

First Experimental Characterization of Electron Beams for THz Options at PITZ

P. Boonpornprasert, M. Krasilnikov and F. Stephan

References

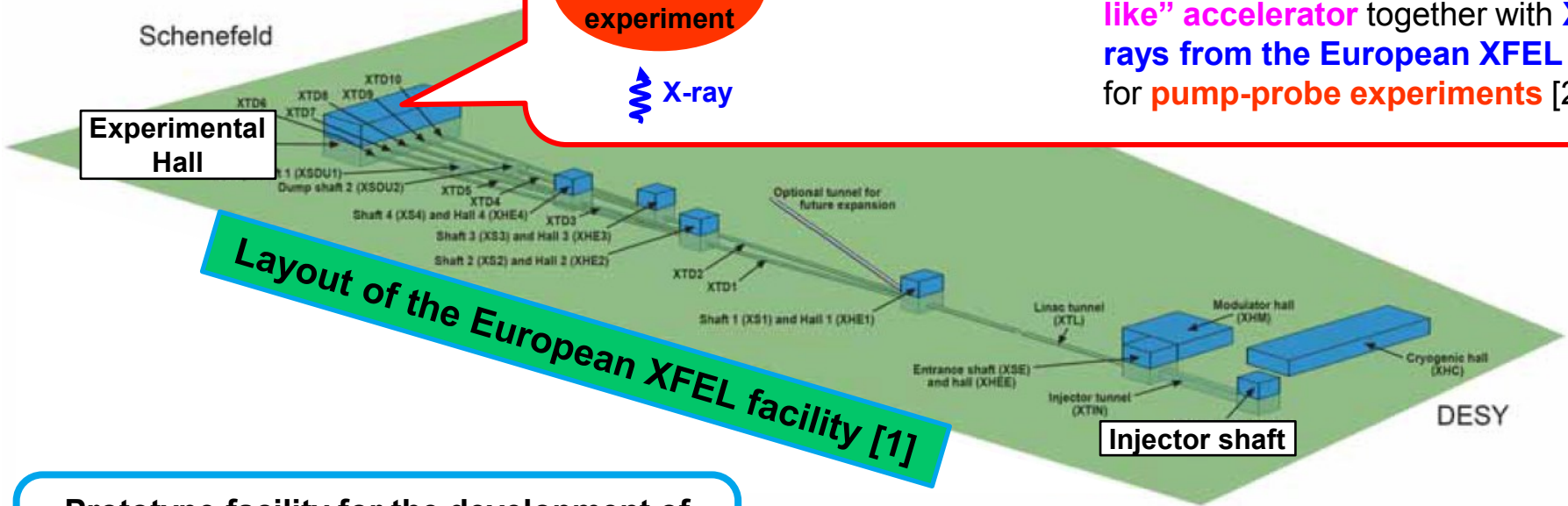
- [1] *Eu XFEL Tech. Design report 2007*
- [2] *E.A.Schneidmiller et. al, WED55, FEL2012*

Pump & Probe experiment

IR/THz

PITZ-like

There is a proposal use IR/THz radiation generated by a “PITZ-like” accelerator together with X-rays from the European XFEL for pump-probe experiments [2].



Prototype facility for the development of such IR/THz source is already existing. It is “PITZ facility”.

- 3 means for generation of THz radiation have been studied:**

 - High-gain FEL for $\lambda_{rad} \leq 100 \mu\text{m}$ ($f \geq 3 \text{ THz}$)
Using long-bunch (~12 ps) 4 nC e-beam
 - CTR and CDR for $\lambda_{rad} \geq 100 \mu\text{m}$ ($f \leq 3 \text{ THz}$)
Using short-bunch (~1 ps) e-beam compressed by velocity bunching

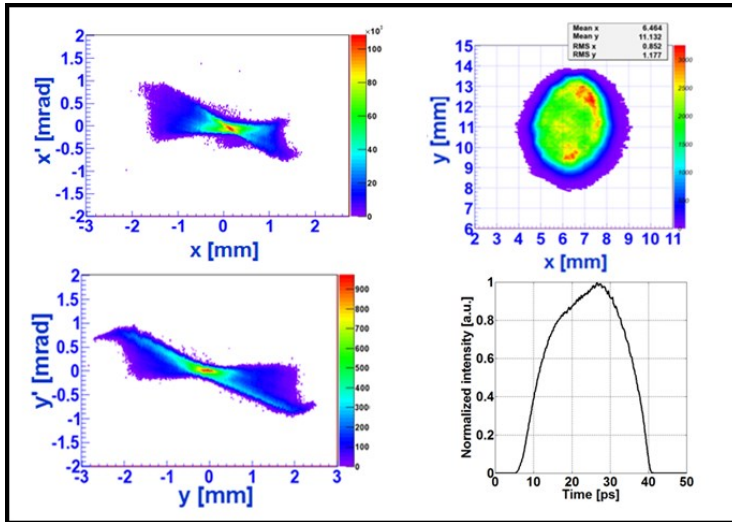


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Characterizations of 4 nC e-beams

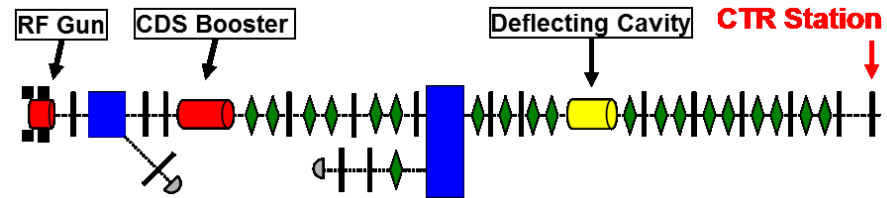
- Beam momentum
- Transverse emittance (single slit scan)
- Longitudinal profile
- Test of beam transport



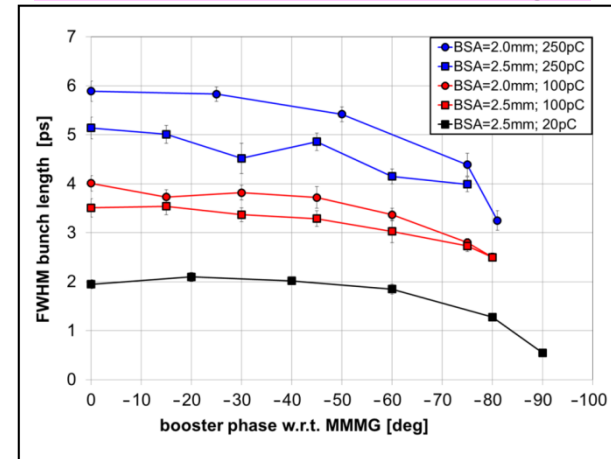
Based on the experimental results

Calculation of high-gain FEL using GENESIS1.3 code

Generations of Short-bunch e-beams Compressed by Velocity Bunching



Measured FWHM bunch length



Based on the experimental results

Calculation of CTR and CDR using Generalized Ginzburg-Frank Formula