Driven Dissipative Quantum Many-Body Physics with Strongly Interacting Photons

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Light consists of photons, mass-less particles that do not interact with one another. Recent technological developments however give rise to structures with strong interactions between light and matter in multiple nodes of a network. These devices may enable us to drive photons into novel strongly correlated quantum many-body regimes. Interestingly, these may by studied in non-equilibrium scenarios where inevitable photon losses are constantly compensated by input drives. They thus give rise to an intriguing class of quantum many-body systems where instead of ground or thermal states one is interested in the still largely unexplored stationary states of their driven and dissipative dynamics.

In this talk, I will present some of our recent approaches to this physics which consider networks of superconducting circuit cavities and discuss aspects of the phase diagrams for their stationary states.