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CrYogenic Brightness-Optimized Radiofrequency Gun (CYBGORG) Beamline

The pursuit of increased electron beam brightness implies multiple complementary research goals including increasing beam brightness at the cathode. Extremely high gradients (> 200 MV/m) have been shown in normal conducting copper cavities at cryogenic temperature (<77K). In addition, for photocathodes operating near their emission threshold material lattice temperatures begin to be the dominant contribution to minimum achievable intrinsic emittance. Cryogenic operation of a high gradient RF photoinjector then becomes a very enticing prospect. The physical emission phenomena associated with the production of photocurrent and RF gradient limiting breakdown are complex and require comprehensive study to be fully well understood and utilize in future beamlines such as an ultra-compact xray free electron laser (UCXFEL). To this end, we will present the case for the CrYogenic Brightness-Optimized Radiofrequency Gun (CYBGORG) beamline at UCLA as a useful cryogenic RF photocathode test bed for such studies. We present here the basic physics motivations for the CYBORG beamline and the commissioning status of the CYBORG beamline and preliminary results.

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