Special Issue

Open Quantum Systems (OQS) for Quantum Technologies

Message from the Guest Editors

Coherent quantum dynamics, a crucial ingredient of all quantum technologies, is hindered by the unavoidable coupling of quantum systems to the external environment. The latter, by "reading" the state of the system, prevents quantum interference. A deep understanding and full characterization of the open dynamics of a quantum system is therefore of the utmost importance from the viewpoint of fundamental physics as well as the implementation of quantum devices.

We have witnessed great progress in the study of open quantum systems in the past few years, ranging from a better understanding of the role played by quantum information flux from the system to the environment in the emergence of classical behavior, to a fuller characterization of the quantum memory effect, to the role of the system–environment exchange of quantum information in quantum thermodynamics. Furthermore, it has been shown that decoherence effects are helpful in some specific tasks or phenomena, such as excitation transfer in complex quantum networks and in quantum biological systems.

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