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Magnetic and Thermal Properties of FeMn2O4 Single Crystals[1]

ROSHAN NEPAL, QIANG ZHANG, Department of Physics and Astronomy, Louisiana State University, Baton Rouge, LA 70803, WEI TIAN, STEPHEN NAGLER, Quantum Condensed Matter Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, RONGYING JIN, Department of Physics and Astronomy, Louisiana State University, Baton Rouge, LA 70803 — We have investigated the magnetic and thermal properties of single-crystalline $FeMn_2O_4$, which forms an inverse spinel structure. Specific heat and thermal conductivity reveal smooth but unusual temperature dependence below 400 K. Quantitative data analysis suggests that these quantities contain large magnetic contributions, reflected by the $T^{3/2}$ dependence of specific heat at low temperatures and the speedy drop of thermal conductivity below 75 K. Correspondingly, there is a sharp decrease of magnetization at $T_{N1} \approx 75$ K. Further investigation of neutron powder diffraction indicates that the system undergoes two magnetic transitions on cooling: one from paramagnetic to a collinear ferrimagnetic (FI) order at $T_{N2} \approx 420$ K, followed by another transition to a non-collinear FI order at $T_{N1} \approx 75$ K. The magnetic structure-property relationship will be discussed.

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