Contribution ID: **31** Type: **not specified**

Impact of vortices on heat capacity in the crust of a neutron star

Bardeen–Cooper–Schrieffer theory explains how the heat capacity of a superfluid vanishes as the temperature approaches zero. Various mechanisms may suppress the pairing gap in the superfluid, leading to an increased heat capacity. Consequently, this alteration may impact the cooling rate and thermal evolution of neutron stars. The presence of a vortex in superfluid neutron matter adds extra degrees of freedom in which energy is stored, thus contributing to the heat capacity.

Through fully microscopic simulations employing the Superfluid Local Density Approximation (SLDA), it is possible to calculate the finite-temperature energy of the system. We utilize the BSk type energy density functional, a highly accurate nuclear functional designed to align with existing astrophysical constraints. Utilizing this state-of-the-art functional, we estimate the change in the heat capacity resulting from the mere existence of a vortex in the system.

Primary author: Dr PĘCAK, Daniel (Warsaw University of Technology)

Presenter: Dr PĘCAK, Daniel (Warsaw University of Technology)

Session Classification: Poster flash talks