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Rare orbital glass state in single crystalline $Y_2Mo_2O_7$ HARLYN SILVERSTEIN, University of Manitoba, HAIDONG ZHOU, National High Magnetic Field Laboratory, ALANNAH HALLAS, University of Manitoba, JASON GARDNER, YIMING QIU, National Institute of Standards and Technology, GEORG EHLERS, ANDREI SAVICI, Oak Ridge National Laboratory, ZAHRA YAMANI, Chalk River Laboratories, MICHEL GINGRAS, University of Waterloo, BRUCE GAULIN, KATHARINA FRITSCHE, KATE ROSS, McMaster University, CHRISTOPHER WIEBE, University of Winnipeg — Perhaps one of the most curious cases of frustrated pyrochlores, $Y_2Mo_2O_7$was first classified as a spin glass in 1986. Conventionally, spin glasses must exhibit some sort of chemical disorder although oxygen vacancies and Y-Mo site mixing is virtually absent in all studies to date. NMR and neutron PDF experiments show the presence of local disorder. While other studies have shown a lattice deformation occurring near T_g=22K, these distortions cannot be detected globally and may not be enough to explain the spin glass behavior. For 25 years, researchers have struggled to resolve spin glass theory with the data; the problem lies in that, until now, scientists have been unable to grow single crystal samples due to the oxidation of Mo^{4+} to Mo^{6+} at low temperatures. Here, we report the synthesis and characterization of the world's first single crystalline sample of $Y_2Mo_2O_7$. Unlike powder samples, single crystalline $Y_2Mo_2O_7$ heat capacity measurements show a T^2 dependence. Neutron scattering experiments show isotropic, broad, liquid-like collective modes and high-Q diffuse scattering characteristic of an orbital liquid to orbital glass transition at T_g.

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