T 86: Projekte / PWA etc.

Zeit: Mittwoch 16:45–19:05 Raum: 30.22: 020

T 86.1 Mi 16:45 30.22: 020

Proton-Driven Plasma Acceleration at CERN — •Steffen Hillenbrand[1,2], Ralph Assmann[2], Anke-Susanne Müller[1], and Frank Zimmermann[2] — [1]KIT, Karlsruhe, Germany — [2]CERN, Switzerland

Plasma-based acceleration methods have seen important progress over the last years. Recently, it has been proposed to experimentally study plasma acceleration driven by proton beams, in addition to the established research directions of electron and laser-driven plasmas. This talk presents the planned experiment and the research efforts carried out at CERN.

T 86.2 Mi 17:00 30.22: 020

Full-scale PWFA Simulations using a Discontinuous Galerkin Approach — •Erion Gjonaj — Technische Universität Darmstadt, TEMF, Schlossgartenstr. 8, 64289 Darmstadt, Germany

Plasma Wakefield Acceleration (PWFA) is one of the emerging technologies for the generation and acceleration of charged electron beams in linear colliders and free-electron lasers. The most critical issue with this technology concerns the choice of the PWFA design parameters (plasma density, excitation beam and laser intensity) which enables the generation of high quality beams with ultra-high energy. Beam dynamics simulations play a key role in the design of PWFA accelerators. The simulation of the PWFA process, however, poses immense challenges with respect to numerical accuracy as well as to computational efficiency. We describe the application of a high order Discontinuous Galerkin method in the time domain for PWFA simulations. The method is characterized by very low numerical dispersion errors. Furthermore, it is explicit by construction and easily parallelizable. It provides a much better alternative for particle based simulations compared to the conventional Particle-In-Cell (PIC/FDTD) method. In the context of PWFA accelerator design, this approach may lead to a substantial reduction of simulation times.

Gruppenbericht T 86.3 Mi 17:15 30.22: 020

BERLinPro: the HZB Energy Recovery Linac Project — •Michael Abo-Bakr — Helmholtz-Zentrum Berlin, Albert-Einstein-Str. 15, 12489 Berlin

The Helmholtz-Zentrum Berlin für Materialien und Energie (HZB) is currently building an Energy Recovery Linac (ERL) in Berlin Adlershof. Goal of this "Berlin Energy Recovery Linac Project"(BERLinPro) is to demonstrate the feasibility of the ERL principle with very high currents while preserving the ultimate beam quality, present state of the art injectors are capable to generate. ERLs pledge to deliver high current beams of unrivaled quality, ideally suited for a very broad field of applications from electron coolers to synchrotron or Compton back scattering radiation sources.

In this talk we give an introduction to BERLinPro and its project goals. The physical and technological challenges of a high current low emittance ERL will be pointed out and a review of the present project status will be given.

T 86.4 Mi 17:35 30.22: 020

Zwei Entwürfe für das Design einer dritten Rezirkulation am S-DALINAC* — •Michaela Kleinmann, Ralf Eichhorn, Florian Hug und Norbert Pietralla — Institut für Kernphysik, TU Darmstadt, Schlossgartenstr. 9, 64289 Darmstadt

Der supraleitende Darmstädter Elektronenlinearbeschleuniger S-DALINAC wurde bis 1991 als rezirkulierender Linac aufgebaut und wird seither betrieben. Allerdings konnte er seine Design-Endenergie von 130 MeV bisher nicht erreichen, da die supraleitenden Beschleunigungsresonatoren hinter den Erwartungen zurückblieben.

Die vom 2-fach rezirkulierenden S-DALINAC erreichte maximale Strahlenergie kann jedoch durch den Bau einer dritten Rezirkulation erhöht werden. Ein technisches Design und entsprechende Strahlsimulationen für die neue Rezirkulation bilden die Grundlagen für ein solches Projekt.

Der Vortrag beschäftigt sich mit zwei grundlegenden Entwürfen für diese dritte Rezirkulation.

* Gefördert durch die DFG im Rahmen des SFB 634

T 86.5 Mi 17:50 30.22: 020

Basic investigations of a bipolar Kicker system for the FAIR - Synchrotron SIS 100 — •Katarina Samuelsson[1,2], Volker Hinrichsen[1], Udo Blell[2], Peter Spiller[2], Jürgen Florenkowski[2], and Isfried Petzenhauser[2] — [1]TU Darmstadt, Darmstadt, Germany — [2]GSI, Darmstadt, Germany

The different application of kicker magnets in synchrotrons requires an individual design of the magnet and the pulse generation. One has to fulfil the physical requirements as rise time, pulse length and deflection angle. The kicker system in the extraction section of SIS 100 have to comply with two demands; 1. Fast extraction of the beam to the experiments and 2. Destruction of the beam at any time onto an internal beam dump. To build a system which corresponds to these requirements as compact as possible, a bipolar kicker is planed to be used. It has the benefit that the decision of the field direction and therefore the deflection angle of the kicker system can be made shortly before the kick. This new technology and its challenges of pulse generation for a bipolar kicker will be presented. The first measurement results from an experimental set-up demonstrate the realization of this new kicker version.

