Contribution ID: **81** Type: **talk**

Exploring the role of hyperons in high density matter in the Quark-Meson-Coupling model

Thursday, 30 June 2022 11:20 (20 minutes)

The microscopic composition and properties of matter at super-saturation densities have been a subject of intense investigation for decades. The scarcity of experimental and observational data has led to the necessary reliance on theoretical models. However, there remains great uncertainty in these models, which, of necessity, have to go beyond the over-simplified assumptions that high-density matter consists only of nucleons and leptons. Heavy strange baryons, mesons and quark matter in different forms and phases have to be included to fulfill basic requirements of fundamental laws of physics.
In my contribution, I will concentrate on the role of hyperons which, according to fundamental physical laws, inevitably appear at densities above a threshold in cold dense matter and at all densities in hot matter in astrophysical compact objects. The Quark-Meson-Coupling-Model (QMC) [1] is ideally suited for such research. The model is based on interaction between quarks in individual baryons instead between the baryons as entities without internal structure. This feature significantly simplifies matters as the same parameter set is used for both, nucleon-only matter and matter with the full baryon octet. I will report the latest results of application of the QMC model to hyperonic matter and neutron stars, highlighting the vital role of experimental data on hypernuclei in constraining the model parameters. The (lack of) the so-called 'hyperon puzzle'in the QMC model will be discussed. Finally, suggestions and full support for future experiments at JPARC will be given.

(1) P.A.M. Guichon, J.R. Stone and A.W. Thomas, Progress in Nuclear and Particle Physics, 100, 262 (2018).

Primary author: Dr STONE, Jirina (University of Oxford / University of Tennessee)

Presenter: Dr STONE, Jirina (University of Oxford / University of Tennessee)

Session Classification: 4; Thu-IIa