SNRI2020 Lab Proposal

Monolithic CMOS Sensors

Scuola Nazionale dei Rivelatori Innovativi 2020

Kick-off Meeting

Torino

2019-11-22

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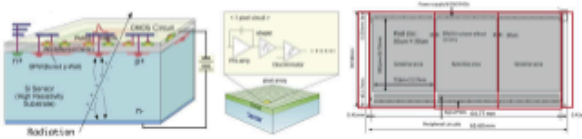
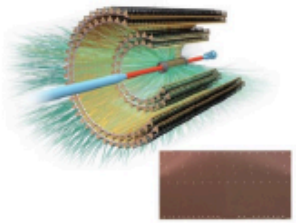
Introductory presentation

- Principle of operation for monolithic pixel sensors
- State of art and different implementations
- Evolution of the species and new ideas for future applications
- Description of laboratory activities

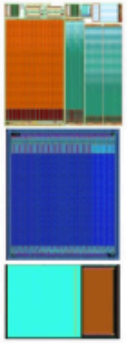
ULTIMATE in STAR
IPHC Strasbourg
First HEP MAPS system

TJ-Monopix: 20 x 10 mm



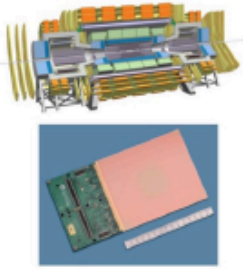


ALPIDE in ALICE
First MAPS with sparse readout
similar to hybrid sensors
Chip-to-chip communication
for data aggregation

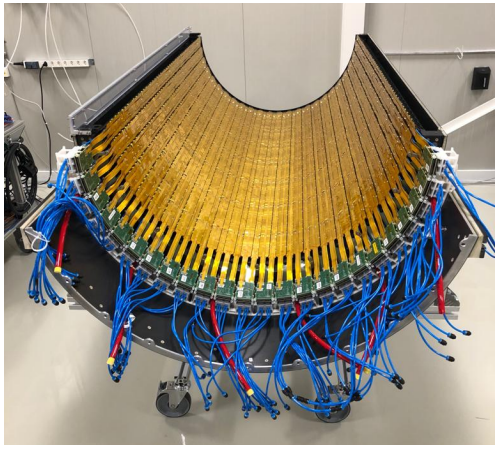


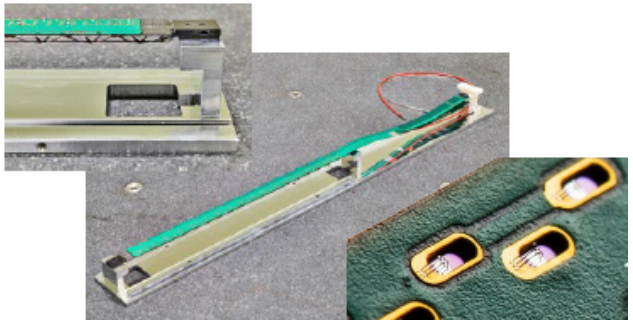
ATLAS CMOS
Depleted radiation hard
MAPS with:
Sparse readout
Chip-to-chip
communication
Serial power

Partially adapted from:
W. Snoeys, TWEPP2018



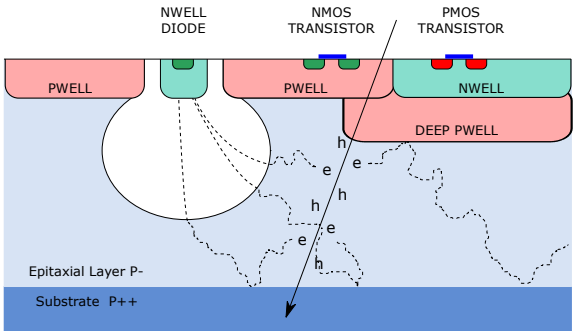
FCC, CLIC, ...
Large stitched fast
radiation hard MAPS
with:
Sparse readout
Chip-to-chip
communication
Serial power

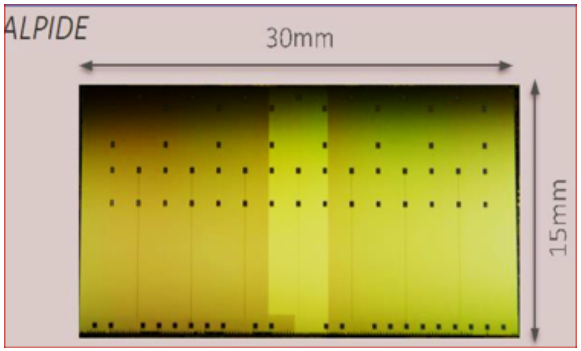




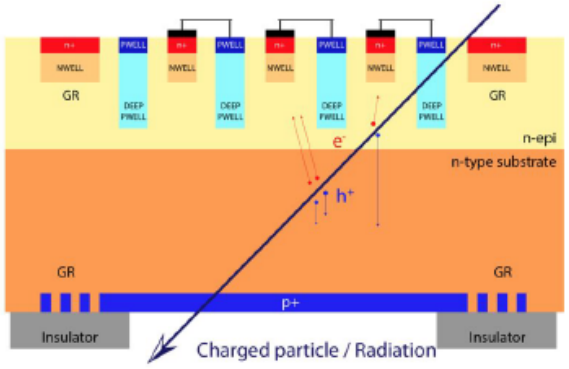
CMOS monolithic sensors developed in Torino

