**BaTb2O4 - a Large Moment Spin Liquid Candidate**

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**Introduction**

 BaTb2O4 is a spin liquid candidate with large Tb3+ magnetic moments. The magnetic structure is frustrated, containing zigzag chains along the c-axis. Despite the onset of Tb3+ short-range antiferromagnetic correlations below 18.5 K and a large effective moment, it remains paramagnetic for temperatures down to at least 95 mK (SR). The magnetic properties are strikingly similar to the pyrochlore antiferromagnet Tb2Ti2O7.

**Experimental**

 To complement previous measurements and to respond to referees, we have measured heat capacity in a PPMS up to 12 T and down to 2 K.

**Results and Discussion**



**Fig. 1** a) Structure of BaTb2O4 with the two Tb3+ sites shown in green and red. b) Magnetic susceptibility down to 2 K and c) Heat capacity of polycrystalline BaTb2O4 measured in a PPMS down to 2 K, and in a dilution refrigerator to 200 mK.

The heat capacity of polycrystalline BaTb2O4 is shown in Fig. 1c. A broad Schottky anomaly can be observed at H = 0 centered at 1.5 K likely due to a crystal-electric field. The peak shifts to higher temperatures in applied magnetic fields and vanishes by 6 T, down to 3 K. At the lowest temperatures, an upturn can be attributed to a nuclear Schottky anomaly.

**Conclusions**

 The combined thermodynamic, neutron diffraction, and SR data support the idea that BaTb2O4 is a spin liquid, with no magnetic ordering observed down to 95 mK. Heat capacity shows no ordering down to 200 mK, and a broad crystal-electric field feature at 1.5 K.

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**References**

[1] A. A. Aczel, L. Li, V. O. Garlea, J.-Q. Yan, F. Weickert, V. S. Zapf, R. Movshovich, M. Jaime, P. J. Baker, V. Keppens, and D. Mandrus, Phys. Rev. B 92, 041110(R) (2015)