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Magnetic field evolution in superconducting neutron stars

In our recent work [Gusakov et al. PRD, 96, 103012, (2017); Ofengeim & Gusakov, PRD, 98, 043007 (2018)] we have proposed and developed a new method to self-consistently
study the quasistationary evolution of the magnetic field in the cores of normal (nonsuperfluid) neutron stars. Most interestingly, we found that a general configuration of the stellar magnetic field induces macroscopic fluid motions in the core, which can exceed the diffusion particle velocities, and hence dramatically accelerate the evolution of the magnetic field. In my talk, I will discuss how (and whether) these results can be extended to superfluid and superconducting neutron stars. New timescales for the magnetic field evolution will be identified and confronted to observations.

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