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Binary neutron stars with realistic spin[1] WOLFGANG TICHY, Florida Atlantic University, SEBASTIANO BERNUZZI, TIM DIETRICH, BERND BRUEGMANN, University of Jena — Astrophysical neutron stars are expected to be spinning. We present the first, fully nonlinear general relativistic dynamical evolutions of the last three orbits for constraint satisfying initial data of spinning neutron star binaries, with astrophysically realistic spins aligned and anti-aligned to the orbital angular momentum. The dynamics of the systems are analyzed in terms of gauge-invariant binding energy vs. orbital angular momentum curves. By comparing to a binary black hole configuration we can estimate the different tidal and spin contributions to the binding energy for the first time. First results on the gravitational wave forms are presented. The phase evolution of the gravitational waves during the orbital motion is significantly affected by spin-orbit interactions, leading to delayed or early mergers. Furthermore, a frequency shift in the main emission mode of the hyper massive neutron star is observed. Our results suggest that a detailed modeling of merger waveforms requires the inclusion of spin, even for the moderate magnitudes observed in binary neutron star systems.

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