

## SYER 2: The Physics of Energy-Recovering LINACs II

Zeit: Mittwoch 11:00–12:30

Raum: S1/05 122

**Hauptvortrag** SYER 2.1 Mi 11:00 S1/05 122  
**Physics opportunities at ERLs** — •JAN BERNAUER — Massachusetts Institute of Technology, Cambridge, MA, USA

The advent of energy recovering linacs opens up a new area in the luminosity / target density plane, allowing for unique experiments both on the intensity and on the precision frontier. In the talk, I will give an overview of experiments already funded or proposed. In the second part, ideas for future experiments will be discussed.

**Hauptvortrag** SYER 2.2 Mi 11:30 S1/05 122  
**MESA - an ERL project for particle physics experiments\*** — •FLORIAN HUG — Institut für Kernphysik, Universität Mainz

The Mainz Energy-recovering Superconducting Accelerator (MESA) will be constructed at the Institut für Kernphysik of the Johannes Gutenberg University of Mainz. The accelerator is a low energy continuous wave (CW) recirculating electron linac for particle physics experiments. MESA will be operated in two different modes serving mainly two experiments: the first is the external beam (EB) mode, where the beam is dumped after being used with the external fixed target experiment P2, whose goal is the measurement of the weak mixing angle with highest accuracy. The required beam current for P2 is 150  $\mu\text{A}$  with polarized electrons at 155 MeV. In the second operation mode MESA will be run as an energy recovery linac (ERL). In an ERL the energy of the electrons is recovered after their experimental use by decelerating them in the superconducting acceleration cavities. The experiment served in this mode is a (pseudo) internal fixed target experiment named MAGIX. It demands an unpolarized beam of 1 mA

at 105 MeV. In a later construction stage of MESA the achievable beam current in ERL-mode shall be upgraded to 10 mA. Within this talk an overview of the MESA project will be given highlighting the challenges of operation with high density internal gas targets and the (\*new\*) physics applications.

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**Hauptvortrag** SYER 2.3 Mi 12:00 S1/05 122  
**Development of a high brightness, high current SRF photo-electron source for ERL applications** — •AXEL NEUMANN for the bERLinPro Team and Collaborators — Helmholtz-Zentrum Berlin, 12489 Berlin, Germany

Energy recovery linacs (ERL) offer the potential to combine major beam properties of the two main domains of particle accelerators: The low emittance of linear accelerators and the high average beam current of storage rings, while also allowing to compress to short bunches below the ps regime. This makes among other applications ERLs an ideal candidate for future light sources. The beam properties of the ERL are given by the performance of the injection section and hence of the beam source. Helmholtz-Zentrum Berlin is currently designing and building a high average current all superconducting CW driven ERL as a prototype to demonstrate low normalized beam emittance of 1 mm\*mrad at 100mA and short pulses of about 2 ps. In this contribution we will discuss the development of this class of a high brightness, high current SRF photo-electron source and present recent commissioning results. Also, alternative approaches at other laboratories will be shortly reviewed.