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Electronic and magnetic properties of double-perovskite $(La_{1-x}Sr_x)_2CuIrO_6$ compounds S. X. ZHANG, W. K. ZHU, Indiana University, Bloomington, W. TONG, High Magnetic Field Laboratory, Chinese Academy of Sciences, PO-HAN LEE, National Taiwan Normal University, JEN-CHUAN TUNG, China Medical University, YIN-KOU WANG, National Taiwan Normal University, L. LING, High Magnetic Field Laboratory, Chinese Academy of Sciences, M. STARR, J. M. WANG, Indiana University, Bloomington, H. D. ZHOU, University of Tennessee, CHI-KEN LU, National Taiwan Normal University — Double perovskite oxides that combine 3d and 5d transition metal elements offer a model system to study novel electronic and magnetic states arising from the interplay of strong electron correlations and spin-orbit couplings (SOCs). In this work, we studied the electronic and magnetic properties of a double perovskite iridate La_2CuIrO_6 and its hole-doped compounds $(La_{1-x}Sr_x)_2CuIrO_6$. Magnetic susceptibility measurements suggest that the Ir sublattice and the Cu sublattice both form antiferromagnetic order but at two different temperatures. Two-dimensional magnetism that was reported in many other Cu-based double-perovskites is not observed in our samples, indicating the existence of Cu-Ir interaction despite a weak orbital mixing. Sr-doping is shown to decrease the magnetic ordering temperatures and enhance the electrical conductivity. Density functional theory (GGA+SOC+U) calculations suggest that an isolated band is generated above the Fermi level as a result of strong SOC and U. The exchange coupling constants between transition metal ions are estimated by calculating the total energies for various magnetic ground states with expanded unit cells.

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