Contribution ID: **21** Type: **not specified**

Photocathode lasers for driving RF guns with Cesium Telluride photocathodes (FLASH, XFEL, ELBE)

Thursday, 21 February 2013 09:00 (40 minutes)

Various photocathode lasers for Cesium Telluride photocathodes will be described. These diode-pumped solid-state lasers generate picosecond pulses, which are finally converted to the ultra violet spectral range by means of two nonlinear optical crystals. The laser systems have been developed at the Max-Born-Institute and are now being used for driving the photo injectors at the FLASH-FEL (DESY Hamburg), as well as the facilities of PITZ (DESY Zeuthen) and ELBE (Forschungszentrum Dresden-Rossendorf, FZDR).
The generation of trains (burst) of ultraviolet pulses will be discussed in more detail. These pulse trains drive the photo injectors of linacs with superconducting cavities of the TESLA type, e. g. at the FLASH FEL and at PITZ. This special operational mode of the laser will be compared to the more common quasi-CW mode, which is used for driving the superconducting RF guns at the FZDR.
Finally, a novel method for generation of shaped ultraviolet pulses, in particular flat-top pulses with sharp rising and falling edges, will be explained. The method is based on a multicrystal birefringent filter. It is being developed as a major component for the photocathode laser of the upcoming European XFEL.

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