Condensed Matter Physics Seminar Series

Exploring piezomagnetic coupling in quantum materials

Linda Ye

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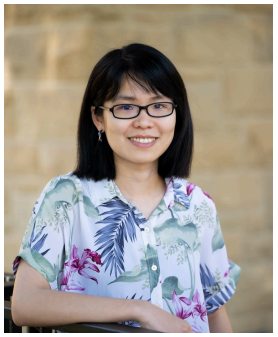

The piezomagnetic effect refers to a linear coupling between mechanical deformation and magnetization. Initially pointed out by Dzyloshinskii in 1950s from a symmetry point of view [1], piezomagnetic coupling is permitted in systems with broken time reversal symmetry and often accompanies a combined time reversal-rotation symmetry. In the context of emerging complex orders in quantum materials, piezomagnetic coupling can offer powerful insights into the underlying symmetries of a given system and the intricate interplay among mechanical, magnetic, and electronic degrees of freedom. In this talk, I will first demonstrate how this effect can be applied to probe the susceptibility of an otherwise elusive magnetic octupole order [2]. I will then show our recent applications of this effect to manipulate the domains of topological antiferromagnets. From the experimental perspective, we will introduce a new technique termed the elastocaloric effect [3] as a thermodynamic tool well suited for probing the piezomagnetic effect in broad classes of quantum materials.

Dr. Linda Ye joined the Division of Physics, Mathematics, and Astronomy at the California Institute of Technology as an Assistant Professor of Physics in September 2023. Prior to her appointment at Caltech, she was a Marvin Chodorow Postdoctoral Fellow at Stanford University. Dr. Ye earned her Ph.D. in Physics from the Massachusetts Institute of Technology in 2020, her M.Eng. in Applied Physics from the University of Tokyo in 2014, and her B.Sc. in Mathematics and Physics from Tsinghua University in 2012. Her research focuses on the design of topological and correlated quantum materials through a combination of materials synthesis, high-precision transport measurements, and cryogenic strain tuning. Dr. Ye made early contributions to the discovery of a novel class of quantum materials known as "kagome metals." She was awarded the Block Award by the Aspen Center for Physics in 2020 and was selected as a Gordon and Betty Moore Foundation Materials Synthesis Fellow in 2024.

Friday, October 25th at 10am
4-330 PAB