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Efficient THz emission from a topological insulator surface LI-GUO ZHU, Case Western Reserve University; Tsinghua University, Beijing 100084, China, BRIAN KUBERA, Case Western Reserve University, KIN FAI MAK, Columbia University, JIE SHAN, Case Western Reserve University — Bi_2Se_3 is a 3D topological insulator (TI) recently confirmed by the ARPES.[1] Direct optical probe of its metallic surface states is, however, hindered by the remnant Drude response of the bulk material. Second-order nonlinear optical techniques with their surface specificity provide unique opportunities for studying surface electronic transitions in TIs such as Bi_2Se_3 with bulk inversion symmetry.[2] Here we demonstrate efficient THz emission from the surface of Bi_2Se_3 under the excitation of a femtosecond optical pulse. The emission arises from optical rectification of the optical pulse at the TI surface and the transient current within the surface depletion region. By spectrally resolving the emission under different pump and emission polarizations, we separate the different contributions. Effects arising from just a few atomic layers of the sample surface due to resonance enhancement of the quasi-real optical transitions between the surface electronic states will be discussed.

[1]Hsieh et al. Nature 460, 1101 (2009).
[2]Hsieh et al. Phys. Rev. Lett. 106, 057401 (2011).

[X] Prefer Oral Session
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