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Recovering the Neutron Star Equation of State from a Binary Neutron Star Gravitational Wave Detection with LIGO MATTHEW CARNEY, BURKE IRWIN, LESLIE WADE, Kenyon College — During the collision of two orbiting neutron stars, the gravitational gradient across one due to the other causes tidal deformations in the neutron star. This deformation causes a change in quadrupole moment of the binary system, which in turn alters the gravitational waveform emitted during the inspiral and eventual collision of the two neutron stars. Such an alteration of the gravitational waveform can give us insight into the behavior and structure of neutron star matter in the form of constraints on the neutron-star equation of state (EOS). We can generate waveforms that include alterations due to tidal deformations and use parameter estimation techniques to measure the model parameters and constrain the equation of state in general. Recent work has involved incorporating a new EOS model into LIGO's fully Bayesian parameter estimation routines and is currently being tested to determine the effectiveness of this method of EOS measurement on a simulated population of neutron star gravitational-wave signals. With LIGO's first binary neutron star detection, GW170817, and potentially more on the way, we can use these methods to directly measure the true neutron star equation of state.

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