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### **X-ray scattering and spectroscopy studies of strongly correlated iridates**

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Due to strong spin-orbit coupling and electronic correlation, iridates host a number of interesting quantum phases of matter. A broad overview of recent x-ray scattering and spectroscopy studies of iridates on honeycomb, pyrochlore, and square lattice will be given. In particular, we will focus on square lattice iridates, which exhibit physical and magnetic properties remarkably similar to those of cuprates, such as quasi-two-dimensional magnetism and very large magnetic exchange. Various studies found unusual metallic phases in  $\text{Sr}_2\text{IrO}_4$  doped with charge carriers [1-3]. We examine the case of partially replacing  $\text{Ir}^{4+}$  ions with  $\text{Rh}^{3+}$  ions, which corresponds to a hole-doping. Our magnetic x-ray scattering and x-ray absorption spectroscopy investigation reveal that the suppression of magnetic order and the rise of metallicity is described by a percolation picture [3]. We also obtained magnetic excitation spectra using resonant inelastic x-ray scattering (RIXS), which will be compared with those of cuprates and possible routes to high temperature superconductivity will be discussed [4].

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[2] C. Dhital et al., Nat. Comm. 5, 3377 (2014).

[3] J. P. Clancy et al., Phys. Rev. B 89, 054409 (2014).

[4] F. Wang and T. Senthil, Phys. Rev. Lett. 106, 136402 (2011).