Topology in driven dissipative coupled Kerr resonators

Jacqueline Bloch*[1]

[1]Centre de Nanosciences et de Nanotechnologies (C2N) – CNRS - Université Paris-Sud – 91460, Marcoussis, France

Abstract

Exciton-polariton lattices obtained by coupling electronic excitations (referred to as excitons) to the photonic modes of coupled cavities provide a platform of choice for exploring non-linear topological physics.
I will discuss our recent progress in non-linear topological photonics using polariton lattices. I will address how we can use the Kerr non-linearity in a polariton lattice to shape topological properties of the linearized excitation spectrum: a topological edge state can be induced by a gap soliton (1) or a Thouless pump be implemented by adiabatic modification of the drive pattern (2). Finally I will discuss how the topological classification proposed by G. Villa and collaborators (4) provides interesting insight into the complex phase diagram of two coupled Kerr resonators. We observe peculiar hysteretical behaviors, when scanning the phase between the fields driving each of the resonators (3).

(1) N. Pernet et al., Nature Physics **18**, 678 (2022)

(2) S. Ravets et al., Phys. Rev. Lett. **134**, 093801 (2025)

(3) Nicolas Pernet, 2022 (https://theses.hal.science/tel-03917551)
(4) G. Villa et al., Science Advances 11, adt9311 (2025)

*Speaker