Contribution ID: **2014** Contribution code: **MOPS112** Type: **Poster Presentation**

Dark current in LCLS-II: source characterization and start-to-end modeling

Monday 2 June 2025 16:00 (2 hours)

The RF photoinjector in LCLS-II produces several microamperes of dark current via field emission. While the vast majority of this dark current is collimated before reaching the first cryomodule, a small amount (typically less than 1 nA) is transported all the way to the beam switchyard (BSY) dump. In this contribution, we present the results of a start-to-end model of the transport of the dark current through the LCLS-II accelerator, including loss patterns under common machine tuning configurations and evolution of the dark current's phase space distribution. Understanding the phase space distribution in the BSY will benefit future experiments on the Linac-to-End Station A (LESA) beamline, including searches for dark matter, by enhancing our ability to tune the LESA optics to properly transport the dark current to the experiment.

Footnotes

Paper preparation format

LaTeX

Region represented

America

Funding Agency

Work supported by the U.S. Department of Energy under Contract No. DE-AC02-76SF00515.

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Session Classification: Monday Poster Session

Track Classification: MC1 :Colliders and Related Accelerators: MC1.A08 Linear Accelerators