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Fluxtubes in a proton superconductor coupled to a neutron superfluid

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In compact stars, nucleons form an interacting multi-fluid system of a neutron superfluid and a proton superconductor. The rotation of the star and the strong background magnetic fields generate superfluid vortices and superconducting flux tubes in the core. Using a field-theoretical model of two coupled bosonic fields with entrainment and density coupling, the phase structure of the system is examined. Especially the superconducting type-I/type-II transition and possible multi fluxquantum phases under the influence of the neutron condensate is investigated, including an effective interaction between the flux tubes.

Summary

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