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Probing the Local Magnetic Order of Quasi-1D Cuprates with RIXS

Saturday, 17 September 2011 09:00 (30 minutes)

We have performed Resonant Inelastic X-ray Scattering (RIXS) at the Cu L- and O K-resonance at the ADRESS beamline of the Swiss Light Source on the quasi-one-dimensional cuprates Li2CuO2 and CuGeO3, prototype edge-sharing chain compounds showing different magnetic ground states at low temperature. The RIXS spectra display a complicated interplay of low-energy excitations from charge, orbital and lattice degrees of freedom.
In particular, we discuss charge transfer related spectral components in the scenario of exotic Zhang-Rice (ZR) singlet and triplet excitations which can be reached in the final state with O K-edge RIXS. Temperature dependent measurements evidence specific temperature behavior for the related peaks, strongly depending on the nature of the magnetic ground state. Our interpretation is further supported by state-of-the-art cluster-based RIXS calculations. Comparing the excitation energy of both ZR features allows to directly determine the binding energy of the Zhang-Rice singlet in Li2CuO2 from the spectra. Finally, this study suggests RIXS as an excellent probe for investigating local magnetic order.

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RIXS

Primary author: Dr MONNEY, C (Research Department Synchrotron Radiation and Nanotechnology, Paul Scherrer Institut, CH-5232 Villigen PSI, Switzerland,)

Co-authors: Dr GECK, J (Leibniz Institute for Solid State and Materials Research Dresden, D-01171 Dresden, Germany); Dr MALEK, J (Leibniz Institute for Solid State and Materials Research Dresden, D-01171 Dresden, Germany); Dr VAN DER BRINK, J (Leibniz Institute for Solid State and Materials Research Dresden, D-01171 Dresden, Germany); Dr ZHOU, K J (Research Department Synchrotron Radiation and Nanotechnology, Paul Scherrer Institut, CH-5232 Villigen PSI, Switzerland); Dr KRAUS, R (Leibniz Institute for Solid State and Materials Research Dresden, D-01171 Dresden, Germany); Dr KUZIAN, R (Leibniz Institute for Solid State and Materials Research Dresden, D-01171 Dresden, Germany); Dr DRECHSLER, S L (Leibniz Institute for Solid State and Materials Research Dresden, D-01171 Dresden, Germany); Dr SCHMITT, T (Research Department Synchrotron Radiation and Nanotechnology, Paul Scherrer Institut, CH-5232 Villigen PSI, Switzerland); Dr BISOGNI, V (Leibniz Institute for Solid State and Materials Research Dresden, D-01171 Dresden, Germany); Dr STROCOV, V (Research Department Synchrotron Radiation and Nanotechnology, Paul Scherrer Institut, CH-5232 Villigen PSI, Switzerland)

Presenter: Dr MONNEY, C (Research Department Synchrotron Radiation and Nanotechnology, Paul Scherrer Institut, CH-5232 Villigen PSI, Switzerland,)

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