Beam Line Design and Instrumentation for THz@PITZ -- the Proof-of-Principle Experiment on a THz SASE FEL at the PITZ Facility

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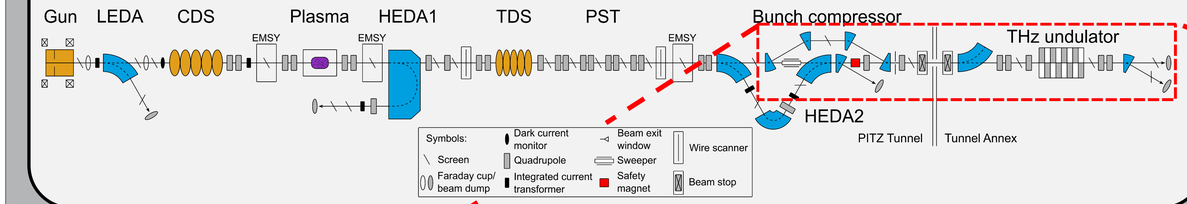
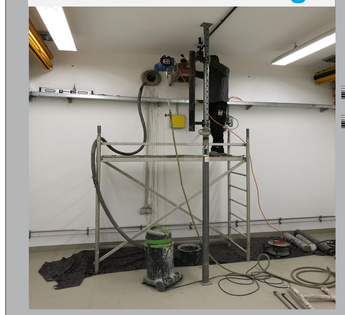
IPAC 2021
Campinas, SP, Brazil

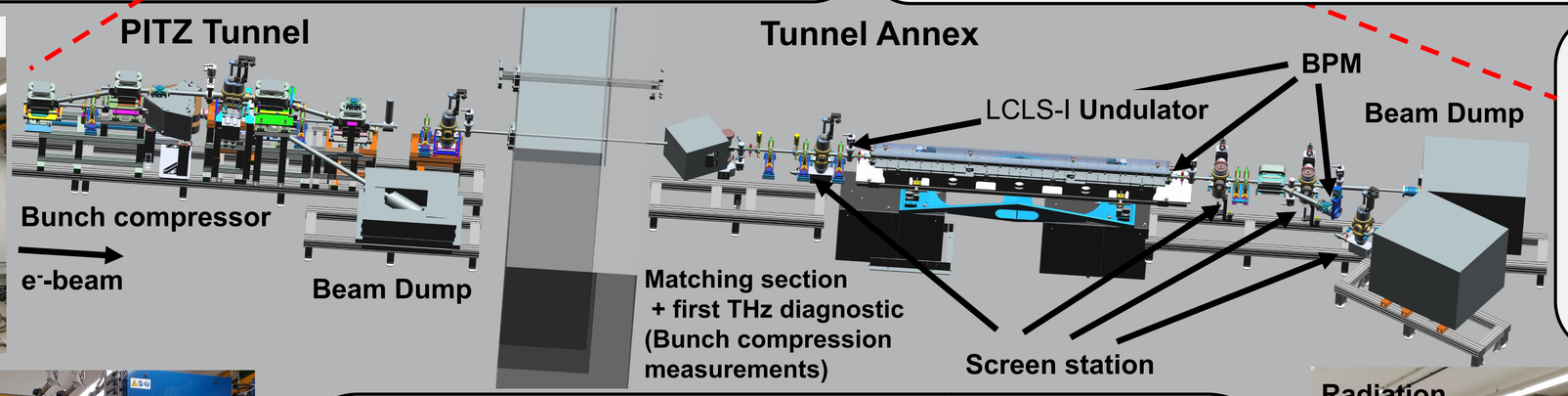
Schematic Overview of PITZ



In order to allow THz pump--X-ray probe experiments at full bunch repetition rate for users at the European XFEL, the Photo Injector Test Facility at DESY in Zeuthen (PITZ) is building a prototype of an accelerator-based THz source. The goal is to generate THz SASE FEL radiation with a mJ energy level per bunch using an LCLS-I undulator driven by the electron beam from PITZ. Therefore, the existing PITZ beam line is extended into a tunnel annex downstream of the existing accelerator tunnel.

