Contribution ID: **102** Type: **Contributed talk**

The impact of the equation of state on superconducting phases in neutron star cores

Tuesday, 9 July 2024 15:35 (20 minutes)

Neutron stars unite several extremes of physics which cannot be recreated on Earth, making them excellent cosmic laboratories for studying the properties of ultra-dense matter. One exciting characteristic is the presence of superfluid and superconducting components in mature neutron stars. Albeit created under very different circumstances, such macroscopic quantum behaviour exhibits many similarities with terrestrial condensates, such as the superfluid phases in helium, ultra-cold atomic gases, heavy-ion collisions or superconducting transitions in metals.

In this talk, I will focus on the last relationship and discuss how we can describe the interiors of neutron stars using a two-component Ginzburg-Landau model, a framework well-known from the study of laboratory superconductors. By adapting this description to the neutron-star interior and connecting it with realistic superfluid parameters and equations of state, we can determine the equilibrium properties of the superconducting component throughout the entire neutron-star core. I will specifically focus on equations of state based on the Skyrme functional, present the corresponding phase diagrams, and discuss how this approach provides insights into the mesoscopic magnetic flux distribution in neutron-star interiors.

session

H. Equation of State and Neutron Stars

Primary author: GRABER, Vanessa (University of Hertfordshire)

Presenter: GRABER, Vanessa (University of Hertfordshire)

Session Classification: H. Equation of State and Neutron Stars