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Development of a High-Field X-band Photoemission RF Gun Powered by Short RF Pulses

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A novel X-band (11.7 GHz) photoemission gun (Xgun), powered by short RF pulses (9 ns), has demonstrated unprecedented surface electric fields of approximately 400 MV/m on the photocathode. As a first step towards fully understanding the Xgun's performance in the high-field regime, we focused on the fundamentals of photoemissions, including the impact of the Schottky effect, multipacting, and dark current emission. The characterization and benchmarking of electron emission for photocathode fields ranging from 60 MV/m to 320 MV/m are discussed. Additionally, we apply these simulations to the next-generation XRF gun being designed.

Working group

WG5 : Beam sources, monitoring and control

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