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Deconfinement Phase Transition in Neutron-Star Mergers

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We study in detail the nuclear aspects of a neutron-star merger in which deconfinement to quark matter takes place. For this purpose, we make use of the Chiral Mean Field (CMF) model, an effective relativistic model that includes self-consistent chiral symmetry restoration and deconfinement to quark matter and, for this reason, predicts the existence of different degrees of freedom depending on the local density/chemical potential and temperature. We then use the out-of- chemical-equilibrium finite-temperature CMF equation of state in full general-relativistic simulations to analyze which regions of different QCD phase diagrams are probed and which conditions, such as strangeness and entropy, are generated when a strong first-order phase transition appears. We also investigate the amount of electrons present in different stages of the merger and discuss how far from chemical equilibrium they can be.

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