Cavity Exciton-Polaritons, Spin Dynamics and Bose Einstein Condensation

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In this presentation, I will present the planar cavity polariton system [1]. I will discuss how the Bose Einstein Condensation of these quasi-particles is taking place, showing how this effect can lead to the realisation of a "polariton laser", a coherent light emitter with characterised by a very low threshold. I will then discuss the impact of the structural disorder on the polariton BEC, showing that it leads to a localisation of the condensate. This localisation can be overcome if the densities of particles in the system is large enough which allow for the polariton system to become superfluid [2].

In a second part I will introduce the spin structure of the cavity polaritons. I will explain the physical origin of the so-called spin Meissner effect which occurs when the spinor polariton condensate is placed in a magnetic field [3]. I will then consider the impact of the structural disorder on the spin Meissner phase. I will show the existence of a new type of condensed phase, where the polariton condensate is elliptically polarised, having one circular spin component localised in the minima of potentials and the other being delocalised and superfluid.

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[2] G. Malpuech, D. Solnyshkov, H. Ouerdane, M. Glazov, I. Shelykh, **Phys. Rev. Lett**. **98**, 206402 (2007).
[3] Y.G. Rubo, A. Kavokin, I. Shelykh., Phys. Lett. A, 358, 227, (2006).

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