Probing Quark Matter in Neutron Stars

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Abstract

The presence of quark matter in neutron star interiors may have distinctive signatures in basic observables such as (1) masses and radii, (2) surface temperatures versus spin-down age (cooling curve), (3) spin-down rates of milli-second pulsars, and (4) the duration and modulation of neutrino luminosities from future galactic core collapse supernovae. I will highlight recent developments in these areas with a view towards assessing how theory may be confirmed by observations in X-ray, ultraviolet, optical and radio frequencies with new generation satellites such as the HST, Chandra, XMM, etc., and from neutrino detectors such as Super Kamiokande and SNO. These efforts offer the promise of establishing the properties of QCD at finite baryon density in addition to delineating the composition, structure, and evolution of both newly-born and old neutron stars.