AKBP 4: Diagnostics, Control and Instrumentation

Zeit: Montag 16:30–17:45 Raum: HS 7

AKBP 4.1 Mo 16:30 HS 7

Continuous Bunch-by-Bunch Reconstruction of Short Detector Pulses — •Matthias Martin[1], Miriam Brosi[1], Erik Bründermann[1], Michele Caselle[2], Patrick Schreiber[1], Johannes Steinmann[3], and Anke-Susanne Müller[1,3] — [1]LAS, KIT, Karlsruhe — [2]IPE, KIT, Karlsruhe — [3]IBPT, KIT, Karlsruhe

The KAPTURE system (KArlsruhe Pulse Taking and Ultrafast Readout Electronics), developed at Karlsruhe Institute of Technology (KIT), was designed to digitize detector pulses during multi-bunch operation at the KIT storage ring KARA (Karlsruhe Research Accelerator). KAPTURE provides digitization for pulses at rates of 500 MHz using up to 4 sampling points per pulse to record each bunch and each turn for potentially unlimited time. The new KAPTURE-2 system now provides eight sampling points per pulse, including baseline sampling between pulses, which allows improved reconstruction of the pulse shape. The advanced reconstruction of the pulse shape is realized with a highly parallelised implementation on GPU. The system will be used for the investigation on longitudinal beam dynamics e.g. by measuring instability induced CSR fluctuations or arrival time oscillations. This contribution will report on first results of the KAPTURE-2 system at KARA.

AKBP 4.2 Mo 16:45 HS 7

FLUTE Profile Monitors - From Image to Information — •Thiemo Schmelzer[1], Wolfgang Mexner[2], Michael Nasse[2], Robert Ruprecht[2], Marcel Schuh[2], Nigel Smale[2], Minjie Yan[2], and Anke-Susanne Müller[1,2] — [1]LAS, KIT, Karlsruhe — [2]IBPT, KIT, Karlsruhe

FLUTE (Ferninfrarot Linac- Und Test-Experiment) is a compact versatile linear accelerator at Karlsruhe Institute for Technology (KIT). It serves as a platform for a variety of accelerator studies as well as a source of strong ultra-short THz pulses for photon science. For the characterization of electron bunches different diagnostic systems are needed. The profile and shape of an electron bunch is measured with profile monitors at FLUTE, using a scintillating screen and a camera to retrieve the transversal spot of the bunch. After the data acquisition, the image is processed to find the beam properties, e.g. spot size. This contribution is focused on the profile monitors at FLUTE, including the acquisition and analysis of the transversal beam image.

AKBP 4.3 Mo 17:00 HS 7

FPGA based real-time signal processing for particle-detectors at COSY — •Mathis Beyss for the JEDI-Collaboration — Forschungszentrum Jülich — Rheinisch-Westfälische Technische Hochschule Aachen

Field programmable gate arrays (FPGAs) allow fast signal processing due to high parallelisation while offering highly customizable circuit design; they are nowadays of high importance in many data processing applications.

At the COoler SYnchrotron (COSY) at the Forschungszentrum Jülich, hydrogen atom detectors (H0) consisting of two plastic scintillators are used to observe the electron-ion recombination rate during electron cooling of the proton beam. The recombination rate provides valuable information on the alignment of the electron and proton beam. Using FPGAs and a System-on-a-Chip approach a fast data acquisition and processing system of the detector signals will be set up and integrated into the Experimental Physics and Industrial Control System (EPICS).

In this work the processing chain from signal discrimination up to coincidence counting of the detected particles and the implementation based on the FPGA development board will be presented.

AKBP 4.4 Mo 17:15 HS 7

Revealing experimental instabilities and improvements in the optics for Undulator interferometry — •Pascal Klag[1], Patrick Achenbach[1], Toshiyuki Gogami[2], Philipp Herrmann[1], Masashi Kaneta[2], Yoshihiro Konishi[2], Werner Lauth[1], Sho Nagao[2], Satoshi Nakamura[2], Josef Pochodzalla[1], and Yuichi Toyama[2] — [1]Johannes Gutenberg-Universität Mainz — [2]Tohoku University Sendai

The Mainz microtron is an electron accelerator, which delivers electron energies up to 1.6 GeV, with a small spread of the energy σbeam$<$13keV. The uncertainty for the absolute energy for all available beam energies was limited to 160 keV. A novel method is used to improve the uncertainty for the energy of a 195 MeV beam. The method is based on interferometry with two spatially separated light sources (undulators) driven by relativistic electrons. A beamtime has been performed, that was dedicated to systematic effects of the energy measurement by undulator interferometry. The analysis of the data revealed that a combination of the moving stage, optics, the magnetic field and the stabilization of the electron beam acted as sources for deviations from a distortion free signal. The uncertainty for the measurement shall be quantified on a maximal rigid system. The presentation will cover how the optics gave a systematic error, but on the other hand, how they beneficially contributed to the alignment.

AKBP 4.5 Mo 17:30 HS 7

Characterization of the FLUTE compressor Magnets — •Yimin Tong — Nancystr.22, Karlsruhe, Deutschland

FLUTE (Ferninfrarot Linac- Und Test-Experiment) is a compact versatile linear accelerator at Karlsruhe Institute for Technology (KIT). Its primary goal is to serve as a platform for a variety of accelerator studies as well as to generate strong ultra-short THz pulses for photon science. In order to achieve optimal bunch compression, the magnet field of the FLUTE quadrupole and and compressor dipole magnets need to meet tight tolerances. The compressor dipoles are currently characterized at the KIT magnet test bench LASMagLab. In this contribution we report on the first results of this magnet characterization.