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Estimating Equation of State Uncertainties from Mass and Radius Observations

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Traditionally, neutron star observations from which mass and radius estimates are obtained are used to inform the dense matter equation of state through Bayesian inference. This procedure introduces a difficult-to-infer uncertainty stemming from prior choices for equation of state models and their parameters. We are developing a method to directly estimate central values of energy density and pressure from mass and radius estimates that is universal, that is, it is largely equation of state independent. In this way the usual prior uncertainties in the equation of state models and parameters are not only avoided, but can be deduced. These prior uncertainties appear to be at least as large as the uncertainties due to observations.

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