Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Signatures of surface states in bismuth at high magnetic field
BABAK SERADJEH, university of illinois, JIANSHENG WU, University of Calif, Irvine, PHILIP PHILLIPS, university of Illinois — Electrons in a metal subject to magnetic field commonly exhibit oscillatory behavior as the field strength varies, with a period set by the area of quantized electronic orbits. Recent experiments on elemental bismuth have revealed oscillations for fields above 9 tesla that do not follow this simple dependence and have been interpreted as a signature of electron fractionalization in the bulk. We argue instead that a simple explanation in terms of the surface states of bismuth exists when additional features of the experiment are included. These surface electrons are known to have significant spin-orbit interaction. We show the observed oscillations are in quantitative agreement with the surface theory, which we propose to test by studying the effect of the Zeeman coupling in higher fields, dependence on the field orientation, and the thickness of the samples.

philip phillips
University of Illinois

Date submitted: 19 Nov 2009

Electronic form version 1.4