

MAR17-2016-000651

Abstract for an Invited Paper
for the MAR17 Meeting of
the American Physical Society

Evidence of a global inversion-symmetry-broken phase in the pseudogap region of $\text{YBa}_2\text{Cu}_3\text{O}_y$ ¹

DAVID HSIEH, California Institute of Technology

The temperature versus doping phase diagram of the cuprate high-temperature superconductors features an enigmatic pseudogap region that is characterized by a partial suppression of low energy electronic excitations. Identifying the complete set of symmetries underlying the pseudogap region is imperative to understanding its microscopic nature and relationship to superconductivity. In this talk I will describe the results of highly symmetry sensitive optical second harmonic generation experiments on $\text{YBa}_2\text{Cu}_3\text{O}_y$ across a wide temperature and doping range using a recently developed nonlinear optical rotational anisotropy technique. I will show evidence of a global inversion-symmetry-broken order that onsets at the pseudogap temperature and persists inside the superconducting dome in the overdoped regime, but shows no coupling to either charge density wave or superconducting order parameters. I will then discuss how these results relate to previous polarized neutron diffraction, Nernst effect and THz polarimetry data on $\text{YBa}_2\text{Cu}_3\text{O}_y$. Finally, I will show evidence of a remarkably similar phenomenon occurring in doped Sr_2IrO_4 , a strongly spin-orbit coupled analog of La_2CuO_4 , hinting at a robust connection between this hidden order and pseudogap physics that extends beyond the cuprates.

¹Supported by funding from ARO, NSF, Moore Foundation, CIFAR and NSERC.