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**$LiZn_2Mo_3O_8$: honeycomb spin liquid in a triangular lattice material?** REBECCA FLINT, PATRICK LEE, MIT — $LiZn_2Mo_3O_8$ is a S=1/2 triangular lattice material in which two-thirds of the spins vanish at 100K, while the remaining spins remain free down to the lowest temperatures. There is no thermodynamic phase transition, and does not appear to be any magnetic order. The experimental proposal is that the triangular lattice decouples into a honeycomb lattice with free spins in the center of each hexagon, however, it is not immediately clear what favors this decompostion. We argue that a set of alternating octahedral rotations can strengthen the bonds of the honeycomb lattice while weakening those to the central spin. Furthermore, if the honeycomb lattice forms a $Z_2$ spin liquid, as proposed for the $J_1 - J_2$ Heisenberg model, instead of a Néel or valence bond solid state, the central spin can delocalize over the hexagon, further favoring this decomposition, and also stabilizing the spin liquid phase over the Néel and VBS phases. Experimentally, this proposal can be tested by searching for signatures of the octahedral rotations, which may be short range or dynamic, but should result in a $q = 0$ soft phonon mode. The spinon spectrum of the gapped $Z_2$ spin liquid should also have signatures in inelastic neutron scattering. We also discuss possible 3D analogues.

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