Contribution ID: **27** Type: **Presentation**

Monte Carlo transverse emittance and quantum efficiency study on Cs2Te

Thursday, 22 September 2022 09:00 (20 minutes)

Monte Carlo simulation study of Cs2Te

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The semiconductor photocathodes are very attractive because of their high quantum yield. The semiconductors that have a relatively large band gap (Eg) and a comparatively low electronic affinity (Ea) are considered good photo emitters [1]. Cs2Te is considered a robust high current photo emitter for FEL and particle accelerator applications [2]. In this contribution, a theoretical formulation of a three-step model [3] is developed, using the Density Functional Theory (DFT) and the Monte Carlo simulation [4]. The simulation includes the density of states (DOS) of the valence bands, the electron transport mechanisms, the direction changes after each scattering event, the Schottky effect, band bending effects, and the transverse momentum conservation. The model agrees well with measured results for thermal emittance, quantum efficiency, and response time data of Cs2Te.

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Session Classification: Theory