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Quantum Hall effect from Dirac fermions of the 3D topological insulator HgTe A.V. STIER, R. VALDÉS AGUILAR, S. HUANG, T. MCQUEEN, N.P. ARMITAGE, Department of Physics & Astronomy, Johns Hopkins University, Baltimore, MD 21218, B. UELAND, F. RONNING, Los Alamos National Laboratory, Los Alamos NM 87545 — Three dimensional (3D) topological insulators (TI) exhibit two dimensional (2D) topologically protected conducting surface states created by strong spin-orbit coupling. Time reversal invariance (TRI) of those states manifest itself in spin-momentum locking and a dispersion relation of massless Dirac fermions. We present our results of magneto-transport of the 3D TI HgTe [1]. Our samples are 70 nm HgTe films strained on slightly Zn doped CdTe substrates. Tensile strain due to the lattice mismatch between the HgTe film and the substrate lifts the heavy hole - light hole degeneracy, which results in TI states at the Brillouin zone center. We observe evidence for a quantized Hall (QH) resistance developing at temperatures below T=50K. The observed effect is confirmed to derive from Dirac fermions of the two TI surfaces as shown through a non-zero Berry's phase by an extrapolation of the filling factors of the QH plateaus to the large magnetic field limit. We have also confirmed the 2D character of the probed states through tilted magnetic field measurements. If time allows, we will discuss our results for very high magnetic fields and dilution refrigeration temperatures experiments. Work supported by the Gordon and Betty Moore Foundation. [1] C. Brüne et.al., PRL 106, 126803 (2011)

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