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Impact of beam background and jitter on LUXE IP chamber and diagnostics

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LUXE is an international project that aims to study Quantum Electro-Dynamics processes that occur in the strong field regime. Using the electron beam from the European XFEL, this experiment will perform electron-laser and photon-laser collisions. Beamline simulations are required to understand what beam properties and backgrounds are expected at key locations. The beam optics was design and simulated with MAD-8 and this used to create a BDSIM simulation. To perform high precision interactions it is crucial that the transverse size and position of the electron beam can be measured. The variation of the beam position over time also has impacts on an efficient collision with the laser. This study uses simulated virtual measurement, wire scanning methods, and real measurements at the XFEL to evaluate those parameters. Finally, background from both the upstream beam line and the different dumps must be estimated to ensure that the impacts on the experiment are low enough. This paper present BDSIM simulations with high statistics necessary to evaluate the background. Critical for BDSIM studies is finding optimised ways to do cross-section biasing and final state splitting in the dumps.

Footnotes

Paper preparation format

LaTeX

Region represented

Europe

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