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From Spin Glass to Spin Liquid Ground States in Molybdate Pyrochlores BRUCE GAULIN, LUCY CLARK, Department of Physics and Astronomy, McMaster University, GORAN NILSEN, Institute Laue-Langevin, EDWIN KERMARREC, Department of Physics and Astronomy, McMaster University, GEORG EHLERS, Oak Ridge National Laboratory, KEVIN KNIGHT, ISIS Rutherford Appleton Laboratory, ANDREW HARRISON, Diamond Light Source, PAUL ATTFIELD, University of Edinburgh — The rare earth molybdate pyrochlores are a well-studied family of geometrically frustrated magnetic materials and in particular, the spin glass ground state in $Y_2Mo_2O_7$ in the absence of disorder continues to be of interest. Here we will present a study of the Lu-based analogue $Lu_2Mo_2O_7$, which displays a transition to a spin glass state at $T_f = 16$ K and an unusual T^2 dependence of low temperature heat capacity. Our neutron scattering studies reveal a build-up of diffuse elastic magnetic scattering and the collapse of the inelastic scattering intensity into the elastic line at T_f. Furthermore, we will show that the O^{2-} anions within $Lu_2Mo_2O_7$ can be topochemically substituted for N^{3-}, which consequently oxidizes the molybdenum cations and drives down their spin quantum number from Mo^{4+} $S = 1$ to Mo^{5+} $S = \frac{1}{2}$. This new oxynitride phase shows an absence of magnetic order despite strong antiferromagnetic exchange and the persistence of inelastic neutron scattering down to low energy scales. Our results on the oxynitride $Lu_2Mo_2O_5N_2$ are consistent with a gapless spin liquid, which highlights the significant role of quantum fluctuations [1]. [1] L. Clark et al., Phys. Rev. Lett. 113, 117201 (2014)

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