Gravitational Wave luminosity peak of compact binary mergers.

Francesco Zappa[1]

[1]Theoretisch-Physikalisches Institut, Friedrich-Schiller-Universität Jena, 07743, Jena, Germany

Abstract

The coalescence of compact objects are thought to be the most powerful events in the Universe, in terms of instantaneous energy emitted through gravitational waves. We give numerical relativity estimates of the luminosity peak of gravitational waves emitted during the coalescence of binary neutron stars (BNS) and binary composed of a black hole and neutron star (BHNS). Our models are constructed from the most advanced simulations of coalescence of compact binaries currently available and depend on the main parameters that characterize these binary systems, allowing us to predict the luminosity of such events. We find that in the BNS case, the highest luminosity peaks are produced when the merger ends with a black hole that promptly forms after the collision of the two neutron stars. For BHNS, the possible tidal disruption of the neutron star plays a crucial role in determining the luminosity peak and this makes it theoretically possible to guess the presence of a disk surrounding the black hole. In both cases this analysis allows to make estimates on the outcome of these mergers based on the fundamental parameters of the binary only.