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Tidal deformability of neutron stars with realistic equations of state[1] BENJAMIN LACKEY, University of Wisconsin–Milwaukee, TANJA HINDERER, Caltech, JOCELYN READ, Albert Einstein Institute, RYAN LANG, MIT — The low-frequency part of the gravitational wave signal of binary neutron star inspirals can potentially yield robust information on the nuclear equation of state. The influence of a star's internal structure on the waveform is characterized by a single parameter: the tidal deformability λ, which measures the star's quadrupole deformation in response to the companion's perturbing tidal field. We calculate λ for a wide range of equations of state and find that the value of λ spans an order of magnitude for the range of equation of state models considered. An analysis of the feasibility of discriminating between neutron star equations of state with gravitational wave observations of the early part of the inspiral reveals that the measurement error in λ increases steeply with the total mass of the binary. Comparing the errors with the expected range of λ, we find that Advanced LIGO observations of binaries at a distance of 100 Mpc will probe only unusually stiff equations of state, while the proposed Einstein Telescope is likely to see a clean tidal signature.

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