

Abstract Submitted
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Bragg Diffraction High Harmonic Spectroscopy¹ JOSEPH FARRELL, LIMOR SPECTOR, BRIAN MCFARLAND, PHILIP BUCKSBAUM, MARKUS GÜHR, PULSE Institute at the SLAC National Accelerator Laboratory, METTE GAARDE, KENNETH SCHAFER, Louisiana State University — High harmonic generation (HHG) spectra contain information about the electronic structure of the generation medium which has proven to be powerful for monitoring molecular and atomic ground states. All HHG experiments on excited atomic or molecular states suffer from a ground state harmonic background, thereby reducing excited state sensitivity. We use a Bragg diffraction scheme to overcome this problem and also obtain spectrally resolved high harmonics without the need for a spectrometer. We imprint a 400nm excited state grating structure on the HHG medium by two counterpropagating 800nm pulses. A strongly focused 800nm probe pulse hits the grating under a shallow angle. The harmonics of order n are scattered into the Bragg angle $\theta_{Bragg} = \sin^{-1}(1/n)$. We test the scheme with plasma gratings in argon gas and molecular alignment gratings in N_2 . The generated harmonics are scattered into their respective Bragg angle and we observe up to 6 spectrally resolved odd harmonics that show enhanced sensitivity to the atomic or molecular excitation.

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