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High spin-low spin transition in insulating $CaMn_2Sb_2$[1]

J.W. SIMONSON, G. SMITH, M.C. ARONSON, Department of Physics and Astronomy, Stony Brook University — Layered manganese pnictides are often interesting compounds to compare with the iron pnictide superconductors. To this end, we have synthesized high quality flux-grown single crystals of $CaMn_2Sb_2$, which forms in a trigonal $CaAl_2Si_2$-type structure characterized by corrugated triangular Mn layers. Previously reported as a bad metal, we observe instead that this compound exhibits a distinct insulating trend in temperature-dependent resistivity measurements, including an enhancement of up to two orders of magnitude between 200 K and T_N = 85 K. Measurements of ac susceptibility exhibit an orientation- and highly field-dependent plateau across the same temperature range, while heat capacity measurements reveal a sharp feature at 85 K as well as a broad anomaly centered near 195 K. Curie-Weiss behavior above 300 K indicates the presence fluctuating moments with prevailing ferromagnetic interactions, corresponding to less than half the static moment reported for the antiferromagnetic ordered state. These results imply a temperature-induced high spin-low spin insulator-insulator transition.

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J. W. Simonson
Department of Physics and Astronomy, Stony Brook University

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