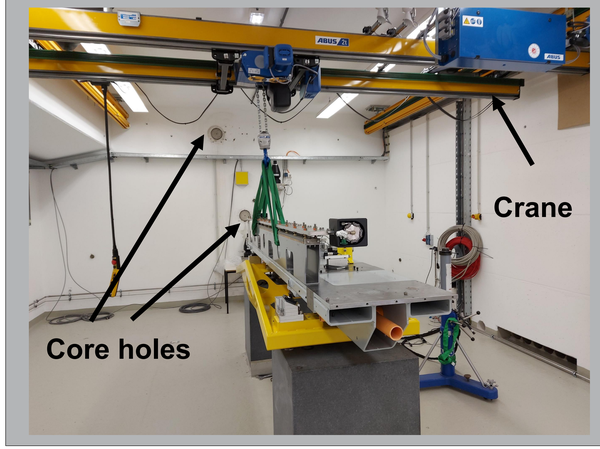
Core hole drilling





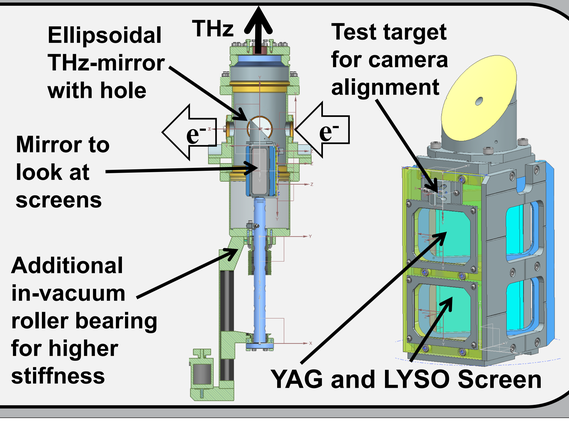
Outlook

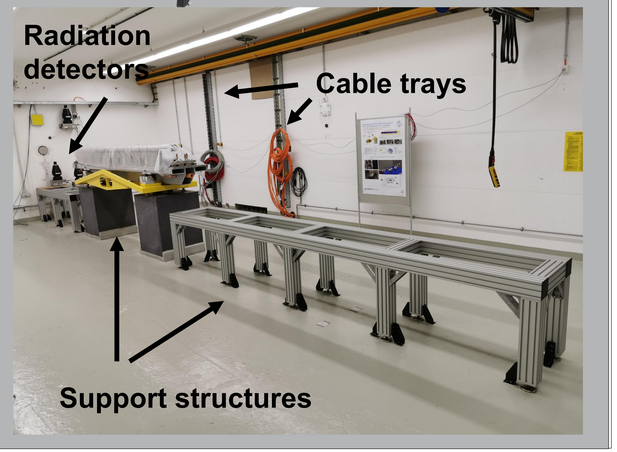
- Preparations of tunnel annex finished
- Last heavy construction work done in 06/2021
- Production / Ordering of components ongoing
- First beam in undulator planed for Q3/2021



Screen Station Design

- Design of all six screen stations finished
- Designed modularly to minimize the number of parts to produce
- In vacuum roller bearings for better stiffness at the THz screen
- Ellipsoidal mirror in vacuum to focus THz radiation, focus in diamond window to minimize window size (diameter: 20mm)





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For further information see also contributions by X.-K. Li, "Matching of a Space-Charge Dominated Beam into the Undulator of the THz SASE FEL @ PITZ", **A. Lueangaramwong**, "Numerical Study of Beam Dynamics in PITZ Bunch Compressor", and **G. Georgiev**, "Beam preparation with temporally modulated photocathode laser pulses for a seeded THz FEL"