

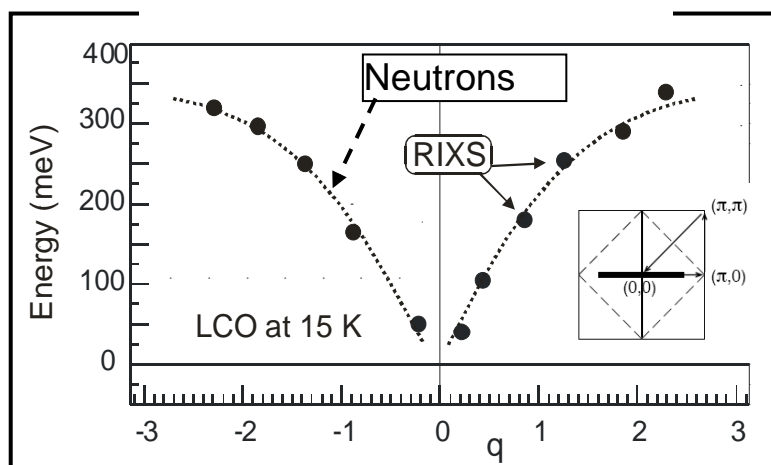
High Resolution RIXS in strongly correlated antiferromagnetic systems: results and perspectives

Lucio Braicovich

Dipartimento di Fisica del Politecnico di Milano, Italy

A breakthrough is our recent demonstration that it is possible to measure spin excitation in cuprates with RIXS at the L3 edge of Copper (1,2,3,4). It is discussed how these experiments should be done to obtain the maximum of information on magnons. In particular we show that the intensity of the signal is not symmetric in q $-q$ while the symmetry is obviously preserved in dispersion. Up to now the magnon dispersion could be obtained only with neutron scattering. Indeed the x-rays (used in the RIXS mode) extend dramatically the possibilities of experimental work since it becomes possible to study very tiny objects not accessible to neutrons as thin films and, in perspective, nano-objects having both fundamental and technological interest. In the presentation the main attention will be given to two benchmark cases i.e. undoped La_2CuO_4 and underdoped $\text{L}_{2-x}\text{Sr}_x\text{CO}$. In the underdoped case we have recently shown that spin excitations are seen in two branches up to about 300 meV and we discuss this result in connection with the dynamic stripe model. All these results have been made possible by the implementation at SLS of high resolution RIXS with a resolving power of the order of 10.000 at Cu L3 edge in collaboration with the Milano-Politecnico group (5). Some relevant aspects of the SLS instrumentation will be presented. Moreover the perspectives of RIXS with resolving power around 30.000 at the Grenoble-ESRF facility in collaboration with Milano-Politecnico are outlined.

RIXS vs Neutrons



RIXS
from ref 3

Neutrons
by Coldea et
al PRL June
2001

References

1. L. Braicovich et al. Phys. Rev. Lett. **102**, 167401 (2009)
2. L. Ament et al. **103**, 117003 (2009)
3. L. Braicovich et al. **104**, 077002 (2010)
4. L. Braicovich et al. Phys. Rev. B (in press)
5. G. Ghiringhelli et al. Rev. Sci. Instrum. **77**, 113108 (2006)

lucio.braicovich@fisi.polimi.it

INVITED