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Momentum dependence in K-edge resonant inelastic x-ray scattering and its application to screening dynamics in CE-phase La0.5Sr1.5MnO4[1] K. H. AHN, New Jersey Institute of Technology, T. F. SEMAN, Northern Illinois University and Argonne National Laboratory, X. LIU, Beijing National Laboratory for Condensed Matter Physics , and Institute of Physics, Chinese Academy of Sciences, J. P. HILL, Brookhaven National Laboratory, M. VAN VEENENDAAL, Northern Illinois University and Argonne National Laboratory — We present a formula for the calculation of K-edge resonant inelastic x-ray scattering on transition metal compounds, based on a local interaction between the valence shell electrons and the $1s$ core hole. Extending a previous result, we include explicit momentum dependence and a basis with multiple core-hole sites. We apply this formula to a single-layered charge, orbital and spin ordered manganite, $La_{0.5}Sr_{1.5}MnO_4$, and obtain good agreement with experimental data, in particular with regards to the large variation of the intensity with momentum. We find that the screening in $La_{0.5}Sr_{1.5}MnO_4$ is highly localized around the core-hole site and demonstrate the potential of K-edge resonant inelastic x-ray scattering as a probe of screening dynamics in materials.

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