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LS separation of J=1/2 Mott insulator observed by magnetic X-ray diffraction SHIGEKI FUJIYAMA, RIKEN, B.J. KIM, Univ. Tokyo, H. OHSUMI, T. KOMESU, SPring-8, RIKEN, D. HIRAI, K. OHASHI, Univ. Tokyo, S. SAKAI, SPring-8, RIKEN, T. ARIMA, Tohoku Univ., H. TAKAGI, Univ. Tokyo
— Spin-orbit coupling is a key concept to realize spin Hall effect in insulating materials. A perovskite iridate Sr_2IrO_4 is known to show insulating transport properties in spite of large spatial extent of 5d electrons. The origin of this unconventional behavior is argued to be a strong LS coupling which results in $J_{\rm eff} = 1/2$ Mott insulator. We performed off-resonant magnetic X-ray scattering in the antiferromagnetically ordered state of this material and found that considerable contribution from orbital moment for the ordered moment. The estimated ratio, $\langle\psi|L_z|\psi|\rangle/\langle\psi|S_z|\rangle$ is 5. This is consistent with $J_{\rm eff} = 1/2$ which expects the ratio as 4. This justifies unconventional $J_{\rm eff} = 1/2$ Mott insulator for this transition metal oxides.

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