Contribution ID: **174** Contribution code: **TUP174-WEA** Type: **Student Poster Presentation**

Spectral response and quantum efficiency of rejuvenated Cesium Telluride photocathodes for high average current photoinjectors

Tuesday 20 August 2024 20:40 (20 minutes)

Cesium telluride (Cs-Te) photocathodes are the current workhorse in high repetition rate free-electron lasers (FELs) around the world. Unfortunately, they are chemically highly reactive, which limits their operational lifetime and require frequent interventions for Cs-Te film replacement or rejuvenation. The precise control of the Cs-Te deposition stoichiometry ratio during the photocathode fabrication process is essential to optimise the resulting quantum efficiency (QE) and emittance of electron sources. For example, an excess of Cs or the formation of another CsxTe phase can lead to a sub-optimal electron bunch energy spread or a decrease in overall quantum yield. In this study, we analyse the photoemissive characteristics of Cs-Te photocathodes rejuvenated by co-depositing a Cs-Te layer over a degraded one. The QE of the photocathodes was measured using a 10 Hz 5 ns pulsed OPO in the wavelength range from 240 to 360 nm. This experiment allows to estimate the photoemission threshold and corresponding energy distribution of emitted electrons, and to compare with the expected spectral response using Spicer's three-step model.

Footnotes

Funding Agency

Primary author: KATONA, Palma (European Organization for Nuclear Research)

Co-authors: Mr BERNERD, C. (CERN, European Organization for Nuclear Research, 1211 Geneva, Switzerland); MARTINEZ-CALDERON, Miguel (European Organization for Nuclear Research); CHEVALLAY, E. (CERN, European Organization for Nuclear Research, 1211 Geneva, Switzerland); Mr ROSSEL, R. E. (CERN, European Organization for Nuclear Research, 1211 Geneva, Switzerland); Mr JONES, L. B. (ASTeC, STFC Daresbury Laboratory, Warrington, United Kingdom, Cockcroft Institute of Accelerator Science, Daresbury, United Kingdom); Mr ZEVI DELLA PORTA, G. (CERN, European Organization for Nuclear Research, 1211 Geneva, Switzerland); Mr MARSH, B. (CERN, European Organization for Nuclear Research, 1211 Geneva, Switzerland); GRANADOS, Eduardo (European Organization for Nuclear Research)

Presenter: KATONA, Palma (European Organization for Nuclear Research)

Session Classification: Poster session

Track Classification: Electron sources