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Reduction of dark current at cryogenic temperatures in a high gradient photogun

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The newly commissioned CYBORG (CrYogenic Brightness Optimized Radiofrequency Gun) beamline at UCLA operates in a high gradient, low temperature regime inaccessible to most other existing photoguns and cathode testing infrastructure. The beamline is designed to study electron emission in regime. The final intended configuration of the beamline will be used for studies of novel photocathodes including low mean transverse energy (MTE), high quantum efficiency (QE) semiconductor cathodes dependent on future laser improvement. In the near term, the unique environment allows us to study temperature dependent effects on dark current. Notable reduction in dark current at cryogenic temperatures was observed, a behavior not predicted by Fowler-Nordheim type field emission. Initial results are presented.

Footnotes

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North America

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