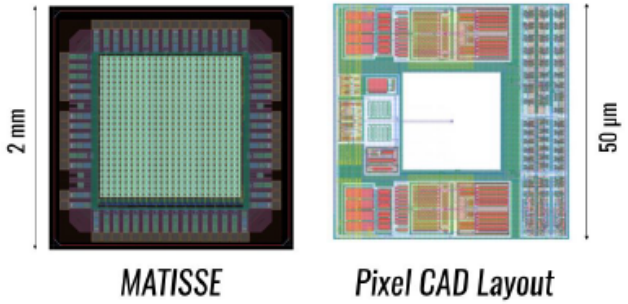
- ALPIDE chips: developed for ALICE ITS2, available as single chip and assembled modules.





- ARCADIA chips: under development, MATISSE prototype and pseudo-matrices ready for test purpose

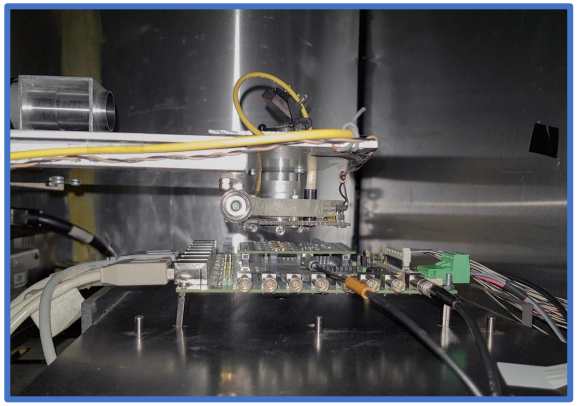




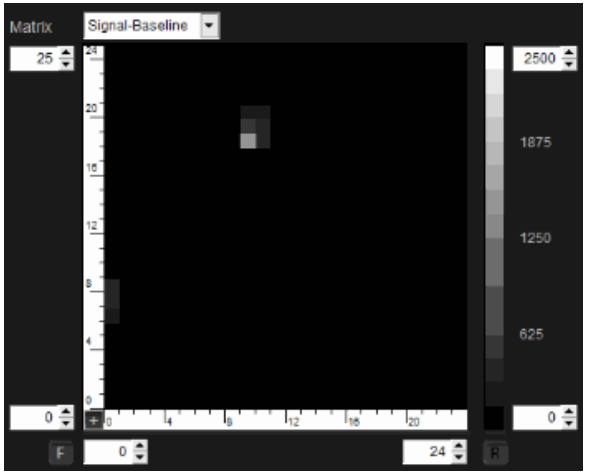
Organisation of the activities

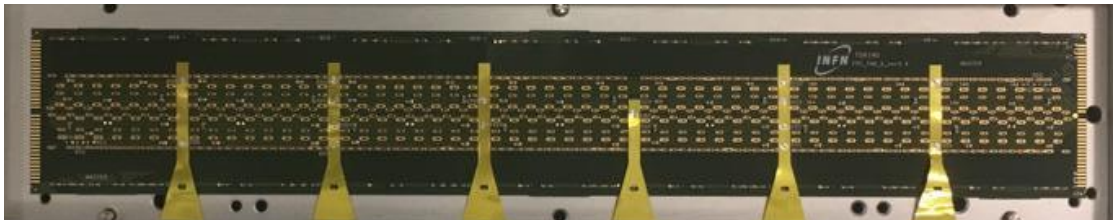
- Introduction to the laboratory equipment: 30 min
- Choice of the sample (single chip - Module): 15 min
- Visual inspection: 30 min
- Calibration of functional parameters: 30-60 min
- Test with micrometric spot laser source: 30-60 min
- Report preparation (??): 30 min

MATISSE chip



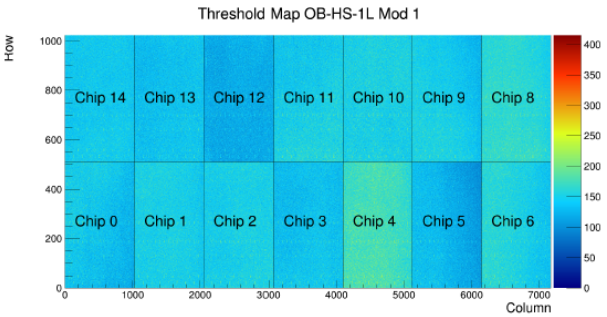
LASER SCAN RESULTS





ALICE ITS2 module

THRESHOLD SCAN RESULTS



Instrumentation and support

- Microscope and thermal camera
- Laser test set-up
- DAQ set up for ALPIDE modules
- DAQ setup for MATISSE/ARCADIA prototypes
- PhD students to support during the laboratory sessions