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Magnetic Field and Temperature Dependence of Charge Stripe Order in La_{2-x}Ba_xCuO₄ ($x \sim 1/8$).¹
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We report a comprehensive x-ray scattering study of charge stripe ordering in La_{2-x}Ba_xCuO₄ ($x \sim 1/8$), for which the bulk superconducting T_c is greatly suppressed. We found that the charge order in this sample is described with one-dimensional charge density waves, which have incommensurate wave-vectors (0.23, 0, 0.5) and (0, 0.23, 0.5) respectively on neighboring CuO₂ planes. The structural modulation due to the charge stripe order is simply sinusoidal, and no higher harmonics were observed. Just below the structural transition temperature, short-range charge density wave correlation appears, which then develops into a large scale charge ordering around 40 K, close to the spin density wave ordering temperature. However, this charge ordering fails to grow into a true long range order, and its correlation length saturates at ~ 23 nm, and slightly decreases below about 15 K. In addition, we report our observation of the unusual magnetic field dependence of the charge order correlation length. Specifically, in the superconducting phase the charge order correlation length increases as the magnetic field greater than ~ 5 T is applied.

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