ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

INSTITUT DE PHYSIQUE IPHYS

Theory Lunch Seminar

Towards a many-body physics of light

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One of the most recent frontiers in quantum optics is the study of many body physics of light. Photons, in resonant nanostructures, can be made strongly interacting thanks to tailored optical nonlinearities that are enhanced by strong light confinement. As a result, model many-body quantum systems can be conceived and are currently realized with superconducting circuits in the microwave range, while rapid progress is being made to achieve a similar goal in the range of optical wavelengths. After reviewing the main concepts and milestone results in this emerging field, I will present two of our research lines. The first is aimed at optimizing photonic nanostructures in order to achieve strong photon nonlinearities. The second is a study of the prototypical driven-dissipative Bose-Hubbard model on a lattice. When in presence of two-photon driving fields, this model is characterized by a local Z_2 symmetry, and displays a second order, dissipative phase transition, which simulates the physics of the Ising model. This setting could be generalized, in view of an all-optical quantum simulator.

Tuesday November 21st 2017 at 12:30 pm

Auditoire II, room N°234, BSP (Cubotron), EPFL