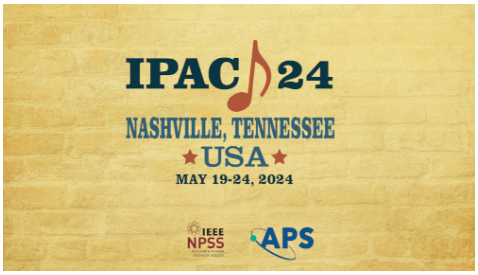

Contribution ID: **1717** Contribution code: **THPC10** Type: **Poster Presentation**

Optimizations for ultrafast electron diffraction with a cryogenic C-band gun

Thursday, 23 May 2024 16:00 (2 hours)

Ultrafast electron diffraction (UED) is a growing accelerator application that enables the study of transient material processes at sub-picosecond timescales with nanometer spatial resolution. In this proceeding, we present simulations of the Cryogenic Brightness-Optimized Radiofrequency Gun (CYBORG) beamline using the General Particle Tracer (GPT) code that are optimized for the application of UED. We explore advantages of performing UED with a beamline equipped with a low intrinsic emittance photocathode, extraction fields approaching 200 MV/m, and a cathode temperature below 77 K. The electron beam bunch length and the 4D transverse emittance are critical metrics for achieving high spatial and temporal resolution in UED, and are minimized at the sample location in our optimization using a Non-Dominated Sorting Genetic Algorithm II (NSGA II).

Footnotes

Funding Agency

The Center for Bright Beams, NSF

Paper preparation format

LaTeX

Region represented

North America

Primary author: PENNINGTON, Chad (Cornell University (CLASSE))

Co-authors: BARTNIK, Adam (Cornell University (CLASSE)); BOSCO, Fabio (University of California, Los Angeles); LAWLER, Gerard (University of California, Los Angeles); ROSENZWEIG, James (University of California, Los Angeles); MAXSON, Jared (Cornell University)

Presenter: PENNINGTON, Chad (Cornell University (CLASSE))

Session Classification: Thursday Poster Session

Track Classification: MC5: Beam Dynamics and EM Fields: MC5.D01 Beam Optics Lattices, Correction Schemes, Transport