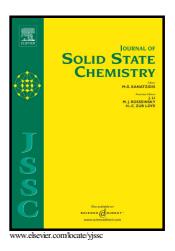
## Author's Accepted Manuscript

Type I antiferromagnetic order in Ba<sub>2</sub>LuReO<sub>6</sub>: Exploring the role of structural distortions in double perovskites containing 5d<sup>2</sup> ions

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### **ACCEPTED MANUSCRIPT**

Type I antiferromagnetic order in  $Ba_2LuReO_6$ : Exploring the role of structural distortions in double perovskites containing  $5d^2$  ions

Jie Xiong, <sup>1</sup> Jiaqiang Yan, <sup>2,3</sup> Adam A. Aczel, <sup>4</sup> Patrick M. Woodward <sup>1\*</sup>

<sup>1</sup> Department of Chemistry and Biochemistry, The Ohio State University, Columbus, Ohio 43210-1185, USA

<sup>2</sup> Materials Science and Technology Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA

<sup>3</sup> Department of Materials Science and Engineering, The University of Tennessee, Knoxville, TN 37996, USA

<sup>4</sup> Quantum Condensed Matter Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA

\*Corresponding Author. woodward@chemistry.ohio-state.edu

#### **Abstract**

The structural, electrical, and magnetic properties of the double perovskite  $Ba_2LuReO_6$  have been examined. It is an insulator whose temperature dependent conductivity is consistent with variable range hopping electrical transport. A transition to an antiferromagnet state with type I order occurs below  $T_N = 31$  K. High resolution time-of-flight neutron powder diffraction measurements show that it retains the cubic double perovskite structure down to 10 K. High intensity, low resolution neutron powder diffraction measurements confirm the antiferromagnetic order and indicate that cubic symmetry is still observed at 1.5 K. The small ordered moment of  $0.34(4)\mu_B$  per Re is comparable to estimates of moments on  $5d^2$  ions in other antiferromagnetically ordered cubic double perovskites. Comparisons with related double perovskites containing  $5d^2$  ions, such as  $Os^{6+}$  and  $Re^{5+}$ , reveal that subtle changes in structure or

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