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Evidence for high temperature orbital fluctuations in $La_4Ru_2O_{10}$ PETER KHALIFAH, University of Massachusetts - Amherst, BRIAN SALES, DAVID MANDRUS, Oak Ridge National Laboratory, QINGZHEN HUANG, National Institute of Standards and Technology, RAYMOND OSBORN, Argonne National Laboratory, STEPHEN NAGLER, MARK LUMSDEN, Oak Ridge National Laboratory, CHRISTOPHER KENDIZORA, Naval Research Laboratory, EMIL BOZIN, SIMON BILLINGE, Michigan State University, ROBERT CAVA, Princeton University — Among ruthenates, the compound $La_4Ru_2O_{10}$ is unique in having a complete orbital ordering transition. Upon cooling below $T_{OO} = 160$ K, the magnetism of this compound is abruptly quenched. Initial crystallographic studies of this phase [1] showed that strong distortions in the Ru-O bond lengths appear only below T_{OO} . We have found distinctly different thermal conductivities of single-crystal $La_4Ru_2O_{10}$ above and below T_{OO} . At high temperatures, this material unexpectedly behaved as a thermal glass, providing strong evidence for dynamic orbital fluctuations in $La_4Ru_2O_{10}$. This is supported by a detailed analysis of the atomic displacement parameters (ADPs) of this material. We will discuss our current model for orbital ordering in $La_4Ru_2O_{10}$, the differences in the local and average structure of this material, and the reasons for the strong magnetoelastic coupling in this phase. [1] P. Khalifah, R. Osborn, Q. Huang, H. W. Zandbergen, R. Jin, Y. Liu, D. Mandrus, and R. J. Cava. "Orbital ordering transition in La₄Ru₂O₁₀", Science, 297, 2237-40 (2002).

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