Special Issue

Many-Body Light–Matter Systems in Superconducting Circuit QED

Message from the Guest Editors

The superconducting circuit QED has emerged as a programmable platform for quantum simulation of many-body physics. In the circuit, arrays of qubits and resonators implement interacting light–matter Hamiltonians with lithographic scalability, in-situ tunability of frequencies, couplings, and dissipation, single-photon control/readout, and compatibility with parametric driving and reservoir engineering. These capabilities make circuit QED uniquely suited to emulate strongly correlated models—ranging from Bose–Hubbard/Jaynes–Cummings/Rabi lattices and spin–boson networks to driven-dissipative criticality, topological bands, localization/glassiness, and gauge-theory analogs—while directly interfacing with quantum-technology building blocks. As devices grow in scale and coherence improves, circuit QED offers a realistic route to benchmarking quantum advantage in many-body dynamics and to translating simulated insights into deployable components for sensing, communications, and fault-tolerant computing.

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Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

Editor-in-Chief

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