

Abstract Submitted  
for the MAR17 Meeting of  
The American Physical Society

**Dynamical Chern-Simons Theory in the Brillouin Zone** BIAO LIAN, Stanford University, CUMRUN VAFA, Harvard University, FARZAN VAFA, University of California Santa Barbara, SHOU-CHENG ZHANG, Stanford University — Berry connection is conventionally defined as a static gauge field in the Brillouin zone. Here we show that for three-dimensional (3d) time-reversal invariant superconductors, a generalized Berry gauge field behaves as a dynamical fluctuating field of a Chern-Simons gauge theory. The gapless nodal lines in the momentum space play the role of Wilson loop observables, while their linking and knot invariants modify the gravitational theta angle. This angle induces a topological gravitoelectric effect where a temperature gradient induces a rotational energy flow. We also show how topological strings may be realized in the 6 dimensional phase space, where the physical space defects play the role of topological D-branes.

Biao Lian  
Stanford Univ

Date submitted: 08 Nov 2016

Electronic form version 1.4