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Competition between heavy-fermion and Kondo interaction in isoelectronic A-site ordered perovskites DEREK MEYERS, S. MIDDEY, University of Arkansas, J.-G. CHENG, Beijing National Laboratory for Condensed Matter Physics, S. MUKHERJEE, Department of Condensed Matter Physics and Materials Science, B.A. GRAY, Y. CAO, University of Arkansas, J.-S. ZHOU, J.B. GOODENOUGH, University of Texas, Y. CHOI, Advanced Photon Source, D. HASKEL, Advanced Photon Source, J.W. FREELAND, Advanced Photon Source, T. SAHA-DASGUPTA, S.N. Bose National Centre for Basic Sciences, J. CHAKHALIAN, University of Arkansas — With current research efforts shifting towards the 4d and 5d transition metal oxides, understanding the evolution of the electronic and magnetic structure as one moves away from 3d materials is of critical importance. Here we use X-ray spectroscopy and electronic structure calculations on A-site ordered perovskites with Cu in the A-site and the B-sites descending along the 9th group of the periodic table to elucidate the emerging properties of d-orbitals change from partially filled 3d, 4d, to 5d. The results show that when descending from Co to Ir charge transfers from the cuprate like Zhang-Rice state on Cu to the t_{2g} orbital of the B site. As the Cu orbital occupation approaches the Cu²⁺ limit, a mixed-valence state in CaCu₃Rh₄O₁₂ and heavy fermion in CaCu₃Ir₄O₁₂ are obtained. The investigated d-electron compounds are mapped onto the Doniach phase of the competing RKKY and Kondo interactions developed for f-electron systems.

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