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A Pulse Shaper for Direct Generation of 515 nm 3D Ellipsoidal Pulses at PITZ

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In this paper, a cathode laser pulse shaper at 515 nm is presented that will be used for emittance optimizations. In case alkali antimonide photocathodes are used, the shaped green pulses can be applied directly for photoemission while Cs₂Te photocathodes requires second harmonic generation to provide UV laser pulses. Recent tests of CsK₂Sb photocathodes in the high gradient RF gun at PITZ are first steps for the future usage of green laser pulses, which would simplify the requirements for the photocathode laser system, especially for CW operation cases envisioned in future. As long the alkali antimonide photocathodes are not in regular use yet, the laser pulses need to be converted into the UV. The green pulse shaper still simplifies the laser system since two conversion stages from IR to green to UV were needed in the past, which dilutes the quality of the shaped laser pulses. In this paper, a pulse shaper for direct generation of 515nm 3D ellipsoidal pulses is presented that is expected to further improve the beam emittance generated by ellipsoidal laser shaping.

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