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Investigation on the beam based alignment (BBA) in the booster accelerator at PITZ

At the photo injector test facility at DESY in Zeuthen (PITZ), the trajectory of the electron beam (6-7 MeV) in the booster accelerator is optimized routinely for improving the transverse phase space, which is crucial to the performance of the photo-injector. If entering the booster tilted and/or displaced, the electron beam will suffer asymmetric RF fields, which is axially symmetric and will kick and distort the beam. The fact that the RF kicking depends on the RF phase is employed to correct the beam trajectory at PITZ. The earth magnetic field also affects the beam trajectory and its effect on the correction procedure should be analyzed.

In this project, the candidate will perform particle tracking first, which tells the behaviors of the beam when passing the booster off-axis. Then by fitting the simulation results to the measurement data, the beam centroid position and angle at the booster entrance can be obtained, predicting the correction that can be realized by tuning the steering magnets before the booster. Finally, whether the beam trajectory improves or not can be verified by measurement.

This project will give us a better understanding of the booster BBA: its capabilities and limits. Besides particle tracking and data fitting, script development using MATLAB or python is also expected, which may finally help establish a routine procedure for booster BBA at PITZ.

Field

B4: Research on Accelerators

DESY Place

Zeuthen

DESY Division

М

DESY Group

PITZ

Special Qualifications:

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