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Structure, oscillations and gravitational wave of neutron stars

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Due to the hot dense environment, quark matter is probably emerge in compact stars, e.g. the cold neutron stars, the hot proto-neutron stars or the remnant of two neutron star merger. At present, it is quite important to look for possible observational signals to distinguish the hybrid stars from normal neutron stars. Concern the recent development in gravitational wave observation, we investigate radial and non-radial oscillations of pure and hybrid neutron stars, as well as proto-neutron stars. We employ equations of state of nuclear matter from Brueckner-Hartree-Fock theory, and of quark matter from the Dyson-Schwinger quark model. For radial oscillations, our results show different character of pure neutron stars and hybrid stars, as well as the behavior during the evolution of proton neutron stars. For non-radial oscillations, characteristic differences between neutron-star and hybrid-star g1-mode oscillation frequencies, damping times, and gravitational wave strains are pointed out. Results of f-mode and the corresponding gravitational wave observable of hybrid stars with pasta structure are also presented.

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