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Status of the CW SRF gun development for LCLS-II-HE at FRIB

Thursday 25 September 2025 12:00 (20 minutes)

A superconducting radio-frequency photo-injector (SRF-PI) can in principle operate in continuous-wave (CW) mode at high gradients with ultra-high vacuum. Using low mean-transverse-energy photocathodes, SRF-PIs could provide high-brightness, high- repetition-rate beams with long cathode lifetimes. For these reasons, an SRF-PI has been adopted for the proposed Low Emittance Injector addition to the SLAC Linac Coherent Light Source II High-Energy (LCLS-II-HE) Upgrade, which would operate in CW with bunch rates of up to 1 MHz. This new injector is a critical part of the effort to extend the photon energy range of this new x-ray laser. A 185.7 MHz quarter-wave gun cavity and cryomodule have been developed by the Facility for Rare Isotope Beam at Michigan State University (FRIB/MSU) in collaboration with HZDR, ANL, and SLAC. A cryomodule test of the first prototype gun cavity and cold tests of a second cavity are underway at FRIB/MSU. The cavities have met the goal of 30 MV/m photocathode field in cold tests in which a photocathode was not installed. All critical cavity parameters fit very well with the simulations and a fully integrated module test with normal conducting cathodes (both metal and semiconductor) are underway.

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Yes

Footnotes

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