

Abstract Submitted
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Doping dependence of the upper critical field H_{c2} in the cuprate superconductor YBCO L. TAILLEFER, N. DOIRON-LEYRAUD, University of Sherbrooke (Canada), D. LEBOEUF, B. VIGNOLLE, C. PROUST, LNCMI, Toulouse (France), B.J. RAMSHAW, R. LIANG, D.A. BONN, W.N. HARDY, University of British Columbia (Canada) — It is generally thought that the upper critical field H_{c2} of underdoped cuprate superconductors is far greater than the vortex-solid melting field H_{vs} at which the state of zero resistance ends, even at $T = 0$ [1]. Here we compare electrical measurements of H_{vs} and thermal measurements of H_{c2} [2] in the cuprate YBCO and show that $H_{c2} = H_{vs}$ at $T \rightarrow 0$, strong evidence that there is no vortex liquid phase at $T = 0$. We then present extensive measurements of the electrical resistivity in high magnetic fields over a wide doping range, from which we obtain H_{c2} as a function of doping in YBCO. We find that H_{c2} collapses to remarkably low values in the underdoped regime, which we attribute to the competing effect of a phase with charge-density-wave order [3, 4], also responsible for a reconstruction of the Fermi surface [5, 6].

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[2] See APS talk by G. Grissonnanche.

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