Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Field induced phase transition in layered honeycomb spin system α-$RuCl_3$ studied by thermal conductivity[1] IAN LEAHY, ALEX BORNSTEIN, University of Colorado, Boulder, CO 80309, KWANG-YONG CHOI, Chung-Ang University, Seoul, South Korea, MINHYEA LEE, University of Colorado, Boulder, CO 80309 — α-$RuCl_3$, a quasi two-dimensional honeycomb lattice is known to be a candidate material to realize the Heisenberg-Kitaev spin model of a highly anisotropic bond-dependent exchange interaction. We investigate in-plane thermal conductivity (κ) as a function of temperature (T) and in-plane applied field (H). At $H = 0$, the onset of a strong increase in κ marks the spontaneous long range ordering temperature, $T_c = 6.5$K, corresponding to zigzag antiferromagnetic ordering. A broad peak appearing below T_c in κ was found to be suppressed significantly as H increases up to $\approx$ 7T, implying the system undergoes a field-induced transition from ordered to a new spin-disordered state analogous to the transverse-field Ising model. Further increasing H above 7.1T, the large field seems to begin polarizing spins thus increasing the phonon mean free path, resulting in a significant rise in κ. This tendency is clearly shown in the field dependence of κ below T_c, which has a pronounced minimum at $H_{\min} = 7.1$T. We will discuss our scaling analysis to characterize this field-induced phase transition and compare to the transverse-field Ising spin system.

[1]Work at the University of Colorado was supported by the US DOE Basic Energy Sciences under Award No. DE-SC0006888

Ian Leahy
University of Colorado, Boulder, CO 80309

Date submitted: 06 Nov 2015 Electronic form version 1.4