Abstract Submitted
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Jones Calculus Analysis of High Order Harmonic Generation in Bulk Crystal[1] ERIN CRITES, SHIMA GHOLAM-MIRZAEI , TROIE JOURNIGAN, ZAIN KHAN , JOHN BEETAR, MAMTA SINGH, MICHAEL CHINI, University of Central Florida — High harmonic generation (HHG) in bulk crystals was first observed in 2011. In a transmission geometry, bulk crystals have been shown to change the polarization state of the laser due to birefringence of the crystal. This results in harmonics generated by unknown, and potentially time-dependent, elliptical polarization, rather than the preferred linear polarization. HHG in thin films has been suggested as an alternative, but thin films are not readily available in all materials. Here, we propose using Jones calculus to counteract the effects of a bulk ZnO crystal on laser polarization. We show that birefringence, rather than nonlinear effects, is the main contributor to the propagation effects. We calculate the potential configurations of a half wave plate, quarter wave plate, and ZnO that result in linear polarization at the exit of the crystal and experimentally confirm this linear polarization at different ZnO angles. We then use the corrected polarization to generate harmonics and find an ellipticity dependence of the harmonics in addition to the expected angle dependence. We compare these harmonics to a reflection geometry setup, which inherently does not have propagation effects, in order to further confirm the validity of the technique.

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