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Numerical Relativity and Gravitational Wave

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Deadline for manuscript submissions:
closed (15 January 2023)

Message from the Guest Editor

Numerical relativity (NR) is currently a major topic connecting general relativity to computational astrophysics and simulation science. After the 2006 breakthroughs in the simulation of black hole collisions, the field developed in several directions. Current applications range from multimessenger astrophysics modeling to cosmology, with new formal and numerical aspects under development.

Key astrophysical NR applications involve the simulations of mergers of neutron stars and black holes and of core collapse supernovae. Binary black hole simulations crucially helped the characterization of the first gravitational signals detected by the LIGO-Virgo experiments. Their increasing accuracy and completeness is driving waveform modeling for gravitationalwave astronomy. General relativistic fluidynamics simulations of compact binary mergers are essential to study the engines that power electromagnetic observables. Strong gravity is also a primary component for quantitative simulations of stellar collapse and accretion onto compact objects.

mdpi.com/si/39884

Special Issue

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Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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