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Gravitational Waves and Nucleosynthesis of Binary Neutron-Star Simulations

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Understanding gravitational-wave observations of binary neutron star mergers requires a knowledge of high-density matter. In turn, the electromagnetic signal is by-and-large determined by r-process elements and hence it requires accurate knowledge of the underlying nucleosynthesis processes. In this talk, I will present first nuclear physics results that aim at elucidating the thermal properties of high-density nuclear matter and discuss their potential impact in BNS simulations. I will then discuss the results of numerical-relativity simulations of BNS mergers subject to nonconvex dynamics, allowing for the appearance of expansive shock waves and compressive rarefactions. Finally, I will briefly discuss the r-process nucleosynthesis of ejecta postprocessing in these simulations employing WinNet.

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