

Prize Talk

PV III Mon 13:00 H1

Quantum degenerate Bose gases: Towards new frontiers with exciton-polaritons — REGIS ANDRE, JACEK KASPRZAK, MAXIME RICHARD, and •LE SI DANG — Institut Néel, CNRS-UJF, Grenoble, France — Träger des Gentner-Kastler-Preises

Microcavity polaritons are bosonic quasiparticles which result from the strong coupling between cavity photon modes and excitons modes confined in quantum wells embedded in the microcavity. By contrast to the bulk case, they feature a well defined ground state for in-plane

momentum $k = 0$. Thanks to a mass four orders of magnitude lighter than for free electrons, quantum degeneracy effects could be obtained for very low densities and high temperature, e.g. Bose-Einstein condensation (BEC) demonstrated up to 40 K in 2006 [1].

In this presentation, we review the key parameters to achieve polariton BEC and recent progress on the physics of polariton condensates. Next we examine prospects to produce degenerate Bose gases of polaritons at room temperature in novel confinement geometries such as one-dimensional microwires.

[1] J. Kasprzak et al., Nature 443, 409 (2006).