

A multi-messenger analysis of neutron star mergers employing numerical relativity simulations

With the detection of the binary neutron star merger GW170817 a new era of multi-messenger astronomy started. Full 3D numerical relativity simulations are a unique tool to study the last milliseconds before and after the merger and to obtain information about the emitted gravitational wave and electromagnetic signals. We present results from the first public database for binary neutron star simulations including more than 350 individual numerical relativity simulations for various masses, mass ratios, spins, eccentricities, and Equations of State. We discuss how these simulations (i) can be used to develop state-of-the-art waveform approximants employed to analyse gravitational wave signals and (ii) help to constrain the Equation of State of cold supranuclear matter combining information from GW170817, GRB170817A, and AT2017gfo.