Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

"Magnetic" refrigeration in synthetic quantum magnets MICHAEL ZALETEL, Station Q, Microsoft Research , NORMAN YAO, Department of Physics, UC Berkeley — The advent of ultracold atomic systems has promised to expand upon our understanding of strongly correlated quantum ground states; by contrast to their material cousins, cold atomic experiments benefit from unique tools such as direct optical imaging and tunable short- and long-range interactions. However, despite advances in coherent quantum control, ultracold atoms remain much too hot. Although sub-nanokelvin temperatures are the norm in experiments, the entropy of the system remains extensively far above the ground state. One strategy to combat this is to shift the entropy elsewhere for example, placing a gapless system near a gapped system can effectively "cool" the latter. In this talk, we will demonstrate that typical atomic systems can act as their own coolant. As an example, we consider a 1D optical lattice geometry where spin-1 atoms interact via a generic AKLT-type Hamiltonian. We will discuss why decreasing the density of atoms in one region is sufficient cool the complementary portion of the system to the ground state, wherein coherent edge dynamics are observed.

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Date submitted: 06 Nov 2015 Electronic form version 1.4