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Lorentz Invariance Violation and Space–Time Symmetry Breaking

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Message from the Guest Editors

Dear Colleagues,

Lorentz invariance is one of the fundamental principles of Einstein's relativity and quantum field theories. In most of the standard models of modern physics, it is assumed to be an exact symmetry that should be preserved at all scales. This idea is supported by a lot of remarkably precise Earth-based laboratory experiments, with no violations detected to date. However, there are many new models of physics beyond the standard model with various interesting mechanisms, some of which, especially quantum gravity (QG) theories, have provoked a violation of Lorentz invariance.

This Special Issue is devoted to both the presentation of new results on the observational constraints on LV and CPTV (and, presumably, on the underlying QG), and the overview of theoretical and experimental aspects of space–time symmetry breaking and departures from CPT and Lorentz invariance, involving at least: quantum field theory and gravitation, particle (astro)physics, phenomenologies of theories beyond the standard model, origins and mechanisms of Lorentz and/or CPT violation, and Finsler geometry and its mathematical foundations.

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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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