

Elastic and inelastic resonance in an electron doped cuprate superconductor

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We expanded our resonant elastic X-ray scattering data set for the copper K-edge of $\text{Nd}_{2-x}\text{Ce}_x\text{CuO}_4$ ($x=14\%$), and acquired resonant inelastic X-ray scattering data for a comparison of the two types of resonant signal.

Keywords : x-ray scattering, k-edge resonance

1. Purpose

The relationship between elastic and inelastic resonant enhancement has not been extensively investigated, and may help in addressing open questions regarding the K-edge resonant scattering process in cuprates. The purpose of this experiment was to enlarge our RIXS and REXS data sets on $\text{Nd}_{2-x}\text{Ce}_x\text{CuO}_4$, so that RIXS and REXS can be compared for the first time on an electron-doped cuprate.

2. Method

We measured total fluorescence yield, RIXS and REXS incident energy profiles with scattering wavevectors in the [001] plane. Because of limitations inherent to the REXS technique, all data were measured using the RIXS spectrometer in 90° scattering geometry, with momentum transfer (Q) wavevector near the Brillouin zone boundary.

3. Result

The RIXS profile near the Mott gap was successfully measured for comparison with elastic resonance in the [001] plane scattering geometry. Features attributed to the well screened resonance shifted to lower energies as a result of electron doping.

4. Conclusion

Incident energy profiles for RIXS and REXS were successfully measured for an electron doped system ($\text{Nd}_{2-x}\text{Ce}_x\text{CuO}_4$), providing an initial basis for comparing the two techniques.

5. Reference