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A parametrized equation of state for neutron-star matter[1] JOHN L. FRIEDMAN, JOCELYN S. READ, BENJAMIN D. LACKEY, University of Wisconsin-Milwaukee, BENJAMIN OWEN, The Pennsylvania State University — Astrophysical constraints on the nuclear equation of state above nuclear density have been studied simply by looking at which members of the set of candidate equations of state are ruled out by observations of neutron stars. A systematic study of observational constraints requires a parameterized equation of state with a set of parameters smaller than the number of neutron star properties that have been measured or will have been measured in the next several years. And the set must be large enough to accurately approximate the large set of candidate EOS's. We find that a parametrized EOS based on piecewise polytropes with 3 free parameters matches to about 5% rms error the universe of candidate EOSs at densities below the central density of $1.4\,M_\odot$ stars. Adding observations of more massive stars constrains the higher density part of the EOS and requires an additional parameter.

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