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SPH simulation of neutron star merger

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The first results of numerical simulations of the neutron star merger process using the smoothed particle hydrodynamics (SPH) method are presented. To generate the initial equilibrium configuration of the binary system that accounts for the tidal deformation of the components, a new method has been applied: halted-pendulum relaxation. The method has been implemented in the well-known astrophysical code PHANTOM. In particular, values of the quadrupole moments of the stars at various separations from each other have been obtained as a result of the simulations. They enable the calculation of the gravitational-wave signal generated by the system and the determination of its deviation from the classical point-mass case described by Einstein's quadrupole formula.

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