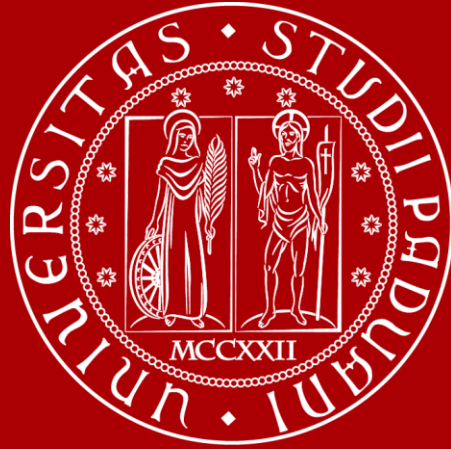




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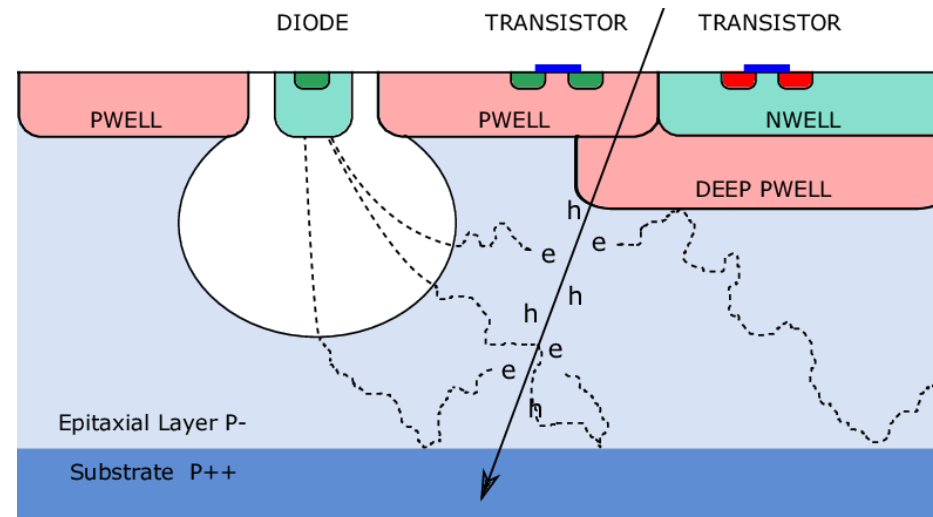
Development of pixel detectors in CMOS technology for applications at future colliders

PhD student: Alessandra Zingaretti
Supervisor: Serena Mattiazzo

Admission to II year
Curriculum: Detectors

Research topic: «Development of pixel detectors in CMOS technology for applications at future colliders»

- Characterization of Monolithic Active Pixel Sensors (MAPS)
 - ALICE collaboration
 - ARCADIA collaboration: Main-Demonstrator 3

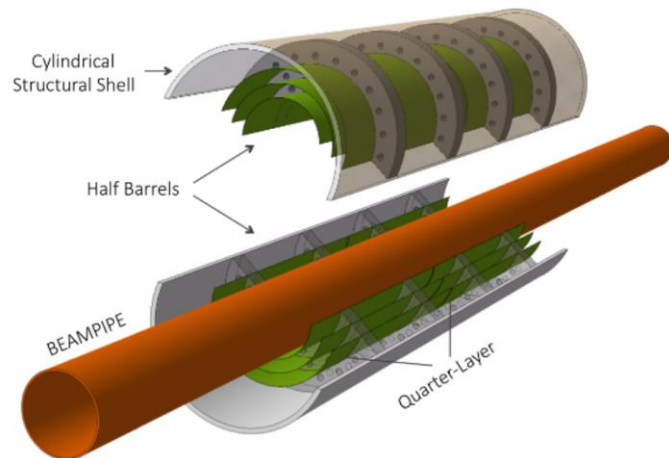


Research topic: «Development of pixel detectors in CMOS technology for applications at future colliders»

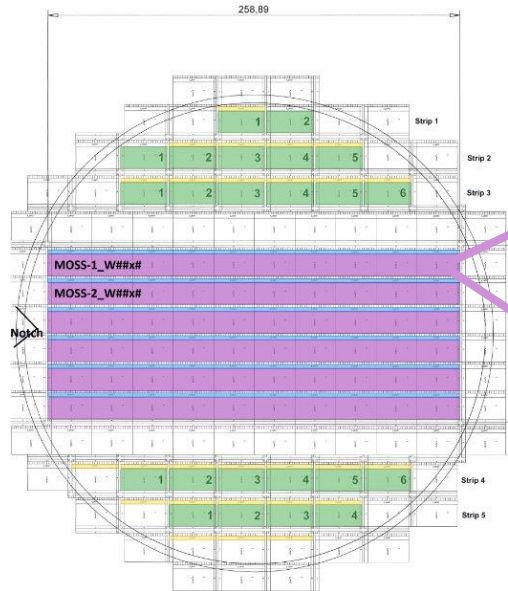
- Characterization of Monolithic Active Pixel Sensors (MAPS)
 - **ALICE** collaboration
 - ARCADIA collaboration: Main-Demonstrator 3



