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Tunable Quantum Spin Liquidity in Mo3O13 Cluster Mott Insulators[1] ARASH AKBARI-SHARBAF, DJAMEL ZIAT, AIME VERRIER, JEFFREY A. QUILLIAM, Universite de Sherbrooke, RYAN SINCLAIR, HAIDONG D. ZHOU, University of Tennessee, XUEFENG F. SUN, University of Science and Technology of China — A study of a tunable quantum spin liquid (QSL) phase in the compound $Li_2In_{1-x}Sc_xMo_3O_8$ (x = 0.2, 0.4, 0.6, 0.8, 1) will be presented. Crystal structure of these compounds can be viewed as Mo ions arranged on an asymmetric Kagome lattice (KL),[1] with two different Mo-Mo bond lengths, separated by nonmagnetic layers composed of Li, In, and Sc ions. Using X-ray diffraction spectroscopy, muon spin relaxation spectroscopy, bulk magnetic susceptibility and specific heat measurements we show that by changing the composition of the nonmagnetic layers we can drive the system from an ordered antiferromagnetic state to a quantum spin liquid state. The mechanism responsible for the tunability of the magnetic phase in this class of materials may be associated with the degree of asymmetry of the KL controlled by the composition of the nonmagnetic layers. For high degree of asymmetry the constraint on the electronic distribution leads to a configuration of Mo_3O_8 clusters with net spin-1/2 per cluster arrange on a triangular lattice[2] and long range antiferromagnetic order.[3] For low degree of asymmetry the electronic distribution leads to a magnetic phase with QSL character. [1] G. Chen *et al.*, arXiv:1408.1963v2 (2014). [2] J. P. Sheckelton *et al.*, Nature Mat. 11, 493 (2012). [3] Y. Haraguchi et al., Phys. Rev. B 92, 014409 (2015).

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