Polaritons in layered two-dimensional materials

Frank Koppens, ICFO (Barcelona)

Heterostructures of graphene and related two-dimensional materials are a promising new material system with virtually unlimited possibilities. Van der Waals heterostructures are constructed by vertically stacking atomically thin materials, selected from a rich palette of thousands of materials that can be semi-conducting, insulating, superconducting, metallic or magnetic. These are key enablers for tailoring new and unique electronic, optical and opto-electronic properties.

This platform has also emerged as a toolbox for in-situ control of a wide range of polaritons: plasmons, excitons and phonons. In this talk, we will show several examples of 2d material heterostructure devices with novel ways of exciting, controlling and detecting polaritons. We challenge the limits of quantum light-matter interactions and study the fundamental limits of optical field confinement, at the length-scale of single atoms.

References