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Towards an effective model of neutron star crust: dynamics of impurity in superfluid neutron matter

Among numerous challenges in astrophysics, construction of effective model of neutron star crust seems to be particularly interesting. The inner crust is supposed to consist of proton impurities immersed in the superfluid neutron matter –one can examine such system with time-dependent numerical simulations, which can be proceeded with recently developed W-BSK Toolkit based on Brussels-Montreal Skyrme (BSk) density functional. This kind of calculations requires high accuracy and computational power, therefore, integral part of these studies isHigh-Performance Computing. One of the crucial properties of the impurities is their effective mass, which can be extracted from the results
of these simulations; moreover, they allow to study other mechanisms of dissipation, such as Cooper pair breaking and creation of quantum vortices. Obtained results can give significant contribution to the studies concerning the model of neutron star crust.

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