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High Gradient CrYogenic Brightness-Optimized Radiofrequency Gun (CYBORG) Test Bed

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Producing higher brightness beams at the cathode is one of the main focuses for future electron beam applications. For photocathodes operating close to their emission threshold, the cathode lattice temperature begins to dominate the minimum achievable intrinsic emittance. At UCLA, we are designing a radiofrequency (RF) test bed for measuring the temperature dependence of the mean transverse energy (MTE) and quantum efficiency for a number of candidate cathode materials. We intend to quantify the attainable brightness improvements at the cathode from cryogenic operation and establish a proof-of-principle cryogenic RF gun for future studies of a 1.6-cell cryogenic photoinjector for the UCLA ultra compact XFEL concept (UC-XFEL). The test bed will use a C-band 0.5-cell RF gun designed to operate down to 45 K, producing an on-axis accelerating field of 120 MV/m. The cryogenic system uses conduction cooling and a load-lock system is being designed for transport and storage of air-sensitive high brightness cathodes.

Topic

Applications

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