Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Delocalized metallic state on insulating, disordered BiSbTeSe2 thin films – a test of Z_2 protection.[1] RK GOPAL, Indian Inst of Science Bangalore, SOURABH SINGH, JIT SARKAR, RESHMA PATRO, SUBHADIP ROY, CHIRANJIB MITRA, Indian Institute of Science Education and Research Kolkata, QUANTUM COMPUTATION AND TOPOLOGICAL MATTER GROUP TEAM — We present thickness and temperature dependent magneto transport properties of bulk insulating and granular BiSbTeSe2 thin films, grown by pulsed laser deposition technique. The temperature dependent resistivity (R-T) of these films is found to be insulating ($d\rho/dT < 0$) and resistivity changes thrice the magnitude measured at room temperature as temperature is varied from 300K to 1.8K. On application of small perpendicular magnetic field in the low temperature regime, the R-T takes an upward shift from the zero field R-T - a trademark signature of a metallic state on an insulating bulk film. The grain boundaries in these films, as seen by scanning electron microscopy, present an additional disorder and hence confinement/trapping centers to the surface Dirac states in comparison to the films grown by molecular beam epitaxy and single crystals, which have atomically flat surface. Therefore these films present real test for the topological protection of surface Dirac states and their immunity against localization which is known as Z2 protection. From the magnetoresistance (MR) measurements at low temperatures a sharp and relatively large rise in MR is found a signature of weak – antilocalization (WAL) -a signature of topologically protected surface states. The WAL analysis of the MR data reveals a phase breaking length of the order of grain size suggesting that grain

[1]Author is grateful to the Government of India and IISER-Kolkata for providing funding and experimental facilities for the following research work.

RK Gopal
Indian Inst of Science Bangalore

Date submitted: 15 Nov 2016 Electronic form version 1.4