

MAR09-2008-001173

Abstract for an Invited Paper
for the MAR09 Meeting of
the American Physical Society

Theory of a striped superconductor

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In the spin and charge striped-ordered cuprate $\text{La}_{1.875}\text{Ba}_{0.125}\text{CuO}_4$, the bulk superconducting T_c is strongly suppressed to about 4K. Nevertheless, recent experiments revealed unusual superconducting fluctuations far above T_c . In particular, these experiments show evidence for 2D superconductivity in this 3D (albeit anisotropic) system, which is unprecedented. We propose an explanation of these results in terms of a new phase, the “striped superconductor”, in which the superconducting order parameter is modulated periodically in space and averages to zero. Such a state can naturally explain the apparent vanishing of the inter-layer Josephson coupling in $\text{La}_{1.875}\text{Ba}_{0.125}\text{CuO}_4$. We discuss several phenomenological features of this phase, including a unique sensitivity to disorder which can lead to an xy “gauge glass” phase that breaks time reversal symmetry spontaneously. Possible microscopic mechanisms leading to striped superconductivity will be briefly discussed.