Spin liquid state in the S=1 vanadium kagome YCa$_3$(VO)$_3$(BO$_3$)$_4$

CHRISTOPHER WIEBE, University of Winnipeg, HARLYN SILVERSTEIN, University of Manitoba, JASON GARDNER, NIST NCNR, HAIDONG ZHOU, University of Tennessee-Knoxville — Over the last decade, the search for model kagome compounds has been fruitful for S=1/2 Cu$^{2+}$ spins in the minerals Herbertsmithite and Volborthite [1-2]. There are fewer comparable materials for S=1 analogues, but recent progress has been made with the discovery of YCa$_3$(VO)$_3$(BO$_3$)$_4$, which has a network of V$^{3+}$ kagome spins [3]. Previous reports were made of no magnetic ordering down to 1.5 K in this compound, despite strong antiferromagnetic exchange [3]. Here we report a new synthesis method for this material which reduces impurity levels, resulting in high quality polycrystalline samples of YCa$_3$(VO)$_3$(BO$_3$)$_4$. Neutron scattering experiments show no evidence for long-ranged magnetic ordering down to 50 mK, with gapped inelastic excitations developing similar to S=1/2 kagome compounds. Heat capacity and susceptibility measurements also show a lack of long-range magnetic order and a lack of spin glassiness, placing this compound as a new spin liquid candidate.


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