



Minicolloque « **Polaritonics** »

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Over the last ten years, European and in particular French research groups have demonstrated a strong leadership in the development of **exciton-polariton science** (cf. selected references below). Polaritons are hybrid excitations obtained in adequately designed semiconductor optoelectronic microstructures, where excitons (bound electron-hole pair excitation in semiconductor materials) and cavity confined photons are in the strong coupling regime [1].

Owing to their light mass, and excitonic fraction, polaritons constitute a unique experimental platform to study a driven-dissipative quantum fluid with interparticle interactions, for which Bose-Einstein condensation [2], superfluidity [3], and the spontaneous/controlled generation of a whole family of quantum hydrodynamics excitations (vortices, solitons) have been reported and investigated thoroughly [4].

Owing to recent progresses in semiconductor nanotechnology, advanced polaritonic microstructures allow an exquisite spatial control of polaritons that opens up an alternative route for quantum simulations. Recently for instance, graphene-like polariton band-structure has been achieved [5], black/white holes analogs have been demonstrated [6] for which Hawking radiation is actively sought after, and progresses have been made in the direction of realizing topologically protected polariton propagation states [7] by additionally exploiting the spin $\frac{1}{2}$ degree of freedom of polaritons and the effective spin orbit coupling provided by the solid state environment.

The nature of the polaritonic fluid is also a constant source of new physics as it challenges the textbook notion of quantum fluids at thermodynamical equilibrium. Using unconventional semiconductor materials to stabilize polaritons at room temperature [8], it offers an opportunity to study the management of heat [9] and the nature of quantum phase transitions [10] in a quantum fluid which is in a middle ground situation between driven-dissipative and thermally equilibrated

The aim of this **polaritonics** minicolloque is to bring together the leading actors of this very hot research field as well as researchers not necessarily involved in the polaritons community, but manipulating similar concepts and ideas. We thus welcome applications to contribute to this mini-colloque in this spirit.

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