SYER 1: The Physics of Energy-Recovering LINACs I

Zeit: Mittwoch 9:00–10:30 Raum: S1/05 122

Hauptvortrag SYER 1.1 Mi 9:00 S1/05 122

What Is An Energy Recovery Linac, and Why There Might Be One In Your Future* — •Geoffrey Krafft — Jefferson Laboratory, Newport News, VA, USA — Old Dominion University, Norfolk, VA, USA

Applying beam energy recovery allows a class of novel accelerators to be built with performance characteristics beyond that possible in ring accelerators or non-recirculated linear accelerators. Although the idea was published 50 years ago, and was explored and developed as a result of "Star Wars" strategic defense programs in the 1980s and 1990s, renewed interest in energy recovery linacs (ERLs) has flowered as a result of continuous development and improvement of superconducting beam acceleration systems. Many applications to electron accelerators where the very best beam quality is required at high average current have been and are being explored. Examples include advanced X-ray sources, electron sources for electron ion colliders, internal target experiments and applications, lithography, and other topics. Examples highlighting new performance possibilities and the present perception on the limits of ERLs will be given. *Authored by Jefferson Science Associates, LLC under U.S. DOE Contract No. DE-AC05-06OR23177. The U.S. Government retains a non-exclusive, paid-up, irrevocable, world-wide license to publish or reproduce this manuscript for U.S. Government purposes.

Hauptvortrag SYER 1.2 Mi 9:45 S1/05 122

An FFAG-ERL at Cornell University for eRHIC Prototyping and Bright-Beam Applications — •Georg Hoffstaetter — Cornell University, Ithaca / NY

Cornell University has prototyped technology essential for any high-brightness electron ERL. This includes a DC gun and an SRF injector Linac with world-record current and normalized brightness in a bunch train, a high-current CW cryomodule for 70MeV energy gain, a high-power beam stop, and several diagnostics tools for high-current and high-brightness beams, e.g. slid measurements for 6-D phase-space densities, a fast wire scanner for beam profiles, and beam loos diagnostics. All these are now available to equip a one-cryomodule ERL, and laboratory space has been cleared out and is radiation shielded to install this ERL at Cornell.

BNL has designed a multi-turn ERL for eRHIC, where beam is transported more than 20 times around the RHIC tunnel. The number of transport lines is minimized by using two non-scaling (NS) FFAG arcs.

A collaboration between BNL and Cornell has been formed to investigate the new NS-FFAG optics and the multi-turn eRHIC ERL design by building a 4-turn, one-cryomodule ERL at Cornell. It has a NS-FFAG return loop built with permanent magnets and is meant to accelerate 40mA beam to 250MeV.