

Condensed Matter Physics Seminar Series

Electronic nematic order in the normal state of strontium ruthenate

John Harter

University of California, Santa Barbara



Despite significant achievements in characterizing the properties of Sr_2RuO_4 over the last three decades, the precise nature of its electronic ground state is still unresolved. In this talk, I will detail our work uncovering evidence of electronic nematic order in the normal state of Sr_2RuO_4 , revealed by ultrafast time-resolved optical dichroism measurements of uniaxially strained thin films. This nematic order, whose domains are aligned by the strain, spontaneously breaks the four-fold rotational symmetry of the crystal. The temperature dependence of the dichroism resembles an Ising-like order parameter, and optical pumping induces a coherent oscillation of its amplitude mode. The existence of electronic nematic order in the normal state of Sr_2RuO_4 may have consequences for the form and mechanism of unconventional superconductivity in this material.

John Harter received his Ph.D. in physics from Cornell University in 2013 under the supervision of Kyle Shen, after which he worked as a postdoctoral scholar in the laboratory of David Hsieh at Caltech. He joined the UCSB Materials Department in 2017, where he is interested in topological, superconducting, and strongly-correlated materials. His group uses ultrafast optical techniques such as nonlinear spectroscopy and transient reflectivity, as well as angle-resolved photoemission spectroscopy, to study a wide variety of quantum materials. Prof. Harter received a Hellman Family Faculty Fellowship in 2021 and an NSF CAREER award in 2022.

Friday, November 3rd, 2023 at 4:00PM
4-330 PAB