# Special Issue

# Integrable Systems and Their Symmetries: Foundations and Advances

## Message from the Guest Editors

Integrable systems are characterized by an extensive set of symmetries, leading to a large number of conserved quantities that determine their dynamics. This connection is vital because it provides rare exact solutions to otherwise intractable nonlinear equations. Studying this relationship offers deep insights into universal behavior in complex physical systems, from fluid dynamics and optics to fundamental particle physics and field theory. It serves as a crucial bridge between mathematics and physics, revealing underlying structures such as infinite-dimensional algebras and enabling powerful methods like the inverse scattering transform. In this Special Issue, original research articles and reviews are welcome. Research areas may include (but are not limited to) the following:

- Integrable systems;
- Symmetry in integrable systems;
- Nonlinear waves;
- Solitons;
- Breathers;
- Rogue waves;
- Hirota bilinear method;
- Darboux transformation;
- Bäcklund transformation;
- Inverse scattering transform;
- Lie symmetry method;
- Painlevé analysis.

We look forward to receiving your contributions.

## Guest Editors

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## Deadline for manuscript submissions

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# About the Journal

### 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

Prof. Dr. Sergei Odintsov
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