Novel Magnetism from the Spin-Orbit-Coupling Strength Alternation\textsuperscript{1} WEIGUO YIN, X. LIU, A.M. TSVELIK, M.P.M. DEAN, Brookhaven National Laboratory, M.H. UPTON, JUNGHO KIM, D. CASA, A. SAID, T. GOG, Argonne National Laboratory, T.F. QI, G. CAO, University of Kentucky, J.P. HILL, Brookhaven National Laboratory — We show that bringing close two magnetic ions with strong and weak spin-orbit coupling, respectively, can yield strong ferromagnetic anisotropy from antiferromagnetic superexchange. We applied this novel exchange anisotropy generating mechanism to explain the unique magnetism of the copper-iridium oxide Sr\textsubscript{3}CuIrO\textsubscript{6} containing chains of alternating Cu(II) and Ir(IV) ions. The calculated large-gap spin excitation spectrum agrees well with the Ir L\textsubscript{3} edge resonant inelastic x-ray scattering experiment. Our findings point to novel magnetic behavior to be expected in mixed 3\textit{d} – 5\textit{d} transition-metal systems via exchange pathways that are absent in pure 3\textit{d} or 5\textit{d} systems. Reference: W.-G. Yin et al., PRL 111, 057202 (2013).

\textsuperscript{1}Work supported by the US Department of Energy under Contract No. DE-AC02-98CH10886 and DE-AC02-06CH11357 and the NSF through Grant No. DMR-0856234.