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Role of Symmetry Properties in Polarization of High-order Harmonics in ZnO[1] SHIMA GHOLAM-MIRZAEI, Department of Physics, University of Central Florida, SHICHENG JIANG, Department of Applied Physics, Nanjing University of Science and Technology, ERIN CRITES, JOHN E. BEETAR, Department of Physics, University of Central Florida, MAMTA SINGH, CREOL, the College of Optics and Photonics, University of Central Florida, C. D. LIN, Department of Physics, Kanas State University, MICHAEL CHINI, Department of Physics, and CREOL, the College of Optics and Photonics, University of Central Florida — Polarization-resolved measurements of high-order harmonic generation (HHG) from solids have been used to study the role of inversion symmetry in determining the harmonic spectrum. Here, we study the orientation dependent parallel- and perpendicularly-polarized HHG from ZnO. We found experimentally that the polarization states of all odd harmonics and all even harmonics depend on the crystal orientation in the same way, but that odd and even harmonics behave differently from one another. More specifically, for laser polarization parallel to the mirror plane, no perpendicular even and odd harmonics are emitted, and for the laser polarization perpendicular to the mirror plane, parallel even harmonics and perpendicular odd harmonics disappear. We further determine the ellipticity of emitted harmonics and identify features in the orientation-dependent harmonic spectrum which arise due to birefringence in the bulk crystal. Contrary to prior studies, we conclude that the universal polarization behavior observed in solid-state HHG is dictated largely by symmetry properties of the target.

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