CEA - Saclay 91191 Gif-sur-yvette Cedex
Service de Physique de l'Etat Condensé
SÉMINAIRE

Mercredi 2 Octobre 2013 à 11h15

Orme des Merisiers SPEC, Salle Itzykson, Bât.774

POLARITON CONDENSATES IN PHOTONIC CIRCUITS

Jacqueline Bloch

Laboratoire de Photonique et de Nanostructures, LPN/CNRS Route de Nozay, 91460 Marcoussis, France Jacqueline.bloch@lpn.cnrs.fr

At the frontier between non-linear optics and the physics of Bose Einstein condensation, semiconductor microcavities opened a new research field, both for fundamental studies of bosonic quantum fluids in a driven dissipative system, and for the development of new devices for all optical information processing. Optical properties of semiconductor microcavities are governed by bosonic quasi-particles named cavity polaritons, which are light-matter mixed states. Cavity polaritons propagate like photons, but interact strongly with their environment via their matter component. After a general introduction on cavity polaritons, I will review recent experimental works performed on polariton condensates confined in microstructures. I will first show how we can generate, in one-dimensional cavities, polariton flows which propagate over macroscopic distances (mm), while preserving their spontaneous coherence. These propagation properties can be used to implement a variety of optically controlled polariton devices: the example of a non-linear resonant tunneling polariton diode will be addressed, a device very promising to reach the quantum regime of polariton blockade. The last part of the talk will be devoted to the physics of polaritons in periodic potentials. I will discuss polariton condensation in a 1D periodic potential, the generation of spontaneous spin currents in the photonic analog of a Benzene molecule (a ring of six coupled micropillars), and finally the direct visualization of Dirac cones in a honeycomb lattice (the photonic analog of graphene). These examples highlight the great potential of semiconductor cavities as a new platform to investigate the physics of interacting bosons.

A coffee break will be served at 11h00. The seminar will be given in English.

Contact : marcelo.goffman@cea.fr/sebastien.aumaitre@cea.fr - Tel : +33 1 69 08 55 29 / 74 37
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