

Special Issue

Symmetry Beyond the Standard Model of High Energy Physics: Theory, Methods and Applications

Message from the Guest Editors

Symmetry has long served as a guiding principle in the development of physical theories, from the formulation of the Standard Model of particle physics to the description of cosmological evolution. Yet, many questions remain unresolved within the SM of particle physics and cosmology, including the nature of dark matter and dark energy, the origin of mass hierarchies, the dynamics of the Higgs sector, the properties of neutrinos, and the quantum structure of gravity. This Special Issue aims to highlight the central role of symmetry in exploring physics beyond established frameworks. We welcome contributions on novel symmetry-breaking mechanisms, extended Higgs sectors and their phenomenology, neutrino physics and flavor symmetries, gauge and discrete symmetries, supersymmetry, dualities, conformal structures, and higher-dimensional approaches. Studies that connect theoretical advances with experimental and observational data are particularly encouraged, including collider phenomenology, precision tests of the Higgs boson, neutrino oscillations and CP violation, cosmological probes of symmetry-based models, and searches for new physics signatures.

Guest Editors

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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.

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