

Numerical Studies to Reduce Beam Intensities at the High Intensity Test Beam-Facility PRIMA

The PRIMary-beam test Area (PRIMA), formerly a transport beamline from the DESY synchrotron to DORIS, is currently being commissioned to serve as a high-rate electron test beam line.

When DESY is not used to accelerate electron bunches for the PETRA III synchrotron radiation facility, bunches can be extracted towards the PRIMA beam line, delivering up to 3×10^{10} electrons for irradiation campaigns and detector testing.

For the latter, the current beam intensity of 1 GHz is too large and needs to be reduced to a few MHz. For stability reasons the beam intensity of the pre-injectors feeding DESY cannot be reduced. Therefore, the usage of collimators has been proposed. Two quadrupoles in the transport line can be used to increase the beam size before collimation. In order to reconstruct track lines in the device under test, the collimated beam needs to have a small divergence.

FLUKA is a Monte Carlo simulation framework for the interaction and transport of particles in material. Using FLUKA, the PRIMA irradiation environment, the selection of proper shielding materials and beam parameters such as beam size, divergence and emittance have been studied whilst the measurements have been performed to confirm these simulation results before starting test beam campaigns.

Using the FLUKA framework, the student will investigate the usage of collimators to explore the optimum parameters for making the beam in PRIMA suitable for detector studies.

Group

FH-FTX-TBT

Project Category

B3. Research on Accelerators

Special Qualifications

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