Special Issue

Symmetries in Gravity Research: Classical and Quantum

Message from the Guest Editors

The analysis of symmetries is often performed to investigate, simplify and solve physical problems. Symmetries also relate to preserved properties as geodesics in spacetime.

Two pillars of modern physics, GR and quantum mechanics (QM), separately agree well with experimental tests in certain domains. However, when the two theories are applied to describe the same phenomenon, they are likely to fail as GR resources do not work properly within the domains of QM. It is believed that GR is a low-gravitational field approximation to a more fundamental theory, quantum gravity (QG), which may require the development of new approaches to gravity for its full description.

In order to develop QG or to have a better understanding of gravitation, it is unavoidable to study gravity in the strong regime, which is still experimentally unattainable. One compelling option is to explore symmetries to understand gravitation in this regime.

- symmetries
- symmetries in gravitation
- symmetries in quantum gravity
- preserving properties in gravitation
- symmetries in general relativity

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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.

Editor-in-Chief

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