Abstract Submitted
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A Jones Calculus Approach to High-Order Harmonic Generation in Bulk Crystals[1] ERIN CRITES, SHIMA GHOLAM-MIRZAEI, ZAIN KHAN, JOHN E. BEETAR, MAMTA SINGH, MICHAEL CHINI, University of Central Florida — High-order harmonic generation was first observed in bulk ZnO crystals in 2011. In transmission geometry, emitted harmonics are susceptible to changes in the driving laser polarization as it propagates through the bulk crystal. To avoid this, high-order harmonics from thin films or in a reflection geometry have been proposed. However, the reflection geometry introduces uncertainty in the measurements due to nonlinear reflection coefficients, and thin films are not available for all materials. Here, we present a new method for analyzing high-order harmonics generated in bulk crystals based on the Jones calculus approach to polarization. We show that nonlinear optical effects for mid-IR pulses in ZnO crystals do not significantly affect the polarization of the mid-IR at the crystal exit plane. Instead, the polarization of the mid-IR is mainly governed by the birefringence of the crystal, allowing us to predict the input polarization required to achieve a desired polarization state at the crystal exit for any orientation of the crystal's optic axis with respect to the driving laser polarization. We apply our analysis technique to high-order harmonics generated from ZnO and BaTiO3 bulk crystals to obtain orientation- and ellipticity-dependent harmonic spectra.

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Erin Crites
University of Central Florida

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