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Improvements in longitudinal phase space tomography at PITZ

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Methodical studies to improve the existing e-beam Longitudinal Phase Space (LPS) tomography were performed at the Photo Injector Test facility at DESY in Zeuthen. Proof-of-principle simulations were done to address some core concerns e.g. booster phase range, space charge effects and noisy artefacts in results. Phase advance analysis was done with the help of an analytical model that determined the booster phase range and step size. A slit was introduced before the booster to truncate the beam and reduce space charge forces. The reconstruction method adopted was image space reconstruction algorithm owing to its assurance of non-negative solution. An initial scientific presumption of LPS from low energy momentum measurements was established to reduce artefacts in the phase space. This paper will explain the proof-of-principle simulations highlighting the key aspects to obtain accurate results. Reconstructed LPS for different experimental cases will be presented to demonstrate the diagnostic capability.

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Footnotes

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Yes

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