Lasing in topological photonic lattices

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The implementation of topological effects in photonics has recently emerged as a promising research avenue for the manipulation of photons at the micron-scale [1]. The possibility of engineering the on-site energy and hopping makes polariton lattices an excellent platform to study this type of phenomena. In this presentation we will review our recent experiments on the topological properties of polariton lattices etched in semiconductor microcavities. In 2D, we have implemented honeycomb lattices in which polaritons behave as electrons in graphene, and we have studied the edge states that emerge from the topological properties of the lattice [2,3]. In 1D, we have fabricated lattices that implement the orbital version of the Su-Schrieffer-Heeger Hamiltonian. These lattices show lasing in topological edge states with resilience to disorder [4].

The implementation of these properties in the world of photonics opens new opportunities in the fabrication of micrometric scale photonic chips with properties intrinsically robust to noise, disorder and defects.

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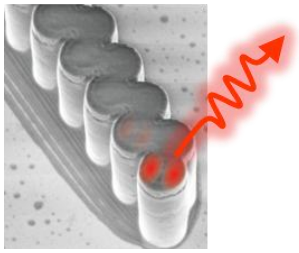

Figure 1: Zigzag lattice of polariton micropillars implementing the Su-Schrieffer-Heeger Hamiltonian and showing lasign in a topological edge state.