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Probing the Neutron Star Radius with Gravitational Wave Events

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Observations of neutron stars provide one of the best ways of probing the ultra-dense matter equation of state (EOS). While X-ray measurements of the neutron star radius have provided some promising constraints on the EOS, uncertainties remain at high densities. Detections of gravitational waves from a binary neutron star merger offer an exciting, complementary approach to constraining the EOS. In this talk, I will discuss how we can directly extract stellar radii from gravitational wave events. In particular, I will explore the surprising relationship has been discovered between the binary tidal deformability and the radius. I will compare the radius constraints from GW170817 to existing radii measurements from X-ray observations and discuss the implications for the EOS. Finally, I will discuss how we can also use gravitational wave events to constrain the properties of the nuclear symmetry energy, motivated by the well-established connection between the stellar radius and the slope of the symmetry energy, L.