Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Quantum Interference, Geometric-phase Effects, and Semiclassical Transport in Quantum Hall Systems at Low Magnetic Fields CHUN-FENG HUANG, 2nd Patent Division, Intellectual Property Office, Ministry of Economic Affairs, Taipei, Taiwan 106, R.O.C., I.-H. TSAI, Department of Mathematics, National Taiwan University, Taipei, Taiwan, R. O. C. — It is well-established how the quantum interference induces strong localization leading to quantum Hall effect at high enough magnetic fields. Decreasing the magnetic fields, however, the localization strength can be reduced and the semiclassical magneto-oscillations following Shubnikov-de Haas formula appear in most quantum Hall systems. To understand the transport properties as the localization strength becomes weak, our team has investigated the magneto-resistance in some quantum Hall systems at low magnetic fields. Under the semiclassical transport, the crossing points in Hall plateaus showed Landau-band quantization and microwave-induced heating demonstrated the band-edge equivalence important to Landau-level addition transformation [1-2]. We note that such equivalence is consistent with the edge universality based on the random matrices of Wigner type, and the Landau-band quantization can be explained by considering geometric phase effects. From our study, some quantum Hall features can survive as the semiclassical transport reveals the insufficient localization. [1] Solid State Commun. 141, 17 (2007). [2] Solid State Commun. 156, 45 (2013).

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Date submitted: 24 Oct 2015 Electronic form version 1.4