Neutron Star Core: Densest State of Matter

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We review the equation of state of matter in neutron stars from the liquid nuclear matter to the quark regime at high density. We focus in detail on the question of how quark matter appears in neutron stars, and how it affects the equation of state. We describe equations of state useful for interpretation of both electromagnetic and gravitational observations, reviewing the emerging picture of hadron-quark continuity in which hadronic matter turns relatively smoothly, with at most only a weak first order transition, into quark matter with increasing density.[1]

Also, we discuss how vortices in dense superfluid hadronic matter can connect to vortices in superfluid quark matter, as in rotating neutron stars, focusing on the extent to which quark-hadron continuity can be maintained.[2]

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2. M. G. Alford, G. Baym, K. Fukushima, T. Hatsuda and M. Tachibana, "Continuity of vortices from the hadronic to the color-flavor locked phase in dense matter," arXiv:1803.05115 [hep-ph].

Section: OT - Other topics and model systems

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