P-18

Evaluation of the undulator capabilities for POLFEL

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Keywords: FEL, undulator

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The construction approach proposed for POLFEL is split onto two phases differing in achievable electron energy range. In the first stage the maximal energy of 50 MeV capacitates the wavelength in Terahertz and infrared range, while the completed accelerator will provide the electrons of 1 GeV and enables XUV radiation. For the THz-IR source two interchangeably operating planar undulators are foreseen. They will be of fixed gap at 12 mm and 5 mm, respectively, and provide radiation in the wavelength ranges 1000 μm - 100 μm and 100 μm - 6 μm, respectively, with the average power in the range 10 W and average peak power of 0.3 MW. Elliptical undulator will be installed in the second phase of construction.

Available wavelengths, pulse duration, peak and average power ranges have been evaluated dependently on electron beam parameters: energy, energy spread, emittance, bunch charge, and repetition rate. Obtained results lay the ground for accelerator optimization in terms of experimental requirements and for constitution of scientific case for the laboratory.

P-19

Performance of superconducting thin film lead photocatode

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Thin lead film photocathodes have been recognised as an advantageous solution for superconducting electron injectors [1, 2]. In comparison to commonly used Cs_2Te cathodes, it allows to expel normal conducting materials from the resonant cavity together with a complicated transfer mechanism. Electron guns furnished with 1 μm thick lead layer have been built and tested in at Hobicat injector in terms of RF performance, quantum efficiency and beam diagnostics and showed a resonant quality in the range of $2 \cdot 10^{10}$ up to accelerating gradient of 30 MVm^{-1} and quantum efficency of $9 \cdot 10^{-5}$ when excited with 258 nm wavelength laser [3-5].

Acknowledgments: The work is supported by European Coordination in Accelerator Research and Development, a part of FP7.

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