

Contribution ID: 114

Type: **not specified**

## 4D Phase Space Analysis Aimed at x-y Coupling Characterization of Electron Beams

*Wednesday 10 September 2025 10:50 (20 minutes)*

The aim of this presentation is to give overview of a Summer Student Project, done within the Photo-Injector Teststand at DESY Zeuthen (PITZ). Emittance (volume in the trace space occupied by the beam) and plane coupling of the beam are important measures of the beam quality. Emittance should be low and there should be no x-y coupling. At the PITZ accelerator, recent measurements indicated significant beam coupling, therefore the main focus of the project was developing a tool for quantization of this coupling, as well as detection of the region of the beam in which coupling is the highest. The method used at PITZ for 4D phase space characterization, which was used to give information about transverse beam space coupling, is called Virtual Pepper Pot method. Series of emittance measurement scans were analyzed and compared for different beam-line parameters such as laser position on the cathode, electron gun solenoid current and effect of presence of gun quadrupoles. The presentation will outline methods applied and discuss preliminary observations.

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