Photonic Crystal Polaritons for Entangled Photon Generation - PCPol

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Abstract:
For the first year of the project we proposed the realization of the strong coupling regime between quantum well excitons and the photonic mode of a photonic crystal slab. The aim was to achieve the ability to tune the dispersion of polariton branches using the tuning abilities of photonic crystals. The main risk associated with the task consisted in the problem of nonradiative recombination of excitons which occurs when patterning a quantum well, and has the potential to hinder strong coupling between excitons and photonic modes.
Once the existence of exciton polaritons in photonic crystals is proved at the end of the first year, photonic structures will be designed to obtain phase matching for polariton scattering in such a way that signal and idler polariton state should have comparable photonic character. The occurrence of parametric fluorescence and parametric oscillations will then be experimentally investigated, and second order interference experiments will be set-up to prove the entangled nature of the emitted beams.

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