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Low temperature Schottky anomalies in the specific heat of $LaCoO_3$: Defect-stabilized finite spin-states C. HE, Department of Chemical Engineering and Materials Science, University of Minnesota, H. ZHENG, J.F. MITCHELL, Materials Science Division, Argonne National Laboratory, M.L. FOO, R.J. CAVA, Department of Chemistry, Princeton University, C. LEIGHTON, Department of Chemical Engineering and Materials Science, University of Minnesota
— The nature of the thermally-induced spin-state transition in $LaCoO_3$ continues to be a matter of vigorous debate. Recent inelastic neutron spectroscopy studies revealed a thermally excited 0.6 meV excitation associated with this transition, close to earlier electron spin resonance work. We show here that measurement of the low temperature specific heat of $LaCoO_3$ single crystals reveals a previously unobserved Schottky anomaly with an energy level splitting, 0.5 meV, associated with the first excited spin-state of the Co^{3+} ion. These states persist well below 2 K and have a g-factor around 3.5, consistent with the high-spin spin-orbit triplet, implying the existence of a low density (approximately 0.1 % of the sites) of finite-spin Co ions *even in the $T = 0$ limit*. We propose that these states are trapped at defects and are consistent with the magnetic excitons observed in earlier work.

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