The Physics of Neutron Stars (as seen with GWs)

What are Neutron Stars?

- Radii, masses, compositions, spin periods
- Different names based on the system: pulsar, magnetar, LMXB, HMXB, etc
- Stellar Structure
- Equation of State

What do NS do in CBCs?

Tides!

- Linear tidal deformability
- Dynamical tides, nonlinear tides
- Tidal disruption

EOS inference based on GW and EM data

- Λ(m) consistency with GW data
- What we can say about composition

Suggested Reading

- P. Landy and R. Essick. *Non-parametric inference of the neutron star equation of state from gravitational wave observations*. arXiv:1811.12529 (2019).
- R. Essick, P. Landry, and D. Holz. *Nonparametric inference of neutron star composition, equation of state, and maximum mass with GW170817*. arXiv:1910.09740 (2019).
- *How Big are Neutron Stars?* https://www.ligo.org/science/Publication-GW170817EoS/index.php