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General Relativistic Magnetohydrodynamic Simulations of Binary Neutron Star Mergers with the APR4 Equation of State ANDREA ENDRIZZI, RICCARDO CIOLFI, BRUNO GIACOMAZZO, WOLFGANG KASTAUN, TAKUMU KAWAMURA, Univ of Trento — We present new results of fully general relativistic magnetohydrodynamic (GRMHD) simulations of binary neutron star (BNS) mergers performed with the Whisky code. All the models use a piecewise polytropic approximation of the APR4 equation of state (EOS) for cold matter, together with a "hybrid" part to incorporate thermal effects during the evolution. We consider both equal and unequal-mass models, with total masses such that either a supramassive NS or a black hole (BH) is formed after merger. Each model is evolved with and without a magnetic field initially confined to the stellar interior. We present the different gravitational wave (GW) signals as well as a detailed description of the matter dynamics (magnetic field evolution, ejected mass, post-merger remnant properties, disk mass). Our new simulations provide a further important step in the understanding of these GW sources and their possible connection with the engine of short gamma-ray bursts (both in the "standard" and in the "time-reversal" scenarios) and with other electromagnetic counterparts.

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