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**Frustration by competing interactions in the highly-distorted double perovskites $La_2NaRuO_6$ and $La_2NaOsO_6$** A.A. ACZEL, Quantum Condensed Matter Division, Oak Ridge National Laboratory, D.E. BUGARIS, Department of Chemistry and Biochemistry, University of South Carolina, L. LI, Department of Materials Science and Engineering, University of Tennessee, J.-Q. YAN, Department of Materials Science and Engineering, University of Tennessee and Materials Science and Technology Division, Oak Ridge National Laboratory, C. DE LA CRUZ, Quantum Condensed Matter Division, Oak Ridge National Laboratory, H.-C. ZUR LOYE, Department of Chemistry and Biochemistry, University of South Carolina, S.E. NAGLER, Quantum Condensed Matter Division, Oak Ridge National Laboratory — The usual classical behavior of S = 3/2, B-site ordered double perovskites results in simple, commensurate magnetic ground states. In contrast, heat capacity and neutron powder diffraction measurements for the S = 3/2 systems $La_2NaB'O_6$ (B' = Ru, Os) reveal an incommensurate magnetic ground state for $La_2NaRuO_6$ and a drastically suppressed ordered moment for $La_2NaOsO_6$. This behavior is attributed to the large monoclinic structural distortions of these double perovskites. The distortions have the effect of weakening the nearest neighbor superexchange interactions, presumably to an energy scale that is comparable to the next nearest neighbor superexchange. The exotic ground states in these materials can then arise from a competition between these two types of antiferromagnetic interactions, providing a novel mechanism for achieving frustration in the double perovskite family. Work at ORNL is supported by the Division of Scientific User Facilities and the Materials Science and Engineering Division, DOE Basic Energy Sciences. Work at the University of South Carolina is supported by the Heterogeneous Functional Materials Research Center, funded by DOE under award number de-sc0001061.

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