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Ranking the Love for the neutron star equation of state with third-generation detectors

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Gravitational wave measurements of the tidal deformability
in neutron-star binary coalescences are golden sources to infer properties of the still unknown equation of state (EoS) of dense matter above
the nuclear saturation density. In this talk I will show how, using a
Bayesian-ranking test we can quantify the ability of current and future gravitational-wave observations to discriminate among families of realistic EoS which differ in particle content and ab-initio microscopic calculations.

Building on the lesson taught from GW170817, I will discuss the improvements on
the EOS constraints from single and stacked detections by interferometers at design sensitivity. Morevoer, I will show that even just a single detection with a third-generation detector such as the Einstein Telescope or Cosmic Explorer will rule out several families of EoS with very strong statistical significance, and can discriminate among models which feature similar properties, hence
constraining the properties of nuclear matter to unprecedented levels.

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