

Experimental report

30/08/2017

Proposal: 4-02-479

Council: 4/2016

Title: Field-induced low energy excitations in the co-doped superconductor $(\text{La,Sr})_2\text{CuO}_{4+y}$

Research area: Physics

This proposal is a new proposal

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Samples: $\text{La}_{1.94}\text{Sr}_{0.06}\text{CuO}_{4+y}$

Instrument	Requested days	Allocated days	From	To
THALES	5	5	07/10/2016	12/10/2016
IN3	0	3		

Abstract:

Despite immense research efforts, high temperature superconductivity remains a mystery. We will here study the interplay between magnetism and SC, in the co-doped cuprate $\text{La}_{2-x}\text{Sr}_x\text{CuO}_{4+\delta}$. We recently found that for $x=0.06$, there is no static magnetism in zero field, but an applied magnetic field would linearly induce a magnetic signal from incommensurate order. Previous inelastic neutron data shows a 5 meV spin gap in zero field, whereas data in 6 T show a complete absence of a gap. We aim to study the gap region in lower fields in order to elucidate how the gap fills upon application of a field.

Report of neutron scattering exp. on ThALES on magnetic excitations in LSCO+O in a magnetic field

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The sample is a co-doped LSCO+O crystal that exhibits static and dynamic magnetic stripes. The aim of this experiment was two-fold: 1) to measure the temperature dependence of the static stripes in applied magnetic field, and 2) to measure the dynamic stripes in a magnetic field. The experiment was a continuation of earlier experiments, and the results here complement the earlier results, although some questions are still left unanswered.

Examples of the raw data are shown in Fig. 1.

The temperature dependence of the elastic stripe order in two different applied magnetic fields is shown in Fig. 2

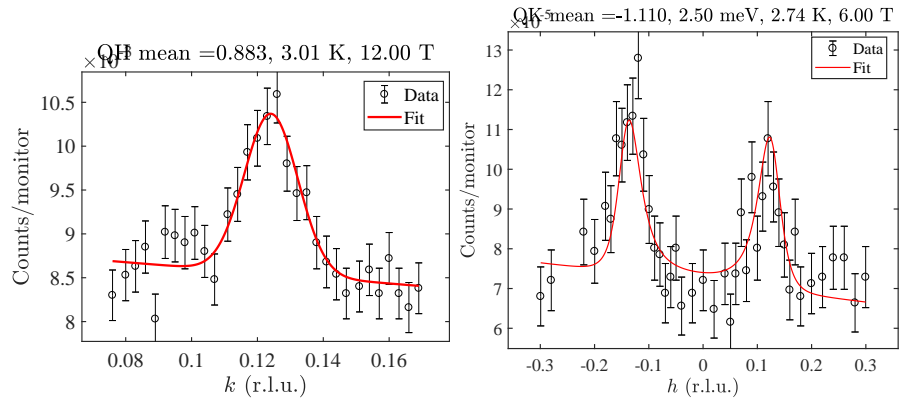


Figure 1: Example of the (left) elastic and (right) inelastic data on LSCO+O in this experiment in applied magnetic field, showing the peaks from magnetic stripes.

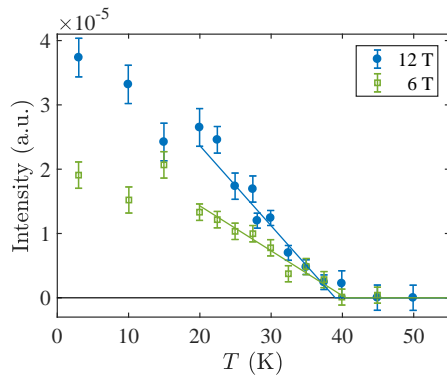


Figure 2: The temperature and magnetic field dependence of the stripes in this compound.