19th International Conference on QCD in Extreme Conditions (XQCD 2023)

Contribution ID: **12**   Type: **Talk**

QCD equation of state at finite isospin density from the linear sigma model with quarks

Wednesday 26 July 2023 14:25 (25 minutes)

Present abstract is based on our recent work [1] where we use the two-flavor linear sigma model with quarks to study the phase structure of isospin asymmetric matter at zero temperature. The meson degrees of freedom provide the mean field chiral- and isospin-condensates on top of which we compute the effective potential accounting for quark fluctuations at one-loop order. Using the renormalizability of the model, we absorb the ultraviolet divergences into suitable counter-terms that are added respecting the original structure of the theory. These counter-terms are determined from the stability conditions which require the effective potential to have minima in the condensates directions at the classical values, as well as the transition from the non-condensed to the condensed phase to be smooth as a function of the isospin chemical potential. We use the model to study the evolution of the condensates as well as the pressure, energy and isospin densities and the sound velocity as functions of the isospin chemical potential. The approach does a good average description up to isospin chemical potentials values not too large as compared to the vacuum pion mass.

[1] - QCD equation of state at finite isospin density from the linear sigma model with quarks: The cold case ; Alejandro Ayala, Aritra Bandyopadhyay, Ricardo L.S. Farias, Luis A. Hernández, José Luis Hernández ; Phys. Rev. D. 107 (2023), 074027 ; 2301.13633 [hep-ph]

Primary authors: Prof. AYALA, Alejandro; BANDYOPADHYAY, Aritra; Mr HERNÁNDEZ, José Luis; Prof. HERNÁNDEZ, Luis A.; Prof. FARIAS, Ricardo L. S.

Presenter: BANDYOPADHYAY, Aritra

Session Classification: Parallel session B