

Abstract Submitted  
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**Ground State Tuning by Spin-Orbit Coupling and Lattice Degrees of Freedom in Single-Crystal  $\text{BaIr}_{1-x}\text{Ru}_x\text{O}_3$  ( $0 \leq x \leq 1$ )<sup>1</sup>** K. BUTROUNA, S.J. YUAN, T.F. QI, J. TERZIC, S. ASWARTHAM, L.E. DELONG, G. CAO, Center for Advanced Materials, Department of Physics and Astronomy, University of Kentucky, Lexington, Kentucky 40506, USA —  $\text{BaIrO}_3$  is a magnetic insulator driven by spin-orbit coupling (SOC) whereas  $\text{BaRuO}_3$  is a paramagnetic metal. The contrasting ground states provide a unique opportunity to study the role of the SOC and the lattice degrees freedom. Our investigation reveals that substitution of  $\text{Ru}^{4+}$  ( $4d^4$ ) ions for  $\text{Ir}^{5+}$  ( $5d^5$ ) ions in  $\text{BaIrO}_3$  reduces the magnitude of the SOC and the structural distortion. There are two major effects of Ru additions: (1) Light Ru doping ( $0 \leq x \leq 0.15$ ) prompts a simultaneous, precipitous drop in both the magnetic ordering temperature  $T_C$  and the electrical resistivity, which exhibits a crossover behavior from a metallic to an insulating state near  $T_C$ . (2) Heavier Ru doping ( $0.41 \leq x \leq 0.9$ ) induces a robust metallic state with a strong spin frustration.

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