Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

The Specific Heat of $Na_{0.3}CoO_2{\cdot}1.3H_2O$: Two Superconducting Gaps R.A. FISHER, N. OESCHLER, N.E. PHILLIPS, LBNL and University of California, J.E. GORDON, Amherst College, M.L. FOO, R.J. CAVA, Princeton University — The specific heats (C) of three polycrystalline samples of $Na_{0.3}CoO_2{\cdot}1.3H_2O$ were measured in magnetic fields $0 \leq B \leq 9$ T. The first sample was not superconducting, but showed a small antiferromagnetic anomaly at $T_N \sim 6$ K. Samples two and three showed clean, but broadened, superconducting transitions with T_c's of 4.52 and 4.65 K, respectively, and no evidence of magnetic impurities. They have large non-superconducting fractions, and qualitatively different specific heats. In the normal state for both samples $\gamma = 16$ mJ K^{-2} mol^{-1}. For $B = 0$, both superconducting samples can be fit with two energy gaps (different in magnitude and fraction for each sample), one larger and one smaller than the BCS value. In a plot of $C/\gamma T$ vs. T/T_c for $B = 0$ the specific heat of the second sample is strikingly similar to that of MgB_2, an established two-gap superconductor. The evolution of $\gamma(B)/\gamma$ with B in the mixed state for the second sample will be contrasted to that of MgB_2.

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Date submitted: 20 Mar 2013 Electronic form version 1.4