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High-harmonic spectroscopy of quantum materials DENITSA BAYKUSHEVA, Stanford University (PULSE Institute), ALEXIS CHACON, Max Planck POSTECH (Korea), JIAN LU, Stanford University (PULSE Institute), TREVOR BAILEY, University of Michigan, JONATHAN SOBOTA, HADAS SOIFER, PATRICK KIRCHMANN, COSTEL ROTUNDU, Stanford University, CTIRAD UHER, University of Michigan, TONY HEINZ, DAVID REIS, SHAMBHU GHIMIRE, Stanford University (PULSE Institute) — We report the evidence of generation of high-order harmonics from the surface states of a three-dimensional topological insulator, Bi_2Se_3, subject to strong mid-infrared laser fields. The response from the surface is identified by analyzing the polarization of high-harmonics and by exploiting the fact that inversion symmetry is broken at the surface. In experiments, high-order harmonics up to 17^{th} order are observed without sample damage at the peak intensity of approx. $3x10^{10}$ W/cm^2. The non-trivial response of the topological material is seen to manifest itself through a significantly enhanced harmonic yield for circularly polarized driving laser fields.

Denitsa Baykusheva
Stanford Univ

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