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Orientation dependent high harmonic generation from solids MENGXI WU, Department of Physics and Astronomy, Louisiana State University, Baton Rouge, Louisiana 70803, USA, YONGSING YOU, SHAMBHU GHIMIRE, DAVID REIS, PULSE Institute, SLAC National Accelerator Laboratory, Menlo Park, California, 94025, USA, KENNETH SCHAFER, METTE GAARDE, Department of Physics and Astronomy, Louisiana State University, Baton Rouge, Louisiana 70803, USA — We present a theoretical study of the generation of high harmonic radiation in an MgO crystal driven by a strong mid-infrared laser field. We find that the resulting harmonic spectra depend on the relative orientation of the crystal and the laser polarization, exhibiting two-, four- or six-fold rotation symmetry around different crystal axes. Similar orientation-dependent harmonic spectra have recently been experimentally observed in MgO [Y. You, *et al.*, Anisotropic high-harmonic generation in bulk crystals, *Nature Physics* (2016)], and were explained using a real-space picture. We show that the orientation dependence in MgO can also be explained using a momentum-space picture, in terms of different band curvatures and coupling strengths along different polarization directions and orientations. Furthermore, we show that the primary and secondary plateau in the harmonic spectrum exhibit very different orientation dependences, and we explain this using the momentum space picture.

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