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Inertial mode excitation of long-lived remnants of binary neutron star mergers

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We show that in the post-merger phase of binary neutron star (BNS) merger are present convective instabilities that excite inertial mode oscillations. These oscillations emit gravitational waves in the frequency band where ground-based detectors are within reach of planned third-generation detectors and could be used also as sensitive probes of the rotational and thermal state of matter in the neutron star remnant. Within the limits of the input physics of our simulations (which neglect magnetic fields and neutrino transport) their presence appear to be quite general for remnants that live more than 50 ms and show up for four different equations of state (EOS), parametrized as piecewise polytropics plus a thermal component with $\Gamma = 1.8$. We also analyze the gravitational wave signal emitted by the remnant after the merger for each EOS in order to characterize the rate of change of the frequencies and the damping of the amplitudes for both the main and excited mode.

Summary

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