Poster-1-25

Probing the electronic structure of cuprate vortex cores by STM

Tejas Parasram Singar,[1] Ivan Maggio-Aprile,[1] Genda Gu,[2] and Christoph Renner[1]

[1] *DQMP, University of Geneva, 24, Quai E-Ansermet,1211 Geneva 4, Switzerland*
[2] *National Laboratory, Upton, New York 11973, USA*

The magnetic vortices in cuprates have been intensely studied over the years. It has been known for a long that vortex halos of HTS cuprates host exotic electronic orders modulating the local density of states (LDOS) at atomic length scales [1]. Earlier scanning tunneling microscopy (STM) investigations revealed charge modulations oriented along the Cu-O bond directions (period ≈ four Bi-Bi lattice spacing) inside the vortex halo region [2], which were later understood in terms of dispersive vortex-enhanced quasi-particle interference patterns [3]. However, the vortex cores were still lacking conventional signatures such as the zero-bias conductance peak (ZBCP) at the core center originally predicted [4] for d-wave superconductors. Only recently, a study performed at a low field in heavily overdoped Bi-2212 reported the observation of d-wave core signatures [5]. Here, we present a thorough STM study of the charge order and vortex cores in Bi-2212 as a function of a very broad range of hole doping, magnetic field, and temperature. They provide novel insight into the checkerboard-like charge order, the subgap states and ZBCP in the vortex core, the pseudogap, and the superconducting gap.

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