Abstract Submitted
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Magnetic and Orbital Excitations in Sr_3CuIrO_6[1] J.P. HILL, X. LIU, M. DEAN, W. YIN, A. TSVELIK, Condensed Matter Physics and Materials Science, Brookhaven Natiional Laboratory, NY 11973, J. KIM, D. CASA, M.H. UPTON, APS, Argonne National Laboratory, Illinois 60439, USA, H. GRETARSSON, Y.-J. KIM, Dept. of Physics, University of Toronto, Canada M5S 1A7, T. QI, G. CAO, Dept. of Physics and Astronomy, U. Kentucky, Kentucky 40506., L. HOZOI, V. KATUKURI, J. V.D. BRINK, Institute for Theoretical Solid State Physics, IFW Dresden, 01069 Dresden, Germany — We report resonant inelastic x-ray scattering studies of the one-dimensional Sr_3CuIrO_6 at the Ir L_3 edge, with ΔE=40 meV. At high energies, we find peaks at 0.6 eV, 0.9 eV, 3 eV, 4 eV and 6 eV. These peaks are non-dispersive, well-defined excitations. On the basis of quantum chemistry calculations, we are able to identify the first two as excitations within the t_{2g} manifold and the next two as between the t_{2g} and e_g manifolds, together with charge transfer excitations from the O $2p$ to the Ir $5d$. The 6 eV feature is another t_{2g} - e_g excitation. From these we are able to determine both the spin-orbit and non-cubic crystal field splittings. We find that they are of comparable strength. In addition, magnetic excitations are observed, corresponding to excitations of the $j_{1/2}$ isospin. We find these are highly dispersive along the chain direction with a bandwidth of 20 meV and a gap of 30 meV. These results allow a complete modeling of the spin and orbital degrees of freedom in this model compound and we conclude an atomic, spin-orbit coupled description works well.

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John Hill
Condensed Matter Physics and Materials Science,
Brookhaven Natiional Laboratory, NY 11973

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