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Heat capacity investigation of phase separation and spin-state transitions in $La_{1-x}Sr_xCoO_3$[1] CHUNYONG HE, University of Minnesota, HENG ZHENG, JOHN MITCHELL, Argonne National Laboratory, C. LEIGHTON, University of Minnesota — We present a heat capacity study (to 0.3 K) on $La_{1-x}Sr_xCoO_3$ single crystals ($0.00 < x < 0.30$). In doped samples we observe three contributions at low T; a lattice term ($\propto \quad T^3$), an electronic term ($\propto \quad T$), and a third term proportional to T^2. Remarkably, the x dependence of the electronic and T^2 contributions reflects very clearly the known magnetic phase separation, indicating that the T^2 term is a signature of the non-F matrix. Possible origins related to AF fluctuations will be discussed. At the lowest T the nuclear hyperfine contribution provides a further probe of magnetic order. The electronic contribution also gives the density of states at the Fermi level which, in combination with the hole density from Hall effect, suggests a large effective mass indicative of strong correlations. Finally, the end-member $LaCoO_3$ shows a striking Schottky anomaly providing new information on the controversial spin-state transition. In particular, we find further evidence of the around 0.5 meV excitation recently observed by inelastic neutron scattering.

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