Double Exchange, Berry fluxes, and fermion mediated state selection in frustrated lattices\textsuperscript{1} 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 $J >> t$, so the DE is a perturbation selecting within the highly degenerate ground states of $J$ \textsuperscript{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” \textsuperscript{2} phase.

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\textsuperscript{2}Motome and Furukawa, PRL 104, 106407(2010).