DAMOP05-2005-000220

Abstract for an Invited Paper
for the DAMOP05 Meeting of
the American Physical Society

Generation of attosecond XUV supercontinuum by a polarization gating

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Since high-order harmonic generation is sensitive to the ellipticity of the laser field, it was proposed that single attosecond pulses could be produced by gating the harmonic generation process using laser pulses with a time-dependent ellipticity. We have created such laser fields with *few-cycle* circular pulses. By using few-cycle laser pulses, it avoids significant ionization of the atom by the leading edge of the pulse. The laser beam from the Kansas Light Source was focused into a hollow-core fiber filled with argon gas to generate the few-cycle pulses. The pulse exiting the fiber passed through two pairs of chirp mirrors and was negatively chirped with a center wavelength at 750 nm. This chirp was compensated by a fused silica plate so that the pulse duration became tunable by adjusting the plate thickness. The shortest laser pulses are 6.2 fs. The pulse with a time-dependent ellipticity was then produced with a delay induced by a quartz plate. Finally, the pulse was focused by a parabolic mirror into a gas jet. The generated high harmonic signal was dispersed by a transmission grating and recorded by a microchannel plate detector and a CCD camera. A 30 eV to 100 eV supercontinuum has been obtained with the polarization gating. This continuum indicates the generation of a single attosecond pulse. Numerical simulations done with a nonadiabatic Lewenstein model combined with three-dimensional propagation confirms that the supercontinuum corresponds to a chirped single attosecond pulse. The pulse is less than 100 attoseconds when the chirp is compensated. We will show that the carrier-envelope phase of the laser pulse can significantly affect the attosecond supercontinuum generation.