

Hidden Order in a Perovskite Iridate Revealed by Nonlinear Optics

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Iridium oxides are predicted to host a variety of exotic electronic phases emerging from the interplay of strong electron correlations and spin-orbit coupling. There is particular interest in the perovskite iridate Sr_2IrO_4 owing to its striking structural and electronic similarities to the parent compound of high- T_c cuprates La_2CuO_4 . Recent observations of Fermi arcs with a pseudogap behavior in doped Sr_2IrO_4 and the emergence of a d -wave gap at low temperatures further strengthen their phenomenological parallels. In this talk I will describe our recently developed nonlinear optical spectroscopy and wide field microscopy techniques, which are highly sensitive to both the lattice and electronic symmetries of crystals. I will present results on the Sr_2IrO_4 system that reveal a subtle structural distortion and a hidden electronic phase that have previously eluded other experimental probes. I will also draw contrasts with the behavior of its bilayer cousin $\text{Sr}_3\text{Ir}_2\text{O}_7$.