

Ultrafast dynamics of antiferromagnetic fluctuations in the spin-chain CuGeO₃

Tuesday 29 October 2019 18:20 (50 minutes)

In the edge-shared spin-chain CuGeO₃, the relation between charge, spin and lattice degrees of freedom, giving rise to the Spin-Peierls transition, is still unclear. In this regard, Resonant Inelastic X-ray Scattering (RIXS) represent a very powerful tool, capable of probing elementary excitations involving different degrees of freedom in a single experiment. Recently, the advent of Free-Electron Laser sources enabled extending these capabilities to the time domain, allowing pump-probe experiments.

In the O K-edge RIXS spectrum of CuGeO₃, one of the charge transfer excitations is characterized by a sharp structure associated to the formation of the Zhang-Rice singlet. The probability for such non-local excitation channel depends on the short-range antiferromagnetic (AF) spin correlations between two neighboring CuO₄ plaquettes. We use a 266 nm ultrashort laser pump to excite carriers across the charge-transfer gap, removing spin-1/2 holes from the Cu sites and thus perturbing the local spin-correlations. We use O K-edge RIXS to probe the suppression and recovery of the Zhang-Rice singlet excitations, giving insight in the dynamics of the short-range AF magnetic interactions.

Position

Postdoc

Primary authors: Dr PARIS, Eugenio (Paul Scherrer Institute); Dr NICHOLSON, Christopher (Department of Physics, University of Fribourg); Mr TSENG, Yi (Paul Scherrer Institute); Dr COSLOVICH, Giacomo (SLAC National Accelerator Laboratory); Dr SCHLOTTER, William F. (SLAC National Accelerator Laboratory); Dr ZOHAR, Sioan (SLAC National Accelerator Laboratory); Dr LIN, Ming-Fu (SLAC National Accelerator Laboratory); Dr DAKOVSKI, Georgi L. (SLAC National Accelerator Laboratory); Prof. MONNEY, Claude (Department of Physics, University of Fribourg); Dr SCHMITT, Thorsten (Paul Scherrer Institut)

Presenter: Dr PARIS, Eugenio (Paul Scherrer Institute)

Session Classification: Poster session

Track Classification: Poster