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The lost heat capacity and entropy in the helical magnet MnSi
SERGEI STISHOV, ALLA PETROVA, Institute for High Pressure Physics of Russian Academy of Sciences, Troitsk, Moscow Region, Russia, ANATOLY SHIKOV, Russian Research Center Kurchatov Institute, Moscow 123182, Russia, THOMAS LOGRASSO, Ames Laboratory, Iowa State University, Ames, IA, EYVAZ ISAEV, Department of Physics, Chemistry and Biology, SE-581 83, Linkoping University, Sweden, BORIE JOHANSSON, Applied Materials Physics, Materials Science Department, The Royal Technological University, SE-100 44 Stockholm, Sweden, LUKE DAEMEN, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, USA — We report results of measurements and analysis of the heat capacity of MnSi. The measurements included data collection at a magnetic field of 4T, which suppresses strongly the longitudinal spin fluctuations and the phase transition. To analyze the experimental data, calculations of the phonon spectrum and phonon density of states in MnSi were performed. Inelastic neutron scattering with a polycrystalline sample of MnSi was used to validate the computational results. The combination of the experimental and theoretical data turned out to be decisive in revealing some hidden features of the thermal excitations in MnSi. In particular, the analysis of the available data led conclusively to the existence of a negative contribution to the heat capacity and entropy in MnSi at $T > T_c$, implying that a specific spin ordering process did occur in the paramagnet phase of MnSi.

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