

Dr. Hope Bretscher

Postdoctoral Fellow, Max Planck for Structure and Dynamics of Matter and Columbia University



Title: Device integrated quantum materials for probing and engineering light-matter hybrids

Abstract: In quantum materials embedded into devices, the macroscopic responses are not solely due to the intrinsic interactions of the materials. Instead, these interactions, and the resulting ground state physics, are modified by the specifics of the device integration. For instance, at meV energies or terahertz frequencies, the devices themselves form sub-wavelength cavities due to their micron-size, confining low-energy light into the near field. This provides a highly tunable platform for exploring and wielding enhanced light-matter coupling, resonant to the energy scale of many emergent phenomena and quantum phases. In this talk, I will review our efforts to utilize these self-cavities both to probe and manipulate low-dimensional materials. I will discuss a series of open questions within the field of cavity control of quantum phases, and propose future experimental routes to investigate the interaction between nonclassical light and quantum materials.