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Empirical constraints on the high-density equation of state from multi-messenger observables

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We search for possible correlations between neutron star observables and thermodynamic quantities that characterize high density nuclear matter. We generate a set of model-independent equations of state describing stellar matter from a Taylor expansion around saturation density. We found that the neutron star tidal deformability and radius are strongly correlated with the pressure, the energy density and the sound velocity at different densities. These correlations can be used to constrain the equation of state at different densities above saturation from measurements of NS properties with multi-messenger observations.

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