Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

**Magnetic Excitations in $\alpha$-$RuCl_3$**[1] STEPHEN NAGLER, ARNAB BANERJEE, QCMD, Oak Ridge National Laboratory, CRAIG BRIDGES, CSD, Oak Ridge National Laboratory, JIAQIANG YAN, MSTD, Oak Ridge National Laboratory, DAVID MANDRUS, Dep. of Mat. Sci. and Eng., U. Tennessee, MATTHEW STONE, ADAM ACZEL, QCMD, Oak Ridge National Laboratory, LING LI, Dep. of Mat. Sci. and Eng., U.Tennessee, YUEN YIU, Dep. of Physics, U. Tennessee, MARK LUMSDEN, QCMD, Oak Ridge National Laboratory, JOHANNES KNOLLE, RODERICH MOESSNER, Max-Planck-Institut, Dresden, ALAN TENNANT, NScD, Oak Ridge National Laboratory — The layered material $\alpha$-$RuCl_3$ is composed of stacks of weakly coupled honeycomb lattices of octahedrally coordinated $Ru^{3+}$ ions. The Ru ion ground state has 5 d electrons in the low spin state, with spin-orbit coupling very strong compared to other terms in the single ion Hamiltonian. The material is therefore an excellent candidate for investigating possible Heisenberg-Kitaev physics. In addition, this compound is very amenable to investigation by neutron scattering to explore the magnetic ground state and excitations in detail. Here we discuss new time-of-flight inelastic neutron scattering data on $\alpha$-$RuCl_3$. A high energy excitation near 200 meV is identified as a transition from the single ion J=1/2 ground state to the J=3/2 excited state, yielding a direct measurement of the spin orbit coupling energy. Higher resolution measurements reveal two collective modes at much lower energy scales. The results are compared with the theoretical expectations for excitations in the Heisenberg - Kitaev model on a honeycomb lattice, and show that Kitaev interactions are important.

[1]Research at SNS supported by the DOE BES Scientific User Facilities Division

Stephen Nagler
QCMD, Oak Ridge National Laboratory

Date submitted: 14 Nov 2014 Electronic form version 1.4