Contribution ID: **70** Type: **Poster**

Isospin matter and pion stars

Tuesday 20 March 2018 16:00 (1 hour)

We explore the condensation of charged pions in the presence of a large isospin chemical potential, in the absence of baryons, within the Linear Sigma Model. A mean-field expansion is used to calculate the thermodynamics and the spectrum of excitations of the pion-condensed medium. The pion condensate is shown to explicitly break the $U(1)_{\tau_3}$ vector isospin symmetry associated with electromagnetic gauge invariance, making it a superconductor.

Results are successfully compared to lattice calculations and used to find the equation of state of isospin matter, made electrically neutral by the addition of leptons. From the obtained equation of state, we calculate the mass-radius relation of a new class of compact stars: pion stars, which are found to have masses of up to $\sim 230\, M_\odot$, with radii of $\sim 10^2 - 10^5$ km.

Summary

We study the condensation of pions under a large isospin chemical potential, in the absence of baryons. As an application, we calculate the mass-radius relation of pion stars, a new class of compact stars.

Authors: BRANDT, Bastian (Frankfurt University); FRAGA, Eduardo (Universidade Federal do Rio de Janeiro); ENDRODI, Gergely (Frankfurt University); SCHAFFNER-BIELICH, Juergen (Frankfurt University); HIPPERT TEIXEIRA, Mauricio (Universidade Federal do Rio de Janeiro); SCHMALZBAUER, Sebastian (Frankfurt University)

Presenter: HIPPERT TEIXEIRA, Mauricio (Universidade Federal do Rio de Janeiro)

Session Classification: Tuesday Posters