# Elastic resonance in an electron doped cuprate superconductor

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We performed the new technique of resonant elastic x-ray scattering (REXS) at the copper-K edge of $Nd_{2-x}Ce_xCuO_4$ (x=0 and 14%) to observe the effect of electron doping and on the REXS profile of a two dimensional cuprate.

Keywords : x-ray scattering, k-edge resonance

## 1. Purpose

REXS is a new technique and has previously been performed on a very limited range of quasi-one and –zero dimensional cuprates. The main purpose of this experiment was to better understand the effects of dimensionality and electron doping on the REXS spectral function, with the hope of learning more about the NCCO system through a unique lens.

## 2. Method

We measured total fluorescence yield and REXS incident energy profiles under a range of polarization conditions in the [001] and [110] planes for samples with 0% and 14% electron doping.

The REXS technique is performed using a horizontal-scattering RIXS spectrometer in 90$^o$ scattering geometry, with an arbitrary momentum transfer (Q) wavevector. Incident energy and analyzer energy are varied in tandem to study resonance on the elastic line.

## 3. Result

The REXS profile was successfully measured for a wide range of polarization vectors in the [001] and [110] planes of each sample. The peak corresponding to c-axis polarization well screened resonance shifted to lower energies at higher electron doping, consistent with the inelastic resonance profile [1].

## 4. Conclusion

Polarization dependence in the REXS spectral function was successfully measured for NCCO at x=0 and 14% doping levels. Results were consistent with the hypothesis that electron doping results in two kinds of well screened resonance states [2-3], characterized in part by the presence or absence of a near-neighbor hole.

## 5. Reference

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