

DESIGN AND INITIAL DEMONSTRATION RESULTS OF LASER WIRE SCANNER FOR ENERGY RECOVERY LINACS

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Abstract

Energy Recovery LINACs (ERL's) can produce electron beams of smaller emittance than in synchrotron rings, with high average current, and without inefficiencies involved in dumping a high-powered accelerated beam. The ERL group at the Cornell Lab for Accelerator-based Sciences and Education (CLASSE) is currently testing an injector for an ERL based X-ray light source: a superconducting RF (SRF) accelerator coupled to a DC electron gun and high rep rate (1.3 GHz) photocathode drive laser, capable of producing a CW beam of 80 pC bunches (100 mA average current). Traditional transverse diagnostics are incapable of operation with such high average currents, motivating the use of a Laser Wire Scanner (LWS). RadiaBeam Technologies, in collaboration with the Cornell ERL group, is developing a LWS system capable of measuring e-beam profiles in both transverse dimensions as well as obtaining the longitudinal beam profile. Due to the low energy of the injector output (5-15 MeV) and beam halo scraping, detection of laser-scattered photons is significantly more challenging than in previous LWS system. This contribution presents a LWS prototype design and initial demonstration results.

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