Business from technology

Silicon Sensor Alliance Detector demonstrator

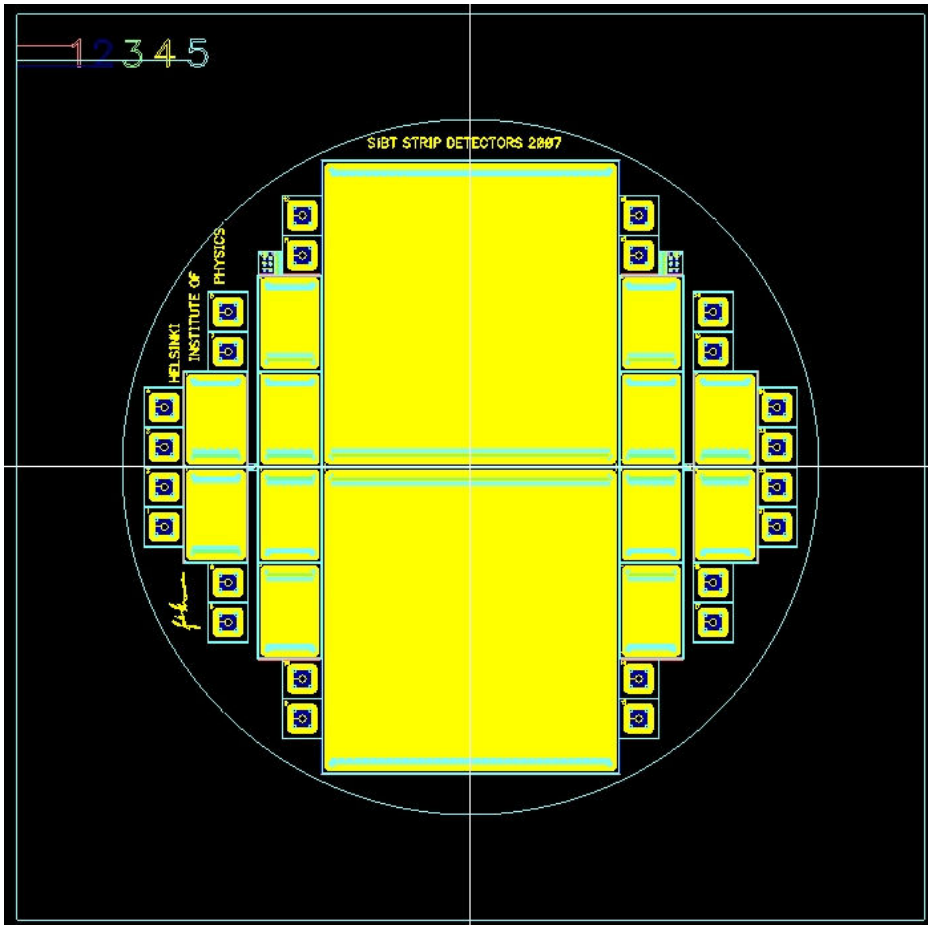
Juha Kalliopuska
Jaakko Härkönen

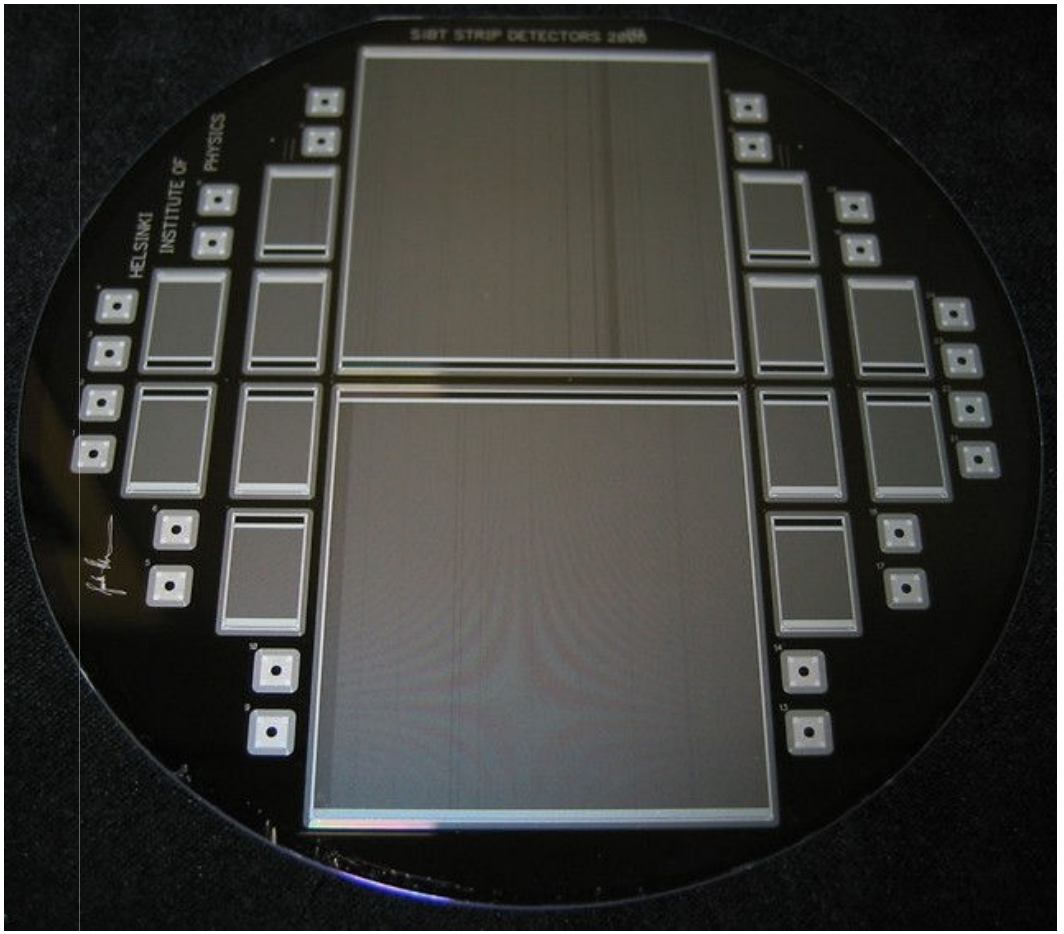
Silicon Sensor Alliance (SSA) demonstrator

- ***Motivation:*** Gain visibility among the high-energy physics community and demonstrate the technical capability to supply homogeneous-quality particle detectors
- ***Execution:***
  - Demonstrator must be attractive for the participating alliance partners
  - 5-10 processed wafers per partner
  - Processing of simple basic strip detector (with design close to the one to be implemented in Super-LHC).
  - This minimizes the in-kind contribution of participating partners
- ***Achievements:***
  - Participating alliance partners achieve pre-evaluation for the future market survey
  - Increased competitiviness of the SSA offering

Demonstrator layout

- Use of existing RD50 mask layout (4”) that is scaled up for 6” wafers
- Current layout comprises (see next page):
  - 5 mask layers: AC-coupled strip detectors with polyresistors and passivation
  - Pitch 50 um
  - 2 x full size CMS 768 channel AC-coupled strip detectors
  - 12 x mini 128 channel AC-coupled strip detectors
  - 24 x DC-coupled diodes
