Abstract Submitted
for the APR14 Meeting of
The American Physical Society

What can we learn about the neutron-star equation of state from gravitational-wave observations of inspiralling binary neutron stars? BENJAMIN LACKEY, Princeton University, LESLIE WADE, University of Wisconsin-Milwaukee — Gravitational-wave observations of inspiralling binary neutron star systems can provide information about the neutron-star equation of state (EOS) through the tidally induced shift in the waveform phase which depends on the tidal deformability parameter Λ. Previous work has shown that Λ, a function of the neutron-star EOS and mass, is marginally measurable by Advanced LIGO for a single event when including the tidal information up to the frequency of merger. In this work, we describe a method for stacking measurements of Λ from multiple inspiral events to measure the EOS. Specifically, we use Markov Chain Monte Carlo simulations to estimate the parameters of a 4-parameter piecewise polytrope EOS that matches theoretical EOS models to a few percent. We find that when 20–50 observations are combined with the constraints from causality and recent high mass neutron-star measurements, the EOS above nuclear density can be measured to better than a factor of two. We also find that quantities that describe the neutron-star structure such as the radius and tidal deformability can be measured to $\sim$10% over a wide range of masses.

Benjamin Lackey
Princeton University

Date submitted: 08 Jan 2014 Electronic form version 1.4