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Magnetic Susceptibility and Heat Capacity of Single Crystal CaV_2O_4 Containing $S = 1$ J_1-J_2 Antiferromagnetic Spin Chains[1] A. NIAZI, D. C. JOHNSTON, S. BUD'KO, D. L. SCHLAGEL, T. A. LOGRASSO, Ames Lab., Iowa State U., Ames, IA 50011, USA, A. HONECKER, TU Braunschweig, Inst. Theor. Phys., 38106 Braunschweig, Germany — The compound CaV_2O_4 has an orthorhombic *Pnam* structure and contains spin $S = 1$ zig-zag (J_1-J_2) chains running along the crystallographic b-axis. Structural considerations suggest that $J_1 \approx J_2$, which would result in competing frustrating antiferromagnetic (AF) interactions in this low-dimensional system. Previous studies on powders have suggested collinear spin models, a gapless chiral phase, or spin freezing below 20 K. We have grown single crystals of CaV_2O_4 for the first time and carried out magnetization and heat capacity measurements down to 1.8 K. We observe long-range AF ordering at $T_N = 54$ K with the easy axis being the c-axis, as reflected by anisotropic susceptibility χ below T_N. The magnetic specific heat $C_p^{mag}(T)$ up to 100 K, obtained after subtracting the lattice contribution of nonmagnetic isostructural $CaSc_2O_4$, shows a clear signature of long-range magnetic order at T_N. However, the molar entropy attains only $\approx 1/4$ of its maximum value 2Rln(3) by 100 K, indicating strong short range order above T_N and large values $J_1,\ J_2 > 100$ K. This is consistent with our estimates $J_1 \approx J_2 \sim 150$–300 K obtained by comparison of our $\chi(T)$ data with exact diagonalization calculations of $\chi(T)$.

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A. Niazi

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