THE POSSIBILITY OF EXISTENCE OF MASSIVE PULSARS WITH QUARK CORE

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The mass-radius relationship of neutron stars (NSs) is of prime importance to understand the high-density low-temperature regime of the hadronic equation of state (EoS) [1,2]. Depending on this relationship, certain models for the hadronic EoS can either be confirmed or ruled out. Several attempts have been made on measuring the radii and masses of NSs to constrain the uncertainties in the high density behavior of the EoS. The observations on double NS, glitches in radio pulsars, thermal emission from accreting NSs and from millisecond X-ray pulsars lead to constraints mass-radius relationship of NSs. The quark matter can support a star as massive as $2M_{\odot}$ only if the quarks are strongly interacting and are therefore not 'free' quarks. In the present work, we solve the Einstein's equations for rotating stars using pure nuclear matter without and with quark matter core. A systematic study of the static as well as rotating compact stars with quark matter inside will be presented in view of the recent observations of the massive compact stars.

[1] Partha Roy Chowdhury, in Proceedings of the International Symposium NIC XI, Heidelberg, Germany, 19-23 July, 2010, PoS (NIC XI) 175.
[2] Partha Roy Chowdhury et al., Physical Review C 81, 062801 (Rapid) (2010)