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Low dimensional perovskites for quantum optics and polaritonics

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Metal halide perovskites (MHPs) have become attractive materials for light-matter interaction, and particularly for quantum optic devices [1]. Their advantages include straightforward fabrication by chemical synthesis, a broad bandgap tunability with the composition, the high emission efficiencies, and the high excitonic binding energy. Consequently, low dimensional MHPs have been incorporated in different microcavities resonators to demonstrate lasing, and more recently polariton condensation in cavity coupled lattices [1]. In this direction, perovskites 0D nanocrystals (NCs) and two-dimensional (2D) perovskites have emerged as a low dimensional MHPs with excellent properties to study Jaynes–Cummings or dressed Boson Hamiltonians. In contrast to 3D perovskites, the semiconducting inorganic layer in 2D perovskites passivated with insulating long organic cations forming a 2D quantum well structure owning a higher defect tolerance and resistance against environmental conditions [3]. Here, it will be summarized recent results from the optical characterization of low dimensional MHPs, for low-cost single photon emitters and for high tunability QED approaches, with fibre-based open-access optical microcavities. The open-cavity approach results as an outstanding scheme for the development of the exciting field of quantum polaritonics [4].

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Type of presence

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