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Raman Spectroscopy of the electron-doped cuprates in magnetic field M. M. QAZILBASH, R. L. GREENE, Center for Superconductivity Research, Department of Physics, University of Maryland at College Park, A. KOITZSCH, B. S. DENNIS, A. GOZAR, G. BLUMBERG, Lucent Technologies, Bell Laboratories, UNIVERSITY OF MARYLAND COLLABORATION, BELL LABS COLLABORATION — We investigate the influence of magnetic field on the electronic excitations across the superconducting (SC) gap of the electron-doped cuprates $R_{2-x}Ce_xCuO_{4-\delta}$ (R = Pr, Nd) for $0.13<x<0.18$. We report the anomalous result that the 2Δ coherence peak energy decreases rapidly with increasing field. In sharp contrast, the magnetic field has only a weak effect on the coherence peak energy in the hole-doped cuprates and conventional superconductors. We determine effective upper critical field lines H^*_{c2} at which the superfluid stiffness vanishes and $H^{2\Delta}_{c2}$ at which the SC amplitude is suppressed. We find that $H^{2\Delta}_{c2}$ is larger than H^*_{c2} for all dopings, especially for $x\leq 0.15$. Both $H^{2\Delta}_{c2}$ and H^*_{c2} decrease more rapidly with doping than T_c or 2Δ for $x>0.15$ (over-doped). The rapid increase of SC coherence length (several hundred Angstrom) with increasing doping implies a weak pair potential with less momentum dependence. This work was supported by NSF grant No. DMR 01-02350.

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