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Axiomatic Approaches to Quantum Mechanics

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Deadline for manuscript submissions:
closed (15 September 2021)

Message from the Guest Editors

Dear colleagues,

The basic principles of quantum mechanics, which work so well in the lab, have always given rise to intensive conceptual debates. Alongside the search for better understanding of those principles, researchers have tried over the years to ground the mathematical structure of quantum mechanics with a small set of physically plausible assumptions. In recent decades, attempts have been made, for example, at deriving the set of quantum nonlocal correlations and the Born rule from information-theoretic and other sensible axioms. More recently, axiomatic approaches subsumed quantum field theory and the foundations of quantum thermodynamics. In addition, many glimpses have been made beyond the quantum formalism, e.g., attempts to relax some of the axioms of quantum mechanics in order to generalize it, possibly towards a quantum theory of gravity.

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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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