EUROPEAN SYNCHROTRON RADIATION FACILITY

INSTALLATION EUROPEENNE DE RAYONNEMENT SYNCHROTRON

ESRF

Experiment Report Form

ESRF	**Experiment title:** Magnetic and charge stripe excitations in $La_{2-x}Ba_xCuO_4$	**Experiment number**: HC 2015
Beamline:	**Date of experiment**: from: 16/02/2016 to: 23/02/2016	**Date of report**: 09/06/2016
Shifts: 18	**Local contact(s)**: Flora Yakhou-Harris	*Received at ESRF:*

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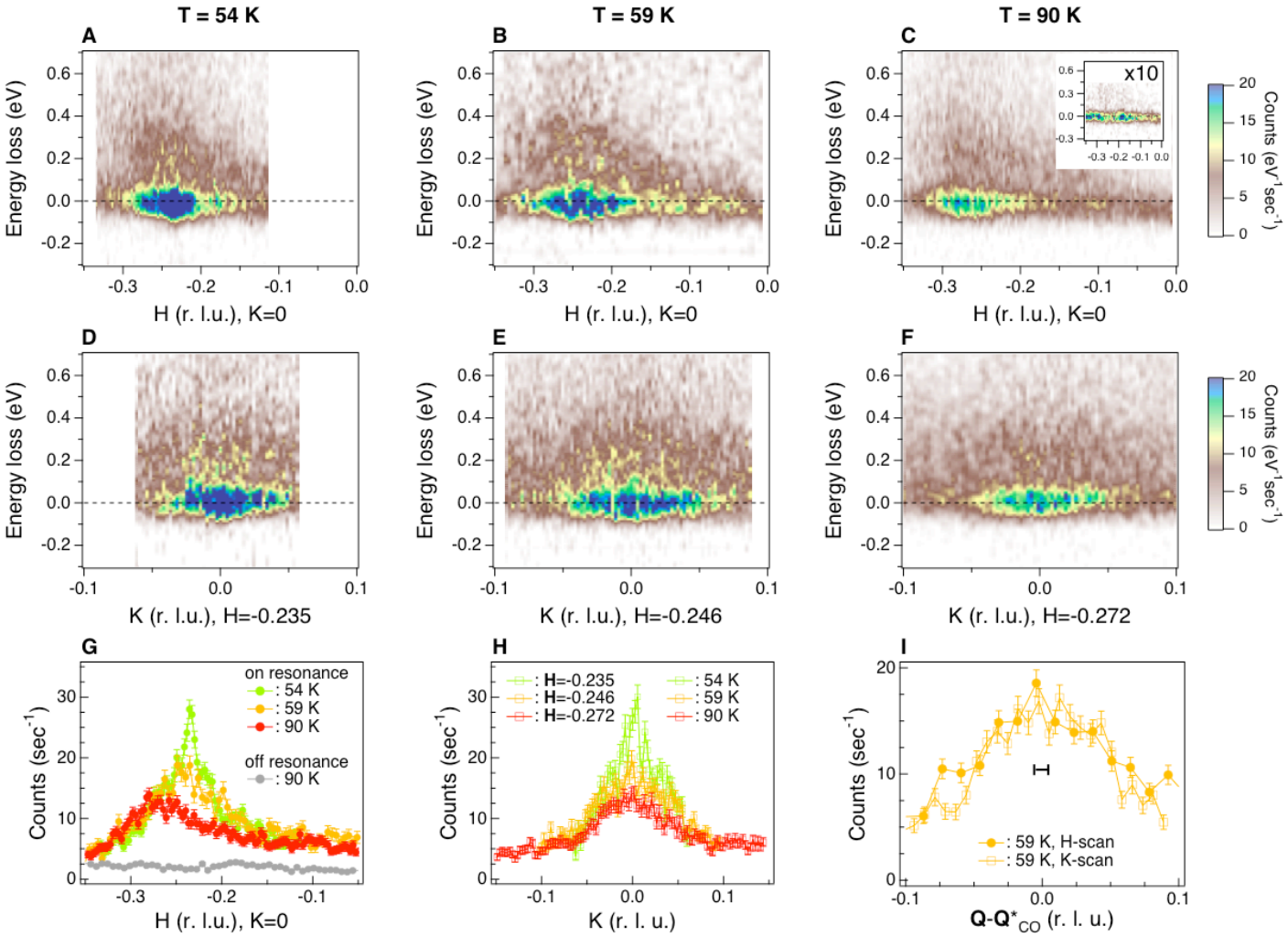
Report:

High-temperature charge density wave correlations in $La_{1.875}Ba_{0.125}CuO_4$ without spin-charge locking (Accepted to publish in PNAS)

Although all superconducting cuprates display charge-ordering tendencies, their low-temperature properties are distinct, impeding efforts to understand the phenomena within a single conceptual framework. While some systems exhibit stripes of charge and spin, with a locked periodicity, others host charge density waves (CDWs) without any obviously related spin order. Here we use resonant inelastic x-ray scattering (RIXS) to follow the evolution of charge correlations in the canonical stripe ordered cuprate $La_{1.875}Ba_{0.125}CuO_4$ (LBCO~1/8) across its ordering transition. We find that high-temperature charge correlations are unlocked from the wavevector of the spin correlations, signaling analogies to CDW phases in various other cuprates. This indicates that stripe orders at low temperatures is stabilized by the

coupling of otherwise independent charge and spin density waves, with important implications for the relation between charge and spin correlations in the cuprates.

Part of the data is shown in Figure 1. These panels show the RIXS intensity map along the H and the K direction at 54 K, 59 K and 90 K. A peak in the quasi-elastic intensity is clearly seen in the vicinity of Q_{CDW}, hence proves the existence of precursor CDW above the nominal CDW transition temperature at 55 K.



Our paper "High-temperature charge density wave correlations in $La_{1.875}Ba_{0.125}CuO_4$ without spin-charge locking" has accepted to publish in PNAS.