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Type: Poster Presentation

Optimizing 4D emittance measurements using the pinhole scan technique

Sunday 10 August 2025 15:00 (3 hours)

Accurate measurement of electron beam emittance is essential for optimizing high-brightness electron sources. The Pinhole Scan Technique measures the 4D phase space and hence the emittance by measuring the beam profile after clipping the beam using a pinhole followed by a drift section and then scanning the beam over the pinhole. This technique has been implemented in low (< 200 keV) beamlines at both Cornell university and Arizona State University. However, the technique poses several practical challenges. In this work, we analyze and address key issues affecting the 4D phase space and emittance measurements using this technique. We identify and investigate sources of inaccuracies like the pinhole aspect ratio, beam divergence, position-momentum correlations in the phase space, and the point-spread-function of the detector and suggest techniques to minimize them. Our findings offer a pathway to more accurate 4D phase space characterization in advanced electron beam systems.

Please consider my poster for contributed oral presentation

Yes

Would you like to submit this poster in student poster session on Sunday (August 10th)

Yes

Footnotes

Funding Agency

US National Science Foundation
US Department of Energy

I have read and accept the Privacy Policy Statement

Yes

Author: OWUSU, Peter (Arizona State University)

Co-authors: ZHANG, Charles (Cornell University); BARTNIK, Adam (Cornell University); MAXSON, Jared (Cornell University); KARKARE, Siddharth (Cornell University)

Presenter: OWUSU, Peter (Arizona State University)

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