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GENERATION OF MULTI-PULSE LASER-WAKEFIELD DRIVERS VIA DELAY MASKS

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Laser-plasma accelerators are rapidly developing to produce high-quality sub-GeV electron beams capable of Free Electron Laser (FEL) operation. Their reduced size and cost with respect to conventional accelerators can widely spread the use of particle beams in medical physics and industry. Although multi GeV electron energies were demonstrated, more work is needed to establish high quality acceleration in this energy range. The Resonant Multi-Pulse Ionization (ReMPI) injection scheme has been proposed to produce FEL quality electron bunches with existing ultrashort and ultraintense laser systems, combining the advantages of the multi-pulse acceleration and the two-color injection.
Here we report on how to produce a multi-pulse driver for the ReMPI scheme focusing the laser beams generated via wavefront division of a single ultrashort pulse by a glass delay mask, which demonstrated to have the right features to be used for ReMPI. A spatio-temporal characterization of the pulse train obtained with this method is presented. An experimental scheme to detect the effectiveness of the delay mask in triggering a resonant wake excitation, based on a density scan of the gas-jet target, was modelled and it will be discussed in detail.

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