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Tuning J_{eff}=1/2 magnetism and anisotropy in Sr_2IrO_4 through Ru substitution STUART CALDER, ORNL, J. W. KIM, APS, GUIXIN CAO, A. E. TAYLOR, A. F. MAY, C. CANTONI, ORNL, M. H. UPTON, Y. CHOI, D. HASKEL, APS, M. D. LUMSDEN, A. D. CHRISTIANSON, ORNL — Iridates can hosts a spin-orbit entangled ground state with J_{eff}=1/2 magnetic moments. Mapping of these pseudo-spins onto several distinct crystal structures has led to the uncovering of a variety of novel properties, such as Kitaev physics and Weyl semimetals. Sr_2IrO_4 is a canonical example of a J_{eff}=1/2 material and much interest has focused on the predictions of unconventional superconductivity driven by analogies to cuprates. In particular, proximity to a superconducting phase was strongly suggested by the magnetic excitation spectra which revealed striking similarities to La_2CuO_4 and was able to be described within a pure Heisenberg model consisting of spin-1/2 on a square lattice. We have investigated the series $Sr_2Ir_{1-x}Ru_xO_4$ with neutron and resonant x-ray scattering and found an evolution of magnetism from ab-plane to c-axis aligned spins [1]. Despite this change the J_{eff}=1/2 moments remain robust. By probing the excitations we observed a large spin-gap (40 meV) that indicates an alteration of the magnetic anisotropy associated with the parent. [1] S. Calder et al., PRB 92, 165128 (2015). [2] S. Calder et al., arXiv:1610.03399 (2016).

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