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Time Resolved Measurements of the Polarization State of Supercontinuum Generated in a Monatomic Gas

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In previous work [1] we found that circularly polarized few-cycle pulses were more effective at accelerating low divergence, quasi-monoenergetic electron beams than their linearly polarized counterparts. These pulses were generated by sending initially elliptically polarized pulses which evolve to circular after propagation through a hollow core fiber differentially pumped with Helium and compressed afterward with a chirped mirror compressor. While temporal and spectral effects due to polarization ellipse rotation due to nonlinear effects from bound electrons are well understood [2], illustrated by its use as a mode locking technique [3] and compression technique [4,5], the temporal effects due to ionization from the laser pulse during supercontinuum generation have only been studied in simulations [6]. In this work we study the effect of ionization on the temporal polarization state of supercontinuum by measuring its temporal electric field before and after broadening. The dynamics of interest have implications for the generation of complex temporal polarization structures on a femtosecond scale.

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