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Geometric Magnetic Frustration in $Li_3Mg_2OsO_6$ Studied with Muon Spin Relaxation[1] J. P. CARLO, Villanova University, S. DERAKSHAN, California State University - Long Beach, J. E. GREEDAN, McMaster University — Geometric frustration manifests when the spatial arrangement of ions inhibits magnetic order. Typically associated with antiferromagnetically (AF)-correlated moments on triangular or tetrahedral lattices, frustration occurs in a variety of structures and systems, resulting in rich phase diagrams and exotic ground states. As a window to exotic physics revealed by the cancellation of normally dominant interactions, the research community has taken great interest in frustrated systems. One family of recent interest are the rock-salt ordered oxides A_5BO_6, in which the B sites are occupied by magnetic ions comprising a network of interlocked tetrahedra, and nonmagnetic ions on the A sites control the B oxidation state through charge neutrality. Here we will discuss studies of $Li_3Mg_2OsO_6$ using muon spin relaxation (μSR), a highly sensitive local probe of magnetism. Previous studies of this family included Li_5OsO_6, which exhibits AF order below 50K with minimal evidence for frustration, and Li_4MgReO_6, which exhibits glassy magnetism. $Li_3Mg_2RuO_6$, meanwhile, exhibits long-range AF, with the ordering temperature suppressed by frustration. But its isoelectronic twin, $Li_3Mg_2OsO_6$ ($5d^3$ vs. $4d^3$) exhibits very different behavior, revealed by μSR to be a glassy ground state below 12K. Understanding why such similar systems exhibit diverse ground-state behavior is key to understanding the nature of geometric magnetic frustration.

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