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Test of a DC-photogun Injector for the Lighthouse facility

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Worldwide there is a push for producing medical isotopes using particle accelerators rather than fission reactions. Here we report on the operation of a DC-photogun designed for producing Mo-99 in the Lighthouse facility and commissioned by the Institute for Radio Elements (IRE, Belgium).

The gun is based on the successful CBETA design by Cornell University. It is installed at the RI site in Bergisch Gladbach, Germany. As innovative components it contains a photocathode deposition system allowing an automatic transfer of photocathodes into the gun and it uses Novec 4710, a gas developed by 3M as a sustainable replacement for SF₆. The injector was installed at the RI site in Bergisch Gladbach, Germany and has produced first e-beam in April 2022. Currently we are ramping up the e-beam power and optimizing the photocathodes.

The high-voltage has been conditioned up to >400kV and we see no negative impact of the NOVEC gas. The laser produces 40W at 515nm and 1.3GHz repetition rate and adjustable pulse length. It can deliver pulse trains of 100ns up to CW with variable pulse power onto the cathode. In the MBE system we routinely prepare photocathodes with at least 5% quantum efficiency, well sufficient for the design current of 40mA. The beam diagnostics is currently used to optimize the electron beam.

The current focus is on ramping up the power to the design value of 40mA at 350kV.

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Footnotes

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