Contribution ID: **2537** Contribution code: **TUPL115** Type: **Poster Presentation**

Development of a compact half-cell RF photocathode gun for single-shot keV ultrafast electron diffraction with femtosecond resolution

Tuesday, 9 May 2023 16:30 (2 hours)

Ultrafast electron diffraction (UED) is a powerful tool for the direct visualization of structural dynamic processes in matter on atomic length and time scales. Observa-tions on a femtosecond time scale with atomic resolution spatially have long been a goal in science and are current-ly achieved with large photo injectors developed for FEL frontends. Here we demonstrate a compact 180 keV photocathode S-band electron gun, which employs field-enhancement at a pin-shaped cathode to produce an extraction field strength of 102 MV/m driven by a rack-mountable solid state 10 kW peak power supply. Simula-tions predict that high-brightness electron bunches with RMS duration of 10 fs, a radius of 135 µm, and spatial emittance of 0.1 mm-mrad are possible for a bunch charge of 10 fC. The impact of laser spot size and dura-tion, as well as their spatial distribution, on the temporal bunch length of electrons on the specimen was investigat-ed. Following the successful completion of the condition-ing phase of the RF gun and multipacting suppression, photo-triggered electrons using a UV laser on the photo-cathode were observed.

Funding Agency

Footnotes

I have read and accept the Privacy Policy Statement

Yes

Primary author: BAZRAFSHAN, Reza (Deutsches Elektronen Synchrotron (DESY) and Center for Free Electron Science (CFEL))

Co-authors: DELSIM-HASHEMI, Hossein (Deutsches Elektronen-Synchrotron); FAKHARI, Moein (Deutsches Elektronen-Synchrotron); FLOETTMANN, Klaus (Deutsches Elektronen-Synchrotron); KAERTNER, Franz (Deutsches Elektronen-Synchrotron); MATLIS, Nicholas (Deutsches Elektronen Synchrotron (DESY) and Center for Free Electron Science (CFEL)); ROHWER, Timm (Deutsches Elektronen Synchrotron (DESY) and Center for Free Electron Science (CFEL))

Presenter: BAZRAFSHAN, Reza (Deutsches Elektronen Synchrotron (DESY) and Center for Free Electron Science (CFEL))

Session Classification: Tuesday Poster Session

Track Classification: MC2: Photon Sources and Electron Accelerators: MC2.A08: Linear Accelerators