Recent progress in TEOBResumS

Abstract

We present the various recent improvements made to TEOBResumS, a new effective-one-body (EOB) waveform model for nonprecessing (spin-aligned), tidally interacting compact binary systems. The point-mass inspiral is modelled in terms of a Padé-resummed radial potential. The merger and ringdown consist of fits informed by $\geq \mathcal{O}(150)$ numerical relativity simulations. The spin-orbit and spin-spin interactions are incorporated in terms of a centrifugal radius replacing the usual EOB radial coordinate. The tides are formulated using the available post-Newtonian (PN) information and light-ring-pole-factorized fits to tidal invariants from the gravitational self-force (GSF) approach. The recent improvements are: (i) new GSF-resummed expressions for the octupolar and gravitomagnetic tides, (ii) contribution of the tides to the multipolar waveform beyond the quadrupole, (iii) inclusion of self-spin (monopole-quadrupole) terms up to the next-next-to-leading order (NNLO). In a parallel front, TEOBResumS has been recast as a post-adiabatic evolution code which "rushes" the inspiral: current *un*-optimized code evolves a binary-neutron star inspiral in a mere half a second from 10 Hz making it the most faithful fast time-domain EOB code. We provide details of each new ingredient and the rush code and show comparisons with binary-neutron star NR simulations. Finally, we report on the status of our ongoing efforts to incorporate angular momentum and spin precession into the evolution.