T 86.6 Mi 18:05 30.22: 020

Dämpfungswiggler für die CLIC Dämpfungsringe — •Daniel Schoerling[1], Stephan Russenschuck[1] und Axel Bernhard[2] — [1]CERN, Genf, Schweiz — [2]KIT, Karlsruhe, Deutschland

Die Emittanz des Positronen- und Elektronenstrahles in CLIC, einem Kompakt-Linearbeschleuniger, der momentan am CERN entwickelt wird, muss um zwei Größenordnungen verringert werden, bevor der Strahl in den 3 TeV Linearbeschleuniger injiziert werden kann. Die Reduktion der Emittanz wird in Dämpfungsringen erreicht. Die Teilchenstrahlen werden kurzzeitig in den Dämpfungsringen gespeichert, wo ihre Emittanz durch massive Abstrahlung von Synchrotronstrahlung minimiert wird. Das aktuelle Design der Dämpfungsringe sieht eine Teilchenenergie von 2.86 GeV und eine Ausstattung mit supraleitenden Wigglern mit einer Gesamtlänge von 104 Metern vor. Die Wiggler sind umso effizienter, je stärker ihr Feld und je kürzer ihre Periodenlänge ist.

Die hier vorgestellte Arbeit diskutiert das technische Konzept der Dämpfungswiggler, Simulations-, Test-, und Messergebnisse. Weiterhin wird ein Ausblick auf die geplanten Wiggler-Prototypen gegeben.

T 86.7 Mi 18:20 30.22: 020

LHeC Ring-Ring Lattice Design — •Miriam Fitterer[1,2], Helmut Burkhardt[1], John M. Jowett[1], and Anke-Susanne Müller[2] — [1]CERN, Geneva, Switzerland — [2]KIT, Karlsruhe, Germany

The Large Hadron Electron Collider (LHeC) aims at lepton-proton and electron-nucleus collisions with center of mass energies in the TeV range and a luminosity of around 10^{33} cm^{-2}s^{-1}. In order to achieve this, the existing 7 TeV LHC proton beam collides with a 50 to 140 GeV electron beam. Presently two options are considered as electron accelerator: the so called "linac-ring" and "ring-ring" option. Both options provide the possibility to operate in parallel with proton-proton or ion-ion collisions and imply either the construction of a linear accelerator with or without energy recovery or the installation of a new electron storage ring on top of the LHC. One of the principal challenges of the Ring-Ring option is the integration of the electron ring in the LHC tunnel. We present here a solution for the e-ring lattice compatible with the main LHC integration constraints.

T 86.8 Mi 18:35 30.22: 020

Study of shock waves in target materials — •Olufemi Adeyemi[1], Gudrid Moortgat-Pick[1], Sabine Riemann[2], Andriy Ushakov[2], and Andreas Schälicke[2] — [1]II. Institute for Theoretical Physics, University of Hamburg, Luruper Chaussee 149, 22761 Hamburg — [2]LC Group, DESY-Zeuthen, Platanenallee 6, 15738 Zeuthen

This study is focused on thermal shock wave development in the conversion targets of positron sources for future linear colliders. The rapid energy deposition of the intense photon (or electron) beam in the target material yields a high heat load and strong thermal stresses. It can lead to shock waves that damage the material or shorten its lifetime. We simulate the shock waves in the target material using a hydrodynamic model and investigate its contribution to the target damage.

T 86.9 Mi 18:50 30.22: 020

LHC Machine Protection challenges for 2011 — •Tobias Bär — CERN, Genf, Schweiz — Universität Hamburg, Deutschland

The Large Hadron Collider has an unprecedented stored beam energy of up to 362MJ per beam. In 2011, 100MJ could be reached. In this talk, crucial machine protection challenges for 2011 and beyond are discussed. Especially, UFOs as potential show-stoppers are addressed. UFOs or "Unidentified Falling Objects" were first observed in July 2010 and are since then a major source of emergency beam dumps. They are prospectively micrometer sized dust particles that lead to fast beam losses when they interact with the beam. The state of knowledge and mitigation strategies are presented.