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Local electronic structure and ferromagnetic interaction in $\text{La}(\text{Co,Ni})\text{O}_3$ S. SCHUPPLER, P. NAGEL, D. FUCHS, H. V. LÖHNEYSSEN, M. MERZ, M.-J. HUANG, Karlsruhe Institute of Technology — Perovskite-related transition-metal oxides exhibit properties ranging from insulating to superconducting as well as unusual magnetic phases, and cobaltates, in particular, have been known for their propensity for spin-state transitions. Nonmagnetic LaCoO_3 and paramagnetic LaNiO_3 are parent compounds for the $\text{La}(\text{Co}_{1-x}\text{Ni}_x)\text{O}_3$ (LCNO) family, which, for intermediate Ni content x , exhibits ferromagnetism. The local electronic structure and the ferromagnetic interaction in LCNO have been studied by x-ray absorption (XAS) and x-ray magnetic circular dichroism (XMCD). XAS indicates a mixed-valence state for both Co and Ni, with both valences changing systematically with increasing x . Simultaneously, a spin-state redistribution towards HS (Co site) and LS (Ni site) occurs, and temperature-dependent spin-state transitions are increasingly suppressed. XMCD identifies the element-specific contributions to the magnetic moment and interactions. A simple model based on a double-exchange-like mechanism between Co^{3+} HS and Ni^{3+} HS can qualitatively account for the evolution of ferromagnetism in the LCNO series.

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