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Gravitational-Wave Signatures of the Hadron-Quark Phase Transition in Binary Compact Star Mergers

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With the first detection of gravitational waves from a binary system of neutron stars GW170817, a new window was opened to study the properties of matter at and above nuclear-saturation density. Reaching densities a few times that of nuclear matter and temperatures up to 100 MeV, such mergers also represent potential sites for a phase transition from confined hadronic matter to deconfined quark matter. The gravitational wave signatures of the production of quark matter, both during the inspiral (see PRD 99 (10), 103009 (2019)), merger and postmerger phase of a compact star merger will be in the focus of this talk. The presented results are based on fully general-relativistic hydrodynamic simulations and employing several suitably constructed equation of states that include a hadron-quark phase transition (see Phys.Rev.Lett. 122 061101 (2019), Phys.Rev.Lett. 124, 171103 (2020)).

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