Special Issue

Dynamics of Open Quantum Systems: Quantum Fluctuations, Decoherence and Emergent Phenomena

Message from the Guest Editors

Nowadays, decoherence stands as a serious obstacle in quantum information processing. As the manipulation of quantum coherence in experiments has progressed, the need to better understand, control, and utilize dissipative non-equilibrium dynamics of quantum systems has grown in importance. This has ranged from fundamental questions associated with the quantum to classical transition and quantum thermodynamics to innovation in quantum optics and cavity or circuit quantum electrodynamics. Current studies of many-body dynamics, ultracold atoms in optical lattices, trapped ions, superconducting systems, nano-electro-mechanical systems, and quantum fields under the influence of external conditions offer new challenges to address deep questions in open quantum systems far from equilibrium. On the theoretical side, quantum trajectories-based methods could be key to both quantum nanodevice design and to explore new regimes of quantum mechanics and quantum measurement, as well as applications to various quantum technologies.

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