AKBP 13: Hadron Accelerators and Colliders

Zeit: Donnerstag 14:00–15:00 Raum: HS 8

AKBP 13.1 Do 14:00 HS 8

Proton beam multiplexing and pulse distribution concepts for the High Brilliance neutron Source HBS — •Marius Rimmler[1], Johannes Baggemann[2], Olaf Felden[1], Ralf Gebel[1], Thomas Gutberlet[2], Ulrich Rücker[2], Paul Zakalek[2], and Thomas Brückel[2] — [1]Institut für Kernphysik, Jülich, Germany — [2]Jülich Centre for Neutron Science, Jülich, Germany

The High Brilliance Source (HBS) project aims to develop a scalable Compact Accelerator-driven Neutron Source (CANS) using nuclear reactions of protons in the low MeV energy range with a suitable solid target. Optimization of the accelerator as well as the target-, moderator- and shielding assembly allows to obtain neutron fluxes at the instruments comparable to today's research reactors. The HBS project features efficient simultaneous operation of different neutron instruments. This will be realized by distributing appropriate 50 - 800 μs long pulse sequences in a multiplexed 70 MeV energy proton beam to different target stations operated at different repetition rate but identical average power. The different timing schemes can be used to obtain the optimal balance between wavelength bandwidth and resolution of the time-resolved neutron spectrum extracted from the thermal or cold neutron moderator according to the requirement of the experiment.

This contribution presents current developments of a proton pulse distribution device. Synchronisation to a pulser in the LEBT beam line of the accelerator requires fast kicker magnets that enable pulsed beam deflection. We discuss challenges in the design of such magnets and outline plans of prototype developments.

AKBP 13.2 Do 14:15 HS 8

Laser cooling of stored relativistic heavy-ion beams at the SIS100 — •Danyal Winters[1], Daniel Albach[3,5], Gerhard Birkl[2], Michael Bussmann[3], Volker Hannen[4], Max Horst[1,2], Daniel Kiefer[2], Sebastian Klammes[1,2], Thomas Kühl[1], Markus Löser[3,5], Ulrich Schramm[3,5], Mathias Siebold[3,5], Thomas Stöhlker[1,6,7], Johannes Ullmann[1,4], Thomas Walther[2], Daniel Winzen[4], and Peter Spiller[1] — [1]GSI Darmstadt — [2]TU Darmstadt — [3]HZDR Dresden — [4]Uni Münster — [5]TU Dresden — [6]HI Jena — [7]Uni Jena

At relativistic velocities, laser cooling is an efficient technique to minimize the momentum spread of stored heavy-ion beams in storage rings. For the future facility FAIR in Darmstadt, this cooling method will also uniquely be applied to the heavy-ion synchrotron SIS100. As part of this project, we are currently designing a dedicated laser beamline, which will run from the laser lab (maintenance tunnel) to the ion beampipe (accelerator tunnel). The laser beamline will be about 25 m long and pumped down to reach a vacuum of $\sim 10^{-6}$ mbar. To analyze and prepare for unwanted effects during laser cooling, such as optical pumping, changes in the polarization of the transported laser light are being studied using a scaled-down version of the laser beamline and the real optics. We will present the status of the construction of the SIS100 (building site), give an overview of our project and show some of our test results.

AKBP 13.3 Do 14:30 HS 8

Laser cooling experiments at ESR and CSRe — •Sebastian Klammes[1,2], Oliver Boine-Frankenheim[1,2], Michael Bussmann[6], Axel Buss[3], Christian Egelkamp[3], Lewin Eidam[2], Volker Hannen[3], Zhongkui Huang[4], Daniel Kiefer[2], Thomas Kühl[1,5], Markus Löser[6,7], Xinwen Ma[4], Fritz Nolden[1], Wilfried Nörtershäuser[2], Rodolfo Sánchez[1], Ulrich Schramm[6,7], Mathias Siebold[6], Peter Spiller[1], Markus Steck[1], Thomas Stöhlker[1,5,8], Johannes Ullmann[2,8], Thomas Walther[2], Hanbing Wang[4], Weiqiang Wen[4], Christian Weinheimer[3], Daniel Winzen[3], and Danyal Winters[1] — [1]GSI Darmstadt — [2]TU Darmstadt — [3]Uni Münster — [4]IMP Lanzhou — [5]HI-Jena — [6]HZDR Dresden — [7]TU-Dresden — [8]Uni-Jena

At heavy-ion storage rings, almost all experiments strongly benefit from *cooled* ion beams, *i.e.* beams which have a small relative momentum spread and a small emittance. Although electron cooling and stochastic cooling are most frequently used, laser cooling has proven to be a powerful technique with a large potential. Laser cooling is based on resonant absorption (of momentum & energy) in the longitudinal direction and subsequent spontaneous random emission (fluorescence) of photons by ions. Because of its efficiency at high energies, laser cooling will *e.g.* be the only cooling method at the heavy-ion synchrotron SIS100. We will report on results from recent laser cooling experiments performed at the ESR (GSI) and the CSRe (IMP, Lanzhou, China) storage rings, using C^{3+} and O^{5+} ion beams, respectively. Finally, we will present our plans for laser cooling experiments at FAIR.

AKBP 13.4 Do 14:45 HS 8

Beam Impact Experiment of 440GeV/p Protons on Superconducting Wires and Tapes in a Cryogenic Environment — •Andreas Will[1,2], Axel Bernhard[1], Marco Bonura[3], Matthias Mentink[2], Anke-Susanne Mueller[1], Andreas Oslandsbotn[2], Carmine Senatore[3], and Daniel Wollmann[2] — [1]KIT, Karlsruhe, Germany — [2]CERN, Geneva, Switzerland — [3]University de Geneve, Geneva, Switzerland

The superconducting magnets used in high energy particle accelerators such as CERN's LHC can be impacted by the circulating beam in case of specific failure cases. This leads to interaction of the beam particles with the magnet components, like the superconducting coils, directly or via secondary particle showers. The interaction leads to energy deposition in the timescale of microseconds and induces large thermal gradients within the superconductors in the order of 100 K/mm. To investigate the effect on the superconductors, an experiment at CERN's HiRadMat facility was designed and executed, exposing short samples of Nb-Ti and Nb3Sn strands as well as YBCO tape in a cryogenic environment to microsecond 440 GeV/p proton beams. The irradiated samples were extracted and analyzed for their superconducting properties, such as the critical transport current. This paper describes the experimental setup as well as the results of the analysis.