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Compressed ultrashort pulse injector demonstrator

Tuesday 3 June 2025 16:00 (2 hours)

High brightness electron beams have a wide range of applications ranging from accelerator-based light sources to ultrafast electron diffraction and microscopy. Photoinjector were developed to generate these bright beams. Since then, research and development of high accelerating gradient photoinjectors has been an important topic to generate even brighter electron beams. However, high gradient photoinjectors suffer issues from material breakdown due to extremely high surface electric fields. One possible path to simultaneously achieve high gradient and suppress breakdowns is to reduce the rf pulse duration fed into the photoinjector. Such an approach was recently demonstrated at the Argonne Wakefield Accelerator (AWA) facility where they commissioned an X-band photoinjector at 400 MV/m cathode field without significant breakdown rates. SLAC National Accelerator Laboratory recently developed rf pulse compression technology optimized for short pulses up to 500MW. We propose to develop an X-band photoinjector which can utilize these ultrashort rf pulses to produce surface fields at 500 MV/m or higher at the cathode. This presentation focuses on the design of the X-band photoinjector.

Footnotes

Paper preparation format

LaTeX

Region represented

America

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