- Implementation of full and mini size ***DC-coupled*** CMS detectors into the 6” mask layout. Approximately double amount of detectors available.


12345
SIBT STRIP DETECTORS 2007
HELSINKI INSTITUTE OF PHYSICS


HELSINKI INSTITUTE OF PHYSICS

Participating partner in-kind contributions

- N-type MCZ (~1 kOhmcm) wafer material from Okmetic
- Jaakko Härkönen provides the 6” (4”) mask layout
- One mask can be fabricated and then circulated around among partners
- Process steps agreed in advance with participating partners via meetings or webseminars
- Fabrication of 5-10 p-on-n wafers by each partner at own cost (approximately 1 man month in-kind contribution)
- Jaakko Härkönen (and his team) and RD50 available for characterization of the detectors

Detector characterization

- Available readout chips
  - APV25 hybrids
  - LHCb R0 chips
- *Phase 1:*
  - Proof of quality assurance (homogeneity)
  - Landau plots of depletion voltage, leakage current @ full depletion and breakdown voltage
- *Phase 2:*
  - Irradiation tests of number of detectors
  - Charge collection efficiency measurement
  - Beam tests

Partners interested in participating

- 6” process capability:
  - VTT
  - Sintef
  - On-semi
  - Semefab
- 4” process capability:
  - FBK-IRST
- Everybody is free to join the demonstrator activity

VTT creates business from technology