Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Singular spin response of topological insulators in ac magnetic fields[1] HAIMING DENG, LUKAS ZHAO, INNA KORZHOVSKA, ZHIYI CHEN, LIA KRUSIN-ELBAUM, City College of New York — Orbital magnetic susceptibility in weak magnetic fields has several contributions whose physical origin is not simple in contrast to the clear Landau diamagnetism of free electrons. Experimentally, anomalous magnetism has been observed in graphite, and bismuth and Bi-Sb alloys, both of which are narrow gap semimetals. Here we report an observation of a singular response in ac magnetic susceptibility – a suppression of diamagnetism at low magnetic fields that appears ubiquitous in all topological insulators (Sb_2Te_3, Bi_2Se_3, $PbBi_2Se_4$) we have studied. We observe two distinct contributions to this effect: a broader one that typically disappears around 40-50 K and is likely related to edges, and a divergent-like one (in the $H \to 0$ limit) that is robust up to room temperature and is likely related to the bulk. The frequency dependence and the dependence on the Fermi level of these effects will be discussed in the context of separation of orbital and spin effects.

[1]Supported in part by NSF-DMR-1122594.

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Date submitted: 20 Dec 2012 Electronic form version 1.4