

Abstract Submitted
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Ultrafast dynamics of hidden order in Sr_2IrO_4 probed by time-resolved nonlinear optical anisotropy ALBERTO DE LA TORRE, JOHN HARTEK, LIUYAN ZHAO, Caltech, GANG CAO, University of Kentucky, DAVID HSIEH, Caltech — The Mott insulator Sr_2IrO_4 is proposed to be a spin-orbit coupled analogue of the parent compound of cuprate high temperature superconductors. Moreover, the layered iridate has been shown to exhibit both a pseudogap and possibly d-wave superconducting phase upon doping. Recently, rotational anisotropy optical second harmonic generation (RA-SHG) measurements have revealed the existence of an additional hidden order in this system, which breaks both the rotational and inversion symmetries of the host lattice. Here we demonstrate the ability to drive the hidden order-disorder transition by light using a newly developed ultrafast extension of the RA-SHG technique that enables symmetry group changes to be resolved on ultrafast timescales. We will show that there exists a temperature dependent fluence threshold for this photo-induced phase transition and we will present a realistic model for understanding the ultrafast switching phenomenon and subsequent relaxation dynamics.

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