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Unusual ferromagnetism and strong spin-orbit coupling in Post-Perovskite $CaIrO_3$[1] LUKE MARSHALL, JINGUANG CHENG, JIANSHI ZHOU, JOHN B. GOODENOUGH, Texas Materials Institute, The University of Texas at Austin, DANIEL HASKEL, Advanced Photon Source, Argonne National Laboratory, MICHEL VAN VEENENDAAL, Advanced Photon Source, Argonne National Laboratory and Department of Physics, Northern Illinois University — Strong spin-orbit coupling (SOC) and strong correlations have been considered essential in understanding the unusual physical properties of the 4d and 5d transition-metal oxides, such as the SOC driven Mott insulating state in Sr_2IrO_4. Recently, an unusual atomic-like orbital moment and strong SOC have been confirmed experimentally in $9R-BaIrO_3$ through analysis of the branching ratio at the Ir $L_{2,3}$ absorption edges as obtained from x-ray absorption and x-ray magnetic circular dichroism (XMCD) measurements. We have applied the same techniques to probe unusual ferromagnetism and SOC in the post-perovskite (pPv) $CaIrO_3$, which is an insulator and exhibits weak ferromagnetism below $T_C \approx 110K$. The branching ratio at the Ir $L_{2,3}$ absorption edges, which is close to unity in pPv $CaIrO_3$, appears to indicate an even stronger spin-orbit interaction in the pPv $CaIrO_3$ than in $9R-BaIrO_3$. However, it has been challenging to model the Ir 5d orbital moment, as probed by the XMCD measurements, due to the understood local octahedral-site distortions.

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