Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Quantum transport of 2D Dirac fermions: the 2D symplectic symmetry class of Anderson localization and the Z2 topological term SHINSEI RYU, Kavli Institute for Theoretical Physics, University of California, Santa Barbara, CHRISTOPHER MUDRY, Paul Scherrer Institute, Switzerland, HIDEAKI OBUSE, AKIRA FURUSAKI, RIKEN, Japan — We discuss the quantum transport of the 2D non-interacting Dirac Hamiltonian, which, underlies theoretical descriptions of graphene and surface states of 3D Z2 topological insulators. For a random scalar potential type disorder, a Z2 topological term is derived in the non-linear sigma model encoding the physics of Anderson localization in the symplectic symmetry class. Unlike the Pruisken term (Chern integer) in the IQHE, the Z2 topological term cannot be expressed, in general, as an integral of a local quantity, but as a sign of the Pfaffian of a family of Dirac operators. The Z2 topological term has a significant effect on the renomalization group flow of the conductance.

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Date submitted: 27 Nov 2007 Electronic form version 1.4