

Stripe Pinning in LBCO

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Soft X-ray coherent diffraction at NSLS-II has been used to address the pinning of stripes in the cuprate HTSC material $\text{La}_{1.825}\text{Ba}_{0.125}\text{CuO}_4$ (LBCO) [1]. LBCO's relatively long stripe correlation length of 26nm [2], compared with only 5.5nm for the YBCO, meant that the resonant signal level at CSX-1 was sufficient to record coherent diffraction at the charge-density wave (CDW) vector (0.24,0,1.5) on resonance at the Cu L_3 -edge. The CDW domains were found to be surprisingly static, with no evidence of significant fluctuations up to the 2.75 hour duration of the measurements from 15K up to 45K, approaching the stripe melting temperature [3]. To ensure consistent illumination of the same region, we introduced a fabricated pinhole array physically attached to the sample and attempted to depin the CDW domains using temperature excursions. We found that the observed pattern of stripe pinning is extremely robust and survives temperature sweeps as high as 220K, but not beyond. Since this temperature is close to the 235K "LTO-HTT" structural transition, we postulate that the pinning sites are the orthorhombic grain boundaries which are rearranged by crossing it. A possibly related "return point memory" effect has been studied before in magnetic systems [4,5], but never for CDWs. We are presently attempting to image the pattern of domains by inversion of the Bragg coherent diffraction pattern [6].

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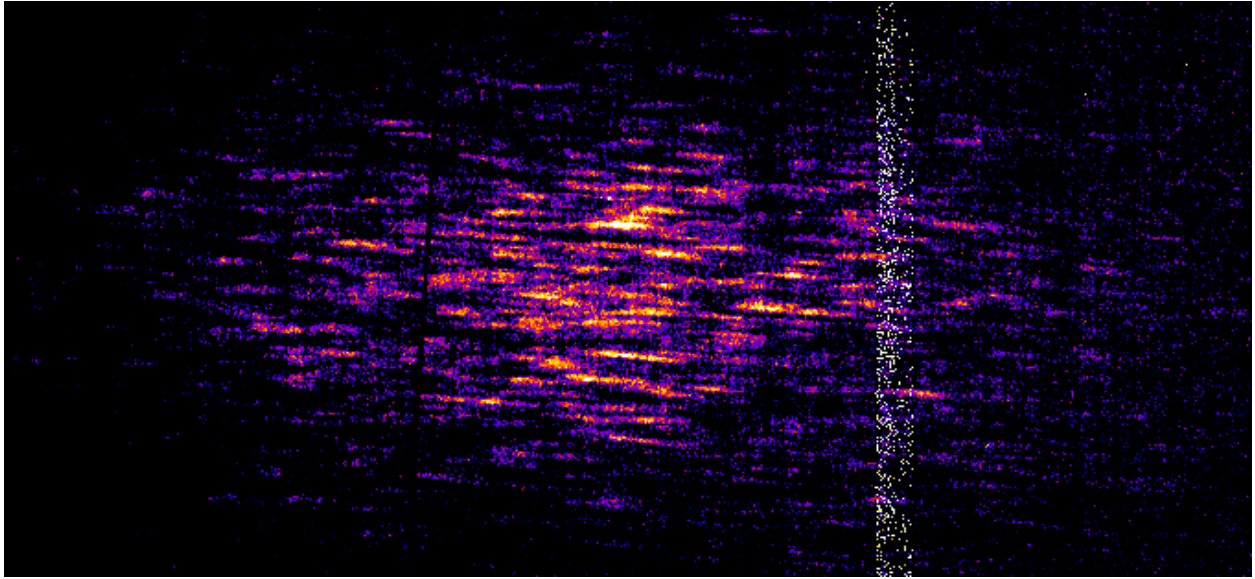


Figure caption. Coherent X-ray diffraction pattern of the cuprate $\text{La}_{1.825}\text{Ba}_{0.125}\text{CuO}_4$ (LBCO) recorded at the charge-density wave vector $(0.24, 0, 1.5)$ on resonance at the Cu L_3 -edge, using the CSX-1 beamline of NSLS-II.