Second DTS POF Rehearsal

Report of Contributions

https://indico.desy.de/e/19350

Contribution ID: **1** Type: **not specified**

Support structures and integration

Monday 8 January 2018 09:50 (50 minutes)

Presenter: MUSSGILLER, Andreas (DESY)

Contribution ID: **2** Type: **not specified**

Detectors as complex systems

Monday 8 January 2018 11:00 (50 minutes)

Presenter: KRUEGER, Katja (DESY)

Contribution ID: **3** Type: **not specified**

ASCIs and Sensors

Monday 8 January 2018 09:00 (50 minutes)

Presenter: Mr PENNICARD, David (DESY)

Contribution ID: **4** Type: **not specified**

Poster 24: Front-end digitization for fast imagers

Monday 8 January 2018 11:50 (2 minutes)

The idea of front-end digitization is to perform the digitization close to where the sensitive signal is generated. Digital signals provide large margins in time and amplitude, making them robust. An early digitization offers an intelligent processing and benefits from CMOS scaling. The challenge of this idea is high bandwidth. This approach is implemented in readout ASICs for two fast imagers, DSSC detector for single photon counting and dSiPM (digital silicon photomultiplier) for particle tracking. Unique features of these ASICs are analog signal processing, digitization, storage of 800 images on pixel level. The DSSC-readout ASIC contains 64 x 64 pixels of 204 x 236 μm² size and the dSiPM-prototype has 16 x 16 pixels with 50 x 57 μm² size. Both ASICs are designed in GF 130-nm CMOS technology. DSSC is using an 8-bit single-slope ADC for digitization. The small area requirements and less power consumption make this ADC compatible for pixel-level architectures. The features of the ADC are described and dynamic range, non-linearity and noise of 4096 ADCs operating in parallel at 4.5 MHz are characterized. The mean DNL-standard deviation of the full matrix is 0.4 LSB and the mean INL-standard deviation is 0.18 LSB. Cu-fluorescence measurements are performed on full-readout chip with DEPFET sensor for final XFEL-timing structure at PETRA-III beamline. Mean sensitivity of 0.72 keV/bin and mean noise of 80 e- has been extracted from the measurements. In dSiPM, digitization is done by an active quenching and recharging circuitry in each pixel sensing the avalanche current. The resulting signal can be used in its digital form for event discrimination. A 12-bit TDC is responsible for a cluster of 16 x 16 pixels and delivers the time stamps. Prototypes have been tested and the TDC performance at 3-MHz frame rate is characterized. The measured TDC resolution is 77 ps, DNL- and INL-standard deviation results in 0.15 LSB and 0.33 LSB, respectively. First dark-count rate measurements from sensor are presented.

Presenters: DIEHL, Inge (DESY); Mr KALAVAKURU, Pradeep (DESY)

Session Classification: Poster

Contribution ID: **5** Type: **not specified**

Poster 25: The Percival soft X-ray detector

Monday 8 January 2018 11:52 (2 minutes)

Presenter: CORREA, Jonathan

Session Classification: Poster

Contribution ID: **6** Type: **not specified**

Poster 26: The adaptive gain integrating pixel detector

Monday 8 January 2018 11:54 (2 minutes)

Presenters: Dr ALLAHGHOLI, Aschkan (DESY); LAURUS, Torsten (Desy)

Session Classification: Poster

Contribution ID: **7** Type: **not specified**

Poster 27: Development of an enhanced lateral drift sensor

Monday 8 January 2018 11:56 (2 minutes)

Future experiments in particle physics require few-micrometer position resolution in their tracking detectors. Silicon is today's material of choice for high-precision detectors and offers a high grade of engineering possibilities. Instead of scaling down pitch sizes, which comes at a high price for increased number of channels, our new sensor concept seeks to improve the position resolution by
increasing the lateral size of the charge distribution already during the drift in the sensor material. To this end, it is necessary to carefully engineer the electric field in the bulk of this so-called enhanced lateral drift (ELAD) sensor. This is achieved by implants with different values of doping concentration deep inside the bulk which allows for modification of the drift path of the charge carriers in the sensor.

In order to find an optimal sensor design, detailed simulation studies have been conducted using SYNOPSYS TCAD. The parameters that need to be defined are the geometry of the implants, their doping concentration and the position inside the sensor. Process simulations are used to provide the
production-determined shapes of the implants in order to allow for a realistic modelling.

The electric field simulation demonstrates the possibility to locally engineer the electric field. The drift simulation confirms the feasibility of the ELAD concept. Results of a geometry optimisation are shown realising an optimal charge sharing and hence position resolution. A position resolution of a few micrometer is expected by using deep implants without relying on a Lorentz drift or tilted incident angle. A description of the multi-layer production process is presented, which represents a
new production technique allowing for deep bulk engineering. Additionally, a wafer layout for the
production is shown.

Presenters: Ms VELYKA, Anastasiia (DESY); Dr JANSEN, Hendrik (DESY)

Session Classification: Poster

Contribution ID: **8** Type: **not specified**

Poster 28: High resolution TPC

Monday 8 January 2018 11:58 (2 minutes)

Presenters: Mr MALEK, Paul (DESY); Mr KRÄMER, Uwe (DESY)

Session Classification: Poster

Contribution ID: **9** Type: **not specified**

Poster 29: The DESY-II test beam facility

Monday 8 January 2018 12:00 (2 minutes)

The DESY II Test Beam Facility is operating three independent beam lines providing electrons with a momentum ranging from 1-6 GeV/c. The facility is open for the world-wide R&D community and its infrastructure meets many needs for detector development, characterization or commissioning. Many important results have proven that the facility will be crucial for future detectors in high energy physics and beyond. Including the local experience, the DESY II Test Beam Facility turns into being unique. (Note: combined MU+MT)

Presenters: Dr DREYLING-ESCHWEILER, Jan (DESY); Mr SCHUETZE, Paul (CMS)

Session Classification: Poster