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GRMHD Simulations of Binary Neutron Star Mergers with Piecewise Polytropic Equations of State BRUNO GIACOMAZZO, University of Trento — We present new results of fully general relativistic magnetohydrodynamic (GRMHD) simulations of binary neutron star (BNS) mergers performed with the Whisky code. Our new simulations consider both equal and unequal-mass systems and describe the NS matter via piecewise polytropic equations of state (EOSs). BNS mergers are powerful sources of gravitational waves (GWs) that can be detected by ground based detectors, such as advanced Virgo and LIGO, and they are also thought to be behind the central engine powering short gamma-ray bursts. In our simulations we therefore focus both on the GW emission and on the dynamics of matter and magnetic fields, both in the case a black hole is promptly formed and in the case of the formation of a long-lived magnetized NS. Since the EOS has an important role in both GW emission and matter dynamics, our simulations employ piecewise polytropic EOSs composed by seven pieces, four for the low-density regions (including the crust) and three for the core, in order to more accurately match physically motivated EOSs. Thermal effects are also included in order to more properly describe the post-merger dynamics.

Bruno Giacomazzo
University of Trento

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