Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Supersymmetry approach to delocalization transition in the network model of weak field quantum Hall effect and related models VAGHARSH MKHITARYAN, Department of Physics and Astronomy, University of Utah, Salt Lake City, UT 84112, USA, SHANTHANU BHARDWAJ, ILYA GRUZBERG, James Franck Institute, University of Chicago, Chicago IL 60637, USA — Recently, a two-channel random network model was proposed for quantum Hall effect in a weak (non-quantizing) magnetic field. For the anisotropic variant of this network, we analytically average over the randomness using the supersymmetry method, and map the network onto a model of interacting $u(1,1|2)$ superspins. We analyze the resulting superspin model by relating it to a nonlinear sigma-model. We argue that the phase diagram of the superspin model does not change qualitatively if we identify $u(1,1|2)$ superspins with ordinary $su(2)$ spin-1/2's. This allows us to develop a deeper insight and extend the phase diagram into the regions inaccessible to a sigma-model approach. We further extend our approach to a related two-channel network models and discuss their physical implications.

Vagharsh Mkhitaryan
Department of Physics and Astronomy,
University of Utah, Salt Lake City, UT 84112, USA

Date submitted: 19 Dec 2011 Electronic form version 1.4