Effects of Molecular Alignment on High Harmonic Generation from N\textsubscript{2} in a Hollow-Core Waveguide}

BRETT SICKMILLER, ROBERT JONES, Department of Physics, University of Virginia — We have studied high harmonic generation (HHG) from laser aligned N\textsubscript{2} molecules in a hollow-core waveguide. In the experiments, a Michelson interferometer splits a single 30 fs 790 nm laser pulse into two time-delayed laser pulses which are then focused into a N\textsubscript{2} filled glass capillary tube [1]. First, the “alignment” pulse drives a sequence of Raman transitions within each N\textsubscript{2} molecule, creating a rotational wavepacket whose temporal evolution results in the periodic alignment of the molecular axis parallel (or perpendicular) to the laser polarization axis [2]. We measure the 15\textsuperscript{th} – 25\textsuperscript{th} harmonics produced by the transiently aligned molecules using the second, “signal” laser pulse. The relative angle between the signal pulse polarization and the molecular axis is varied by changing the pulse delay or by rotating the polarization of the alignment pulse in the interferometer. We observe variations in the individual harmonic signals of up to a factor of 3 for parallel as compared to perpendicularly aligned targets.