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A new photocathode R&D program at the Argonne Wakefield Accelerator facility: photocathode fabrication chamber and higher-power testing with a 1.3 GHz NCRF injector test stand

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A New Photocathode R&D program at the Argonne Wakefield Accelerator facility: photocathode fabrication chamber and high-power testing with a 1.3 GHz NCRF injector test stand abstract -> A new program is under development at the Argonne Wakefield Accelerator (AWA) facility to fabricate and test photocathodes. The goal is to provide high quality beams for the in-house structure-based wakefield acceleration program as well as to serve the advanced photocathode community. The AWA houses three independent 1.3 GHz NCRF photocathode guns: the 1.5 cell drive gun, with a cesium telluride cathode, for generating drive bunches with 0.001 –100 nC single bunch and 600 nC bunch train; the 1.5 cell witness gun, with a magnesium cathode, for generating the low emittance and low charge main beam; and a 0.5 cell high-gradient gun on an injector test stand that is dedicated to cathode studies. The AWA is developing start-to-end photocathode research capabilities, including fabrication of cesium telluride and other semiconductor cathodes using two deposition chambers, in-situ cathode characterization of quantum efficiency and thermal emittance, and ex-situ cathode inspection taking the advantage of the various surface analysis resources inside Argonne. The photocathode R&D program at AWA is flexible and open to collaborators worldwide. Highlights of the nascent photocathode research program at the AWA, plans for future studies and collaborative efforts will be reported on.

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