Heat transport study of a layered spin-dimer compound $Ba_3Mn_2O_8$

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Low-dimensional or frustrated quantum magnets usually exhibit exotic ground states, magnetic excitation, and quantum phase transitions. Magnetic excitations, which vary with quantum phase transitions induced by external magnetic field, have quite important effects on the transport property of the system.[1] Here we report the study on the low-temperature heat transport of $Ba_3Mn_2O_8$ single crystal, a layered spin-dimer compound exhibiting the magnetic-field induced magnetic order or the magnon Bose-Einstein condensation(BEC). The thermal conductivities(κ) along both the ab plane and the c axis show nearly isotropic dependence of magnetic field, that is, κ is strongly suppressed with increasing field, particularly at the critical fields of magnetic phase transitions. These results indicate that the magnetic excitations play a role of scattering phonons and the scattering effects enhanced when the magnetic field closes the gap in the spin spectrum. In addition, the magnons in the BEC state of this materials do not show notable ability of carrying heat.

[1]X. F. Sun, W. Tao, X. M. Wang, and C. Fan, Phys. Rev. Let. **102**, 167202 (2009).