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Testing Photocathodes in Extreme Conditions

Monday 11 August 2025 15:00 (30 minutes)

Photocathodes are the electron sources of choice for accelerator applications that rely on bright and ultrashort electron bunches, including next-generation light sources and electron microscopes. These applications benefit significantly from photocathodes with low mean transverse energy (MTE), which directly contributes to higher beam brightness and better transverse coherence. However, the need for high charge densities, combined with the disordered structure of many photocathode materials, surface roughness, and spatial work function variations, limits the achievable MTE from conventional photocathodes to several hundred meV, which is nearly two orders of magnitude above the theoretical minimum. Additionally, most commonly used photocathodes degrade under high electric fields or intense laser fluences, posing challenges for reliable operation in advanced accelerator environments. Robust photocathodes capable of sustaining these extreme conditions while delivering bright electron beams with significantly reduced MTE are thus critical for enabling next-generation accelerator performance. In this talk, we will highlight recent advances in photocathode development and testing under extreme conditions, including high fields and cryogenic temperatures, conducted by the Center for Bright Beams (CBB, https://cbb.cornell.edu) and beyond toward brighter, more resilient electron sources.

Please consider my poster for contributed oral presentation

Yes

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

No

Footnotes

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I have read and accept the Privacy Policy Statement

Yes

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