive blue supergiant stars.

Acknowledgement:
This work was supported by NCN under grant number 2021/43/P/ST2/03319 (A.A. and D.B.) and by ANPCyT, CONICET and UNLP (Argentina) under grant numbers PICT19-00792, PIP 2022-2024 GI -11220210100150CO and X960, respectively (A.G.G., G.A.C., and J.P.C.).

Category

Theory

Collaboration (if applicable)

Primary authors: Dr AYRIYAN, Alexander (University of Wroclaw & AANL); GRUNFELD, Ana Gabriela; BLASCHKE, David; CONTRERA, Gustavo (IFLP); CARLOMAGNO, Juan Pablo (IFLP-CONICET)

Presenter: Dr AYRIYAN, Alexander (University of Wroclaw & AANL)

Track Classification: QCD matter in astrophysics