Iliya Esin

Quantum Matter Manipulation with Coherent Bosons

Manipulating quantum matter via external stimuli is at the frontier of quantum materials science. In this talk, I will discuss the potential of using coherent bosonic fields—such as photons, phonons, and polaritons—to manipulate material properties on demand. A judicious choice of the system configuration and the bosonic driving field can lead to exotic non-equilibrium phenomena, including topological phases, spontaneous symmetry breaking, and metal-to-insulator transitions. In pursuit of realizing effective driving sources, I will introduce our latest work on developing a hyperbolic phonon-polariton laser. This device can serve as a tool for inducing and probing novel non-equilibrium phases in solid-state materials, with potential applications in electronics, quantum sensing, and computation.