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WORKSHOP AND SCHOOL ON TOPOLOGICAL ASPECTS OF CONDENSED MATTER PHYSICS
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TRANSPORT PROPERTIES OF TOPOLOGICAL INSULATORS

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Abstract:

ARPES and STM results on the 3D topological insulators have stimulated strong interest in this novel class of electronic materials. However, the investigation of the massless Dirac surface states by transport techniques has been hampered by large contributions from the bulk conductance in most as-grown crystals. Following a brief introduction, I will describe progress in the past year in lowering the bulk contribution in Bi2Se3, Bi2Te3 and Bi2Te2Se. The surface states can be identified by their quantum (Shubnikov de Haas) oscillations, despite the very large bulk resistivity now achievable at 4 K (~6 Ohm-cm). In the limit of intense magnetic field, the Zeeman energy of the surface electron can become comparable to the large spin-orbit Rashba term. I will also describe recent measurements which allow the g-factor of the surface carriers to be determined. The prospect of reaching the n=0 fully spin polarized Landau level will be discussed.