

Abstract Submitted  
for the MAR13 Meeting of  
The American Physical Society

**Double Exchange, Berry fluxes, and fermion mediated state selection in frustrated lattices**<sup>1</sup> SHIVAM GHOSH, CHRISTOPHER L. HENLEY, Cornell University — We consider a Kagome or Pyrochlore magnet with local moments (treated as classical) as well as noninteracting electrons with hopping  $t$  at metallic filling, in the “Double Exchange” (DE) limit of infinitely strong Hund’s rule coupling  $J_H$ . Whereas a DE-dominated model always has a ferromagnetic ground state, we make the problem nontrivial by including a dominant separate antiferromagnetic exchange  $J \gg t$ , so the DE is a perturbation selecting within the highly degenerate ground states of  $J$  [1]. We derive this in two stages (i) spin directions define a set of Berry fluxes for each loop in the lattice (ii) we fit an effective Hamiltonian in terms of these fluxes. The same method can be applied to the energy landscape of competing spin-liquid-like states within large- $N$  mean field theories. Depending on filling, the stable state on the Kagome is coplanar or the non-coplanar “cuboc1” [2] phase.

[1] Motome and Furukawa, PRL 104, 106407(2010).

[2] Messio, Lhuillier, and Misguich, PRB 83, 184401 (2011).

<sup>1</sup>This work is supported by the National Science Foundation grant DMR-1005466

Shivam Ghosh  
Cornell University

Date submitted: 15 Nov 2012

Electronic form version 1.4