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Observation of vortices and hidden pseudogap from scanning tunneling spectroscopic (STS) studies of electron-doped cuprate superconductor $La_{0.1}Sr_{0.9}CuO_2$ (La-112) M.L. TEAGUE, A.D. BEYER, N.-C. YEH, Phys. Dept, Caltech, Pasadena, CA, USA, S.-I. LEE, Phys. Dept Sogang U. Seoul, Korea — We present STS studies on the electron-doped cuprate superconductor La-112 as a function of magnetic field (H). The spatially resolved spectra manifest vortices, and the average vortex lattice constant scales consistently with Abrikosov's theory. A hidden pseudogap (V_{CO}) smaller than the superconducting gap (Δ_{SC}) is revealed inside the vortex core, and the core radius is comparable to the superconducting coherence length $\xi_{ab} = 4.86$ nm. Analysis of the energy histograms reveals that Δ_{eff}, where $\Delta_{eff}=[(\Delta_{SC})^2+ (V_{CO})^2]^{1/2}$, shifts downward with increasing H from $\Delta_{eff}= 12.2 \pm 0.8$ meV at H = 0 to a base value of $V_{CO}=8.5 \pm 0.6$ meV at H > 0. This finding differs from the behavior of conventional superconductors where the vortex-state spectral weight would shift continuously to lower energies with increasing H and show peaks at zero energy due to suppression of Δ_{SC} inside vortices. Finally, Fourier transformation of the vortex-state tunneling spectra will be reported and compared with results from other cuprates. Ref.: Teague et al., arxiv:0809.0541. Work supported by NSF Grant DMR-0405088.

Marcus Teague
Caltech

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