Magnetic and structural behaviors in (Sr$_{1-x}$La$_x$)$_2$IrO$_4$

XIANG CHEN, TOM HOGAN, CHETAN DHITAL, ZHENSONG REN, MANI POKHAREL, MENG LIANG YAO, CYRIL OPEIL, STEPHEN WILSON, Boston College — There has been a considerable amount of interest recently in exploring the compound Sr$_2$IrO$_4$ due to its similarity to the high-$T_c$ superconducting parent compound La$_2$CuO$_4$ and the possible realization of a parallel unconventional superconducting state by electron-doping. There has since been renewed effort attempting to doped electrons into prototypical spin-orbit driven Mott phases such as Sr$_2$IrO$_4$ (Sr-214), where La-substitution within (Sr$_{1-x}$La$_x$)$_2$IrO$_4$ remains one of the more promising avenues. Here we present a combined transport, magnetization, and diffraction study revisiting the mechanism and effect of doping in this compound. We will focus on how the evolution of known structural and electronic order parameters in the parent Sr$_2$IrO$_4$ evolve upon La-substitution.