ATTRACT TWD Symposium: Trends, Wishes and Dreams in Detection and Imaging Technologies



Contribution ID: 79

Type: not specified

## **FLEXPIX - Flexible Pixel Detector**

Trying to reach new energy and luminescence frontiers with new collider experiments brings new challenges especially to the vertex detectors.

Essential are the minimalisation of the material budget and wish to have the first layer of the vertex detector as close as possible to the beam pipe. Ideally one would like to have the beam pipe wrapped up with the sensors as thin as possible to minimize multiple scattering. One of the main challenges is to have still high signal in such very thin sensor.

We propose a detector concept, which could solve all challenges at once.

DEPFET sensor with its all silicon module concept are already world leading in the minimalisation of the material budget and can still have high signal and low noise due to the internal amplification which is inherent in the DEPFETs [1]. At present for the development of the BELLE II pixel detector all silicon module provides stability, mounting capability and interconnection to the outside world [2].

Idea of the new concept would be to incorporate thin DEPFET sensors into flexible wired 3D foil [3]. In this way the foil itself can provide all interconnection to the sensor as well as required stability/flexibility. Proposed concept would give ideal 4pi coverage around the interaction region.

Combination of MEMS and micro-electronics, together with development of customized interconnect technologies (fine pitch, flexible) and further development of the features of new flavours of DEPFET readout cells (infinipix, rndr, quadpix..) would provide an ideal detector for the future colliders.

References:

- 1. Andricek, et al. Processing of ultra-thin silicon sensors for future e+e linear collider experiments , 2004, IEEE Transactions on Nuclear Science, 51, pp. 1117-1120.
- 2. Andricek et al., All-silicon multi-chip modules based on ultra-thin active pixel radiation sensors, International Conference and Exhibition on Device Packaging 2014, 2014, pp. 159-161
- 3. Bock, K. et al. Multifunctional system integration in flexible substrates, Proceedings Electronic Components and Technology Conference 2014, pp. 1482-1487

## Summary

DEPFETs, MEMS, FINEPITCH, FLEXIBLE, VERTEX

Author: NINKOVIC, Jelena (MPG Halbleiterlabor)

Co-author: ANDRICEK, Laci (MPG Semiconductor Lab)

Presenter: NINKOVIC, Jelena (MPG Halbleiterlabor)