

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Investigation of frustrated antiferromagnet on the honeycomb lattice with an applied field¹ SHENXIU LIU, Department of Physics, Stanford University, HONGCHEN JIANG, TOM DEVEREAUX, Stanford Institute of Materials and Energy Sciences, SLAC — Quantum spin-1/2 honeycomb XY antiferromagnet, or the equivalent hard-core boson system, with both nearest-neighbor J_1 and next-nearest-neighbor J_2 interactions is a representative frustrated system possibly hosting new phases of matter. Recent theoretical study suggests that this system may exhibit a series of incompressible states, which host fermionic elementary excitations rather than bosonic excitations, at small fixed filling factors or equivalent magnetic field strength. In this work, we will examine the theoretical prediction by directly studying the frustrated honeycomb J_1 - J_2 XY model, using unbiased grand canonical density-matrix renormalization group technique. By searching for magnetization plateaus with an applied magnetic field, we will ultimately determine the presence of these incompressible states as well as their properties. For a more comprehensive study, different variants of this model, including the honeycomb J_1 - J_2 Heisenberg antiferromagnet, will also be investigated.

¹this work is supported by the Department of Energy, Office of Science, Basic Energy Sciences, Materials Sciences and Engineering Division, under Contract DE-AC02-76SF00515.

Shenxiu Liu
Department of Physics, Stanford University

Date submitted: 05 Nov 2015

Electronic form version 1.4