

Thomas Jefferson National Laboratory FEL Industrial Applications*, G.R. NEIL, TJNAF - The Thomas Jefferson National Accelerator Facility, FEL is laid out in a racetrack configuration to utilize energy recovery of the spent electron beam. The electrons are produced in a 350 kV DC photocathode gun and accelerated to 10 MeV in a superconducting accelerating unit with 1 meter of active length. The electrons are then accelerated in an SRF cryomodule up to an energy of 57 MeV. To minimize emittance-growth effects and to accelerate the commissioning process, the FEL is placed at the exit of the linac. The electron beam is deflected around two cavity mirrors in two magnetic chicanes with a path-length dispersion (M56) of 30 cm. After the FEL, the beam can be recirculated for energy recovery and dumped at the injection energy of 10 MeV. The recirculation loop is based on the isochronous achromat used in the MIT Bates accelerator but designed with an energy acceptance of 6%. We estimate that the power output at 3 μm should be 980 W with a small signal gain of 46%. This paper will explore the technical and economic justification of the design and present the commissioning progress to date.

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