

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Magnetotransport in ultra quantum Bismuth and related alloys

DORON BERGMAN, KARYN LE HUR, Yale University — Recent studies of elemental Bismuth and related alloys in strong magnetic fields, have uncovered peculiar electric and thermal transport behavior (Behnia et al. *Science* 317, 1729 (2007), Banerjee *PRB* 78, 161103 (2008)). In particular, the Hall resistivity resembles that of the fractional quantum Hall effect, in exhibiting quasi-plateaus, corresponding to fractional filling factors. At the same time anomalous features appear in the Nernst and Seebeck coefficients. Recent efforts to address possible interaction effects (Burnell et al., Alicea et al. preprints 2008), while suggesting interesting electronic states of Bismuth in this ultra quantum regime, have not explained the unusual transport phenomena. We investigate the transport phenomena in more detail, by using a microscopic model of the Bismuth band structure. We first explore Landau level physics in this model, and then go on to develop a theory of the anomalous transport phenomena, using Boltzmann kinetic theory.

Doron Bergman
Yale University

Date submitted: 20 Nov 2008

Electronic form version 1.4