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The nuclear matter density functional under the nucleonic hypothesis

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A Bayesian analysis of the possible behaviors of the dense matter equation of state informed through recent LIGO-Virgo as well as NICER measurements reveals that all the present observations are compatible with a fully nucleonic hypothesis for the composition of dense matter, even in the core of the most massive pulsar PSR J0740+6620. Under the hypothesis of a nucleonic composition, we extract the most general behavior of the energy per particle of symmetric matter and density dependence of the symmetry energy, compatible with the astrophysical observations as well as our present knowledge of low energy nuclear physics from effective field theory predictions and experimental nuclear mass data. These results can be used as a null hypothesis to be confronted with future constraints on dense matter to search for possible exotic degrees of freedom.

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