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Quantum spin liquid behavior in geometrically frustrated Mo pyrochlore antiferromagnet $Lu_2Mo_2O_{5-y}N_2$

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The magnetic ground state of a quantum spin liquid (QSL) candidate compound, $Lu_2Mo_2O_{5-y}N_2$ oxynitride pyrochlore ($S = 1/2$, Mo^{5+}), was investigated by muon spin rotation/relaxation experiment. In contrast to $Lu_2Mo_2O_7$ ($S = 1$, Mo^{4+}) which exhibits a spin glass-like freezing of Mo moments below $T_g \simeq 16$ K, no such spin freezing or long range magnetic order was observed down to 0.3 K. More interestingly, two distinct magnetic domains discerned by spin dynamics were observed below ∼13 K; one showing the "sporadic" spin fluctuation similar to that observed in other QSL candidate compounds including the kagome antiferromagnets, and the other showing the fast paramagnetic fluctuation that is only weakly suppressed with decreasing temperature. Their origins are discussed in terms of the bond randomness induced by the partial substitution of O with N and the inhomogeneous Mo valency due to O deficiency ($y > 0$) [1].

References

[1] S. K. Day *et al.*, arXiv:2206.13049.

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