# Light-matter coupling in photonic crystal structures: from sea-mouse to exciton-polaritons

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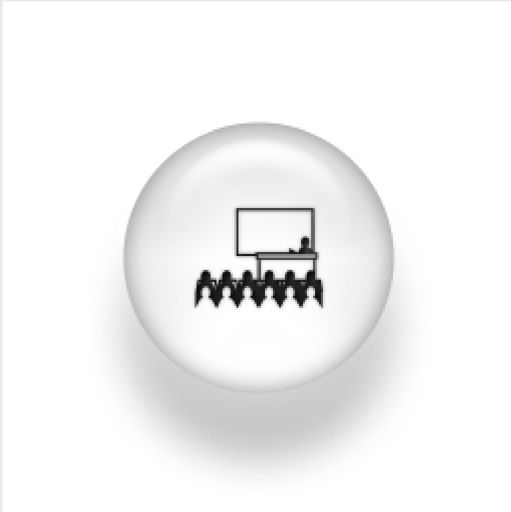

*Dr. Creatore Celestino*

Universitá degli Studi di Pavia, Italy

ABSTRACT:

Photonic crystals (PhCs), structures characterized by a spatially periodic dielectric function, are nowadays very appealing due to their rich physics. In particular, the occurrence of photonic band gaps, i.e. frequency regions where propagation of light is strongly inhibited, and the ability to manipulate and control the photonic flow of light, make PhCs interesting for many applications. Furthermore, the present accurate engineering of photonic states allows to investigate light-matter coupling in PhCs in both weak and strong coupling regimes. For the former limit, we examine the modifications of the spontaneous emission from a dipole embedded in a generic one-dimensional (1D) photonic structure, and we show a model derived within a quantum-electrodynamical formalism, discussing its extension to two-dimensional PhCs (like Photonic Crystal slabs). For the strong-coupling regime, we analyze some interesting features of Bragg-polaritons, i.e. the extra intragap modes resulting from the strong coupling between Bragg photon modes in a 1D Bragg mirror and bulk excitons.