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Hybrid stars are compatible with recent astrophysical observations

Compact stars (CSs) are stellar remnants of massive stars. Inside CSs the density is so high that matter is in subatomic form composed of nucleons. With increase of density of matter towards the centre of the objects other degrees of freedom like hyperons, heavier non-strange baryons, meson condensates may appear. Not only that at higher densities, the nucleons may get decomposed into quarks and form deconfined strange quark matter (SQM). If it is so then CSs may contain SQM in the core surrounded by nucleonic matter forming hybrid stars (HSs). However, the nature and composition of matter inside CSs can only be inferred from the astrophysical observations of these CSs. Recent astrophysical observations in terms of CS mass-radius (M-R) relation and gravitational wave (GW) observation indicate that the matter should be soft in the intermediate density range and stiff enough at higher density range to attain the maximum possible mass above $2 M_{\odot}$ which is not compatible with pure hadronic equation of states (EOSs). Consequently, we study the HS properties with different models of SQM and find that within vector bag model considering density dependent bag parameter, the model goes well with the astrophysical observations so far.

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