

Abstract Submitted
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The Cornell-BNL ERL Test Accelerator: Demonstration of the World's first Multipass Superconducting Linear Accelerator with Energy Recovery.¹ COLWYN GULLIFORD, ADAM BARTNIK, Cornell University, NILANJAN BANERJEE, None, JAMES CRITTENDEN, KIRSTEN DEITRICK, JOHN DOBBINS, GEORG HOFFSTAETTER, PETER QUIGELY, DAVID SAGAN, DAVID BURKE, Cornell University, WILLIAM LOU, None, KARL SMOLENSKI, Cornell University, J. SCOTT BERG, STEPHEN BROOKS, ROB HULSART, GEORGE MAHLER, FRANCOIS MEET, Brookhaven National Lab, ROB MICHNOFF, Cornell University, STEPHEN PEGGS, THOMAS ROSER, DEJAN TROBJEVIC, NICHOLAOS TSOUPAS, Brookhaven National Lab — Energy recovery has been achieved in both single and multipass configurations of the Cornell-BNL ERL Test Accelerator (CBETA). In the multipass configuration, energy transferred to the electron beam during the first four passes through the accelerating structure was recovered from the beam during four subsequent decelerating passes. The combination of superconducting accelerating cavities for minimizing power loss in the accelerating structure and permanent magnets for the return loop resulted in high-energy efficiency operation. The use of a fixed-field alternating-gradient optical system for the return loop allowed transport of beams with 42, 78, 114, and 150 MeV in a common vacuum chamber. In the single turn configuration, energy recovery efficiencies of 99.8-100.5% were measured for each of the accelerating cavities. The technology used in CBETA makes possible more compact particle accelerators featuring higher beam currents and reduced energy consumption.

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