Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Dynamical Time-Reversal Symmetry Breaking and Photo-Induced Chiral Spin Liquid in Frustrated Mott Insulators MARTIN CLAASSEN, Department of Applied Physics, Stanford University, HONG-CHEN JIANG, BRIAN MORITZ, THOMAS DEVEREAUX, Stanford Institute for Materials and Energy Sciences, Stanford University SLAC — Spurred by recent progress in melting, enhancement and induction of electronic order out of equilibrium, a tantalizing prospect concerns instead accessing transient Floquet steady states via broad pump pulses, to manipulate band topology and affect electronic transport. Here, we extend these ideas to strongly-correlated systems and show that pumping frustrated Mott insulators with circularly-polarized light can drive the effective spin system across a phase transition to a chiral spin liquid (CSL). Starting from a Kagome Hubbard model deep in the Mott phase, circular polarization promotes a scalar spin chirality $\mathbf{S_i} \cdot (\mathbf{S_j} \times \mathbf{S_k})$ term directly to the Hamiltonian level, dynamically breaking time-reversal while preserving SU(2) spin symmetry. We find that the transient physics is well-captured by an effective Floquet spin model, fingerprint its phase diagram, and find a stable photo-induced CSL in close proximity to the equilibrium state. The results presented suggest a new avenue of employing dynamical symmetry breaking to engineer quantum spin liquids and access elusive phase transitions that are not readily accessible in equilibrium.

Martin Claassen
Department of Applied Physics, Stanford University

Date submitted: 11 Nov 2016 Electronic form version 1.4