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Abstract for an Invited Paper
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Experimental signatures of spin liquid physics on the S=1/2 kagomé lattice[1]

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I will describe our recent experimental progress on the quest to study novel ground states in frustrated magnets. New states of matter may be produced if quantum effects and frustration conspire to prevent the ground state from achieving classical order. Materials based on the kagomé lattice appear to be ideal hosts for the possibility of a quantum spin liquid ground state in two-dimensions. I will discuss our work which includes single crystal growth, bulk characterization, and neutron scattering measurements of the S=1/2 kagomé lattice material $ZnCu_3(OH)_6Cl_2$ (also known as herbertsmithite). Recent susceptibility measurements on single crystals yield valuable information on the additional terms in the spin Hamiltonian beyond nearest neighbor Heisenberg exchange, and anomalous x-ray diffraction yields detailed information on the presence of a small amount of atomic impurities. Most interestingly, inelastic neutron scattering measurements of the spin correlations in a single crystal sample reveal a continuum of spinon excitations in this two-dimensional insulating magnet. We will discuss our results in relation to recent theories for spin liquid physics on the S=1/2 kagomé lattice.

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