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Beyond 2nd order in the simulations of binary neutron stars in general relativity DAVID RADICE, Caltech, LUCIANO REZZOLLA, Institut fuer Theoretische Physik, Frankfurt, FILIPPO GALEAZZI, Max Planck Institute for Gravitational Physics — The inspiral and merger of binary neutron stars (BNSs) is one of the most promising sources of gravitational waves (GWs) for future ground-based laser detectors such as LIGO, Virgo or KAGRA. GWs carry valuable information concerning the binary parameters as well as the equation of state of neutron stars. Extracting such information, however, requires the use of accurate models of GWs that can only be constructed using numerical-relativity simulations. Even though few high-quality BNSs waveforms have been computed in the past few years, substantial difficulties need to be addressed to be able to cover the parameter space of BNSs and produce reliable GWs templates. In this talk I present some recent progress in the modeling of BNSs in numerical relativity. In particular I will show how, with the use of higher-order numerical schemes, we were able to obtain GWs signals showing, for the first time, higher-than-second-order accuracy in the phase and amplitude evolution. Our results are also in excellent agrenment with the predictions of post-Newtonian theory almost up to the contact frequency of the binary.

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