

The Strong Field Dynamics of Binary Neutron Stars

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What is the nature of neutron stars? Where are r-process elements formed in the Universe? Multi-messenger observations of neutron star mergers might provide us with the key to answer these and other important open questions in theoretical astrophysics. However, multi-messenger astronomy also poses new challenges to theorists who need to develop models for the joint interpretation of all data channels. In this talk, I will review our current theoretical understanding of how neutron star mergers proceed and of how the dynamics is imprinted in their multi-messenger emissions. I will present recent simulation results and their implications. Finally, I will discuss future challenges and prospective for this field.