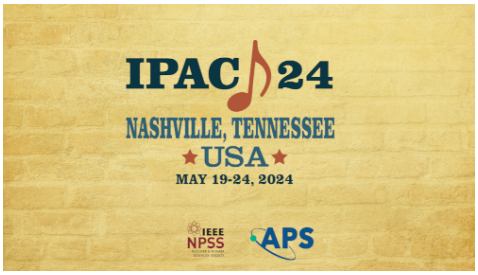

Contribution ID: **1627** Contribution code: **WEPG21** Type: **Poster Presentation**

Measuring transverse momentum space of alkali-antimonide photocathodes with the Cornell cryo-MTE-meter

Wednesday, 22 May 2024 16:00 (2 hours)

The brightness of the beam in any linear accelerator can be no greater than at its source. Thus characterization of source initial conditions, including spatial and momentum distributions, is then critical to understand brightness evolution in a linac. Often measurement of the initial momentum distribution and closely related quantities such as the mean transverse energy (MTE) is hampered by imperfect knowledge of either the spatial source distribution or the downstream particle optics. Here, we experimentally demonstrate a method* that reconstructs the initial transverse momentum space without the aforementioned limitations, only assuming the beam transport is linear. This method entails scanning the excitation laser across the photocathode and simultaneously measuring the 4D phase space of the beam via aperture scans. We also measure the transverse momentum space and MTE with other methods, including solenoid scans and m11=0 imaging, and compare the results. Lastly, we will discuss the measurements of initial transverse momentum spaces across a spectrum of photocathode temperatures and excitation energies for an alkali-antimonide photocathode.

Footnotes

- C. Zhang et al., "Reconstructing 4D source momentum space via aperture scans", in Proc. IPAC'23, Venice, Italy, May 2023, pp. 4595-4597. doi:10.18429/JACoW-IPAC2023-THPL071

Funding Agency

This work was supported by the U.S. National Science Foundation under Award PHY-1549132, the Center for Bright Beams, and DOE grant awards DE-AC02-76SF00515 and DE-SC0020144.

Paper preparation format

LaTeX

Region represented

North America

Primary author: ZHANG, Charles (Cornell University (CLASSE))

Co-authors: BARTNIK, Adam (Cornell University (CLASSE)); ECHEVERRIA, Elena (Cornell University (CLASSE)); PENNINGTON, Chad (Cornell University (CLASSE)); GALDI, Alice (Università degli Studi di Salerno); PIERCE, Christopher (Cornell University (CLASSE)); MAXSON, Jared (Cornell University)

Presenter: ZHANG, Charles (Cornell University (CLASSE))

Session Classification: Wednesday Poster Session

Track Classification: MC6: Beam Instrumentation, Controls, Feedback, and Operational Aspects: MC6.T03 Beam Diagnostics and Instrumentation