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Toward the emission of photoelectrons from high field cryogenic radio frequency guns

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The intrinsic emittance obtained from radio-frequency (RF) photoinjectors is notably reduced by increasing the launch field at the cathode. Moreover, cryogenic RF guns offer the possibility of producing stronger fields, due to the higher bulk conductivity, while lowering the mean transverse energy (MTE) of near-threshold photo electrons. Such devices thus constitute an ideal tool for driving low emittance electron applications like ultra fast electron diffraction (UED) and free electron lasers (FELs).

The CYBORG beamline at UCLA is a stepping stone facility meant to investigate the production of very low MTE photoelectrons in cryogenic RF guns. In this paper we report about the status of the beamline progress. Indeed, after an initial phase dedicated to the study of dark current emission in the high field cryo-RF gun, the facility is heading toward a second phase aimed at producing high brightness photoelectrons. In particular, we discuss the integration of the existing system with the UV laser and a loadlock for cathode exchange as well as the plan for the diagnostics envisioned for the upgraded version of our beamline.

Footnotes

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