Abstract Submitted
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Detection of singular robust room-temperature spin response from disordered topological Dirac fermions[1] LUKAS ZHAO, HAIMING DENG, INNA KORZHOVSKA, ZHIYI CHEN, CCNY, VADIM OGANESYAN, CSI & GC - CUNY, LIA KRUSIN-ELBAUM, CCNY — In real three-dimensional (3D) topological insulators, the Dirac fermions intermix with the typically conducting bulk thereby complicating access to the low energy (Dirac point) charge transport or magnetic response. Here we use low frequency *ac* susceptibility measurements to probe spin response in the 3D topological material family: Bi_2Se_3, Bi_2Te_3, and Sb_2Te_3. We detect a remarkable paramagnetic singularity in the magnetic susceptibility at low magnetic fields which persists up to room temperature, and which we demonstrate to arise from samples' surfaces. The singularity is universal, largely independent of the bulk carrier density, and is consistent with the existence of electronic states near the spin-degenerate Dirac point of the 2D helical metal. We will discuss the exceptional thermal stability of the signal; it points to an intrinsic surface cooling process of thermoelectric origin, where the rectifying configuration required for surface cooling by the the bulk is witnessed by 2^{nd} harmonic generation in the sub-surface region. The cooling mechanism and the singular response will be discussed within a simple Dirac model with Rashba-type spin orbit coupling.

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