Phase diagram of the driven-dissipative Bose-Hubbard model

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I will present recent theoretical results [1] on a driven-dissipative version of the Bose-Hubbard model describing strongly correlated photons (polaritons) moving in a planar array of coupled cavities. I will focus on the properties of steady states resulting from the competition bewteen the laser pump, injecting photons into the cavities, and the photon losses.

   The theory is based on the mean-field decoupling of the tunneling term, starting from the known exact solution of the quantum master equation for the single-cavity problem [2]. I will show that the self-consistent equation of the order-parameter (coherence) gives rise to multiple solutions, whose properties and collective oscillations are investigated.