Special Issue

Quantum Coherence and Information Transfer: from Quantum Optics to Biomolecules

Message from the Guest Editors

Quantum information is a steadily growing field of investigation in virtue of our increasing capability to observe and describe exquisite quantum effects appearing in diverse systems ranging from atomic and atom-radiation systems to complex chemical and biophysical systems. In all these systems, quantum information is produced by quantum coherence and, more specifically, by the quantum correlations inherent in their short-time coherent evolution. Conversely, the same quantum information framework is used to describe such correlations and determine their value in terms of information production and transfer, with potential applications of technological relevance. In fact, different entropy measures have been developed over the years to characterize quantum-type correlations, including quantum conditional entropy, mutual entropy, (relative) entropy of entanglement, and the strictly related entanglement of formation.

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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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