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Magnetic Field Effects in the Merger of Binary Neutron Stars

I will discuss the current status of fully general relativistic magnetohydrodynamic (GRMHD) simulations of binary neutron star (BNS) mergers performed with the Whisky code. BNSs are among the most powerful sources of gravitational waves (GWs) that will be detected in the next few years. BNS mergers are also thought to be the central engine of short gamma-ray bursts (SGRBs) as well as the possible source of other electromagnetic emissions that, if detected together with a GW signal, could help in localizing them and infer some of their properties. Magnetic fields play a very important role in the post-merger dynamics, including the possible formation of strongly magnetized NSs or of magnetized disks around spinning black holes (which could be accompanied by the formation of relativistic jets). I will present results of recent GRMHD simulations of BNS mergers that considered both the formation of stable magnetars (in the case of low mass BNS systems) and of strongly magnetized disks around spinning black holes. I will describe the evolution and amplification of the magnetic fields during and after the merger, their impact on the post-merger dynamics, GW emission, and possible electromagnetic counterparts.

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