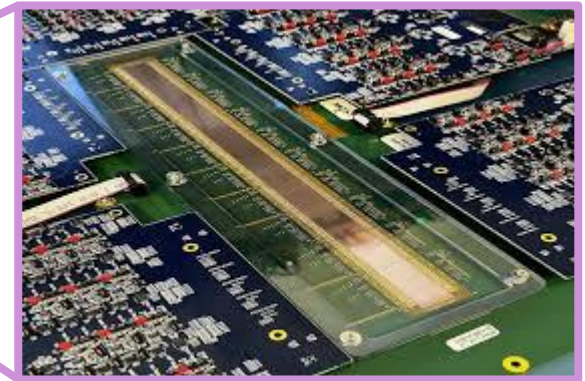
ALICE



ITS3 upgrade



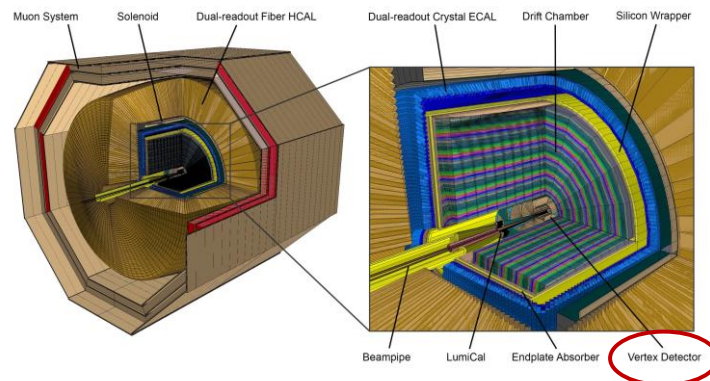
MOnolithic **Stitched**
Sensor (**MOSS**)



wafer-scale sensor (~27 cm)

Research topic: «Development of pixel detectors in CMOS technology for applications at future colliders»

- Characterization of Monolithic Active Pixel Sensors (MAPS)
 - ALICE collaboration
 - **ARCADIA collaboration: Main-Demonstrator 3**
(Advanced Readout CMOS Architectures with Depleted Integrated sensor Arrays)





PhD plan

1° year: laboratory activity + courses, workshops and school

2° year: period at CERN for MOSAIX characterization

3° year: final activities + thesis

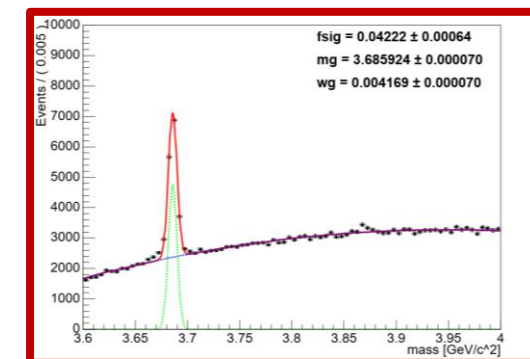
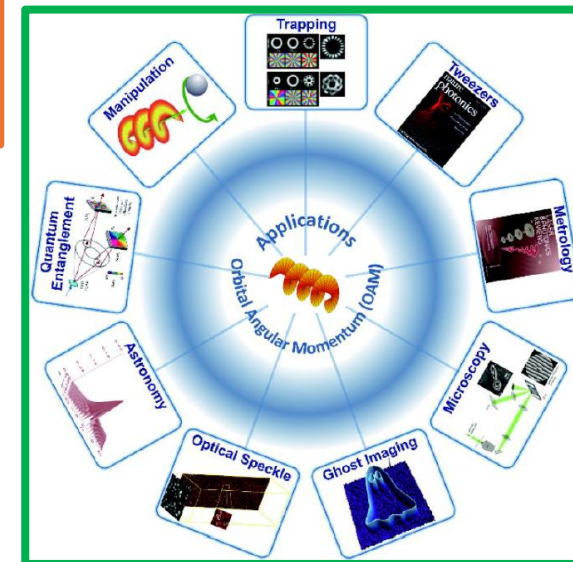
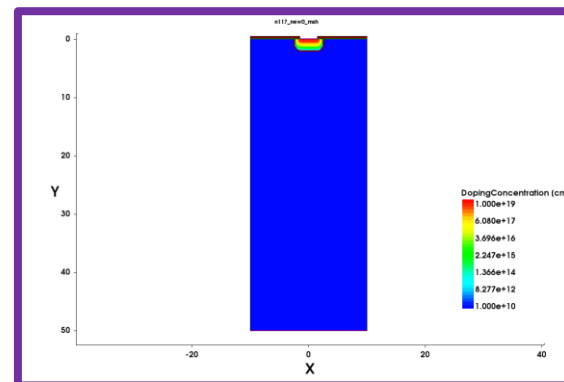
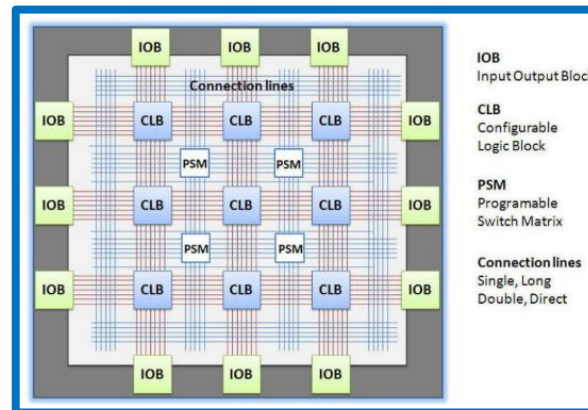
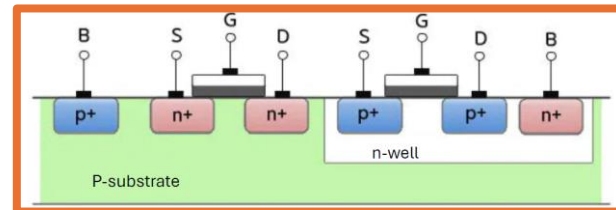
Courses and exams

