

Sensing Quantum Materials with New Electromagnetic Probes

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Abstract: The interaction between electromagnetic fields and condensed matter not only underpins much of modern technology, but also provides one of the most fundamental ways to study quantum materials. To this end, the ever expanding family of emerging phenomena in these materials calls for new electromagnetic probes working in unexplored parameter spaces. In this talk I will present two of such cases where deeply sub-wavelength probes allowed us to study interesting physics at length scales millions of times smaller than the corresponding free-space wavelength: Metallic magnetic domain walls in a magnetic insulator as a new class of interface states established by microwave impedance microscopy, and ultrafast charge transfer across a sub-nm van der Waals interface probed by time-domain THz emission spectroscopy. I will also discuss the exciting opportunities provided by advancing and combining several of these techniques to create an integrated extreme-broadband imaging and sensing system.

Bio: Eric Y. Ma received his B.S. in Physics from Peking University, and his Ph.D. in Applied Physics from Stanford University. He stayed at Stanford as a joint post-doctoral researcher in Applied Physics and Electrical Engineering. He has also held positions at Apple. Dr. Ma will join Berkeley Physics full time as an Assistant Professor in July 2021.