

Abstract Submitted  
for the MAR11 Meeting of  
The American Physical Society

**Edge states and the bulk-boundary correspondence in Dirac Hamiltonians** VASUDHA SHIVAMOGGI, ROGER MONG, University of California, Berkeley — We present an analytic prescription for computing the edge dispersion  $E(k)$  of a tight-binding Dirac Hamiltonian terminated at an abrupt crystalline edge. Specifically, we consider translationally invariant Dirac Hamiltonians with nearest-layer interaction. The result is a geometric formula that relates the existence of surface states as well as their energy dispersion to properties of the bulk Hamiltonian. We give examples of how the formula can be used to find the edge state dispersion in various topologically ordered systems. We further prove the bulk-boundary correspondence between the Chern number and the chiral edge modes for quantum Hall systems within the class of Hamiltonians studied here. Our results can be extended to the case of continuum theories which are quadratic in momentum, as well as other symmetry classes.

Vasudha Shivamoggi  
University of California, Berkeley

Date submitted: 22 Nov 2010

Electronic form version 1.4