CMP Seminar

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Recent advances on photonic quantum simulators

Driven photonic systems have sparked a considerable interest for the generation of exotic phases of light [1,2] and for the realization of photonic quantum simulators [3,4], notably in superconducting quantum networks and lattices of semiconductor microcavities. In the broad context of quantum simulation, there are at least two intriguing theoretical challenges: on one side, it is important to reveal what kind of physical systems an (open-system) quantum simulator platform can map and faithfully represent; on the other side, a crucial mission of theorists is to develop new methods (e.g., see [5,6]) to describe complex quantum systems with predictions that can be accurately tested in a quantum simulator. After a general introduction, we will present recent results on photonic systems in the presence of two-photon driving and dissipation that can be achieved via reservoir engineering. These quadratically-driven photonic systems [7,8,9] are conveniently exploited to create photonic qubits and for the generation of photonic Schroedinger's cat states. Via corner-space renormalization [5] calculations, we will show how 1D and 2D lattices of quadratically-driven electromagnetic resonators can simulate magnetic phase transitions in the quantum critical regime [10].

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Correlated Systems, Phys. Rev. Lett. 115, 080604 (2015).
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Monday, November 4th, 2019 at 4:10 p.m.
Room: 1400 BPS Bldg.
Host: Carlo Piermarocchi