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The Effects of Ionization on the Generation of High Energy 6 fs Pulses SHAMBHU GHIMIRE, BING SHAN, CHRIS NAKAMURA, CHUN WANG, ZENGHU CHANG, Department of Physics, Kansas State University —

So far, the highest energy of the laser pulses with ~ 6 fs duration generated by the hollow core fiber/chirped mirror compressor technique is below 1 mJ. We studied the effects of multiphoton ionization on the pulse propagation in the fiber that was filled with argon gas. Our experiments showed that when the input pulses are circularly polarized, the output energy can be scaled up by a factor of 1.5 in comparison to that with a linear polarization input. The highest pulse energy obtained with a good spatial mode is 0.6 mJ. A single shot SHG-FROG was used to fully characterize the output pulse which yielded a pulse width of 6.2 fs. The increase of pulse energy is attributed to the lower probability of ionization of the nonlinear medium with a circular polarization input than that with a linear polarization input for the same pulse energy. We believe that the plasma defocusing is a major factor that affects the spatial mode of the beam exiting the fiber. Our results indicate that the defocusing is reduced by using a circularly polarized input.

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