# AKBP 7: Hadron Accelerators and Colliders

Zeit: Dienstag 14:00–15:15 Raum: HS 7

AKBP 7.1 Di 14:00 HS 7

**Target Concept for a Compact Laboratory Scale Accelerator Driven High Brilliance Neutron Source** — •Paul-Emmanuel Doege[1], Johannes Baggemann[1], Tobias Cronert[1], Thomas Gutberlet[1], Eric Mauerhofer[1], Ulrich Rücker[1], Jörg Voigt[1], Yannick Bessler[2], Jörg Wolters[2], Sarah Böhm[3], Jingnig Li[3], Ghaleb Natour[2], and Thomas Brückel[1] — [1]JCNS, Forschungszentrum Jülich, Germany — [2]ZEA-1, Forschungszentrum Jülich, Germany — [3]NET, RWTH-Aachen, Germany

In the framework of the High Brilliance Neutron Source Project - HBS, novel accelerator driven neutron sources are in development. They are intended to be employed in a variety of fields, such as neutron scattering, imaging and activation analysis. Due to the scalable, modular approach, sources replacing todays medium flux reactor facilities, as well as laboratory sources for universities or industry will be possible to realize. The neutron production of these sources is based on nuclear reactions, which are taking place when ions of hydrogen isotopes with an energy well below the spallation threshold energy are impinging on a suitable target material. The target assembly and the cooling circuit need to be adapted to the projectile energy and the beam current. A target assembly for 10 MeV protons and an average beam power of 400 W, which was conceived for a laboratory scale facility, will be presented here.

AKBP 7.2 Di 14:15 HS 7

**Electron Cooling Experiments with 2.4 GeV/c proton beam at COSY** — •Philipp Niedermayer, Vsevolod Kamerdzhiev, Arthur Halama, Christian Böhme, Ilja Bekman, Karl Reimers, Nikolay Shurkhno, and Rolf Stassen — IKP-4, Forschungszentrum Jülich, 52428 Jülich

Experimental results from the recent cooling beam time are presented. Studies of transverse and longitudinal magnetized electron cooling were carried out. Thereby the e-cooling was accompanied by stochastic cooling, barrier bucket and operation of an internal cluster jet target. To further investigate the cooling process, shifts in the electron orbit were performed while monitoring the momentum of the cooled proton beam. From the measurements the effective energy distribution within the electron beam was deduced. Comparing the results to theoretical predictions yields better understanding of the cooling dynamics in order to further improve the cooling process. By combining electron and stochastic cooling, best results in terms of cooling speed and equilibrium emittance were achieved.

AKBP 7.3 Di 14:30 HS 7

**Search for Electric Dipole Moments at COSY in Jülich - Spin Tracking Simulations using Bmad** — •Vera Poncza[1,2] and Andreas Lehrach[1,2] for the JEDI-Collaboration — [1]Institute for Nuclear Physics IV , FZ Jülich, Germany — [2]III. Physikalisches Institut B, RWTH Aachen University, Germany

The observed matter-antimatter asymmetry in the universe cannot be explained by the Standard Model (SM) of particle physics. In order to resolve the matter dominance an additional $\mathcal{CP}$ violating phenomenon is needed. A candidate for physics beyond the SM is a non-vanishing Electric Dipole Moment (EDM) of subatomic particles. Since permanent EDMs violate parity and time reversal symmetries, they are also $\mathcal{CP}$ violating if the $\mathcal{CPT}$-theorem is assumed.

The JEDI (Jülich Electric Dipole moment Investigations) collaboration in Jülich is preparing a direct EDM measurement of protons and deuterons first at the storage ring COSY (COoler SYnchrotron) and later at a dedicated storage ring.

In order to analyse the data and to disentangle the EDM signal from systematic effects spin tracking simulations are needed. Therefore a model of COSY was implemented using the software library Bmad. It includes the measured magnet misalignments of the latest survey and a simplified description of the RF-Wien Filter device that is used for the EDM measurement. Simulation results regarding the invariant spin axis as well as closed orbit simulations will be presented.

AKBP 7.4 Di 14:45 HS 7

**Simulation for a Prototype Proton EDM Storage Ring** — •Saad Siddique[1,2] and Andreas Lehrach[1,2] for the JEDI-Collaboration — [1]1 Institute for Nuclear Physics IV , FZ Jülich, Germany — [2]2 III. Physikalisches Institut B, RWTH Aachen University, Germany

Matter-antimatter asymmetry can be understood by investigating Electric Dipole Moments (EDM) of Elementary charged particles. Permanent EDMs of subatomic particles violate both time reversal (T) and Parity (P) invariance and also CP-violation via CPT-theorem. Finding an EDMs of charged particles with ultimate precision would be a strong sign for physics beyond the Standard Model (SM). Up to now, EDMs of neutral systems (neutrons, atoms and molecules) have been investigated. However, direct search of proton and deuteron EDMs bear the potential to reach the sensitivities beyond $10^{-29}$ecm. This goal can be pursued either with an all-electric proton storage ring, or by an approach using a combined electric-magnetic lattice which shall allow access to the EDMs of proton, deuteron, and $^3$He in one-and-the-same machine. The purpose of this Prototype Proton EDM Storage Ring is to demonstrate the satisfactory beam lifetime and spin coherence time in the electrostatic ring, clockwise and counter-clockwise beam operation, beam spin control, beam-based element alignment, and methods for reducing systematic errors in the EDM measurements and deals with simulation of lattice and beam lifetime of Prototype pEDM Ring.

AKBP 7.5 Di 15:00 HS 7

**Characterisation of the Radiation Hardness of Cryogenic Bypass Diodes for the HL-LHC Inner Triplet Circuit** — •Andreas Will[1,2], Axel Bernhard[1], Giorgio D'Angelo[2], Reiner Denz[2], Dietrich Hagedorn[2], Arnaud Monteuuis[2], Anke-Susanne Mueller[1], Felix Rodriguez Mateos[2], Krzysztof Stachon[2], and Daniel Wollmann[2] — [1]KIT, Karlsruhe, Germany — [2]CERN, Geneva, Switzerland

One option for the powering layout of the new HL-LHC Nb3Sn triplet circuits is the use of cryogenic bypass diodes, where the diodes are located inside an extension to the magnet cryostat, operated in superfluid helium and exposed to radiation. Therefore, the radiation hardness of different type of bypass diodes has been tested at low temperatures in CERN*s CHARM irradiation facility during the operational year 2018. The forward bias characteristics, the turn on voltage, the reverse blocking voltage and the capacitance of each diode were measured weekly at 4.2 K and 77 K, respectively, as a function of the accumulated radiation dose. The diodes were submitted to a dose close to 12 kGy and a 1 MeV equivalent neutron fluence of $2.2 \cdot 10^{14}$ n/cm$^2$. After the end of the irradiation campaign the annealing behaviour of the diodes was tested by increasing the temperature slowly to 300 K. This contribution describes the experimental setup, the measurement procedure and discusses the results of the measurements.