Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

**High q-State Clock Spin Glasses in Three Dimensions and the Lyapunov Exponents of Chaotic Phases and Chaotic Phase Boundaries** EFE ILKER, Sabanci University, A. NIHAT BERKER, Sabanci University and MIT — Spin-glass phases, phase transitions for q-state clock models and their q infinity limit XY model in d = 3 are studied by renormalization-group (RG) that is exact for the d=3 hierarchical lattice, approximate for the cubic lattice. In addition to the chaotic rescaling behavior of the spin-glass phase, each of the two types of spin-glass phase boundaries displays, under RG, its own distinctive chaotic behavior. These chaotic RG trajectories subdivide into two categories: strong-coupling chaos (in the spin-glass phase and, distinctly, on the spinglass-ferromagnetic boundary) and intermediate-coupling chaos (on the spinglass-paramagnetic boundary). We characterize each different phase and phase boundary exhibiting chaos by its distinct calculated Lyapunov exponent. We show that under RG, chaotic trajectories and fixed distributions are equivalent. The phase diagrams of arbitrary even q-state clock spin-glass models are calculated. These, for all non-infinite q, have a finite-temperature spin-glass phase. The spin-glass phases exhibit universal ordering behavior independent of q. The spin-glass phases and the spinglass-paramagnetic boundaries respectively have universal fixed distributions, chaotic trajectories, Lyapunov exponents.In the XY limit a T=0 spin-glass phase is indicated.

A. Nihat Berker
Sabanci University and MIT

Date submitted: 11 Nov 2013 Electronic form version 1.4