Attended courses:

- Design of readout integrated circuits for particle detectors
- Structured light: from principles to modern applications
- Fundamental of FPGA-based digital design
- Methodologies and techniques for the analysis of experimental data

Attended courses and passed exams:

- Numerical simulation of Electronic Devices with TCAD





Schools and workshops

Workshops:

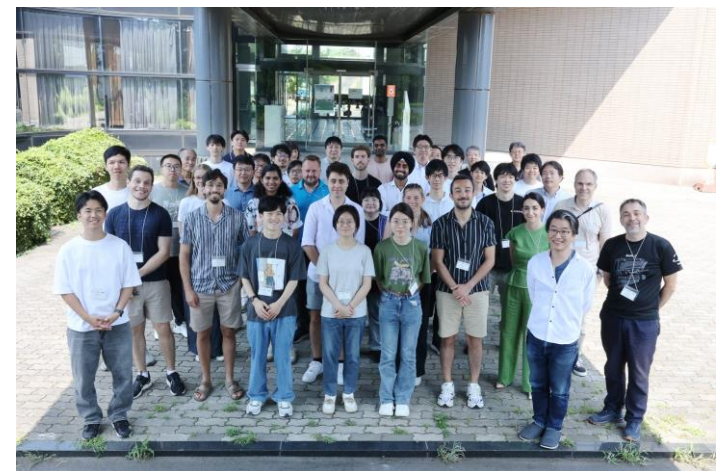
- FCC Italy&France (Venice, 4-6 November 2024)
- ALICE Italia meeting (Brescia, 16-18 December 2024)
- IFD 2025 – INFN Workshop on Future Detectors (Sestri Levante, 17-19 March 2025)
 - **Talk:** "ARCADIA fully depleted MAPS sensor first test-beam results"
- TECH-FPA PhD Retreat 2025 (L'Aquila, 17-21 February 2025)
- ELMA workshop (Energy Loss Measurements with MAPS) (Trieste, 10-11 September 2025)

School:

- MAPS Academy (Japan, 23-30 July 2025)

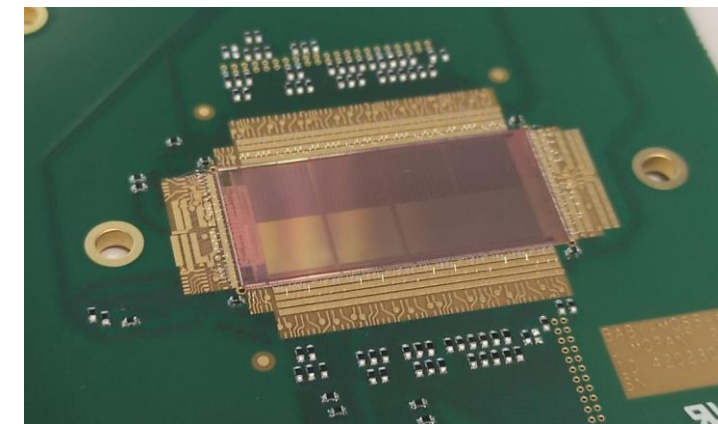
