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Probing high density physics in the gravitational wave astronomy era

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The recent multimessenger detections of signals from neutron star binaries has opened a new era also for the study of high density physics. With interior densities that can exceed those of an atomic nucleus, and low temperatures (at least in mature systems) compared to the Fermi temperatures of the constituents, neutron stars allow to probe very different and complementary regimes of the QCD phase diagram, compared to terrestrial experiments. In this talk I will discuss some of the recent observations, and show how gravitational wave detections, especially if coupled with electromagnetic observations, can allow to make progress on constraining the equation of state of dense matter. In particular, I will not only discuss compact binary coalescences (that have already been observed in gravitational waves), but also long lived quasi-monochromatic signals, i.e. 'continuous' waves, that are still currently unobserved, but may allow for new and significant constraints.

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