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Foundational Aspects of Gauge Field Theory

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Deadline for manuscript submissions:
20 November 2024

Message from the Guest Editor

This Special Issue explores the foundational aspects of gauge field theory, with a focus on gauge symmetries and gauge invariance, examining the significance of gauge principles and the implications of pursuing relational gauge-invariant approaches. In this context, symmetry reduction techniques are frequently adopted, either tacitly or in an explicit way, to detect and describe physical degrees of freedom. In fact, these tools can offer a beneficial interplay between geometric and physical insights in gauge field theory. The proposed investigation extends across various domains within physics, with possible implications in, e.g., cosmology, quantum gravity, and black hole physics, including holography, Carroll symmetries, Hawking radiation, the information paradox, soft hair and scalar charges, quantum (sub)systems, and entanglement entropy. We welcome both review and original research papers that delve into the aforementioned aspects.

- gauge field theory
- gauge symmetries
- spacetime symmetries
- gravity theories
- gauge-invariant approaches
- fundamental symmetries
- cosmology
- quantum gravity
- black holes
- entanglement entropy

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Message from the Editor-in-Chief

The concept of entropy is traditionally a quantity in physics that has to do with temperature. However, it is now clear that entropy is deeply related to information theory and the process of inference. As such, entropic techniques have found broad application in the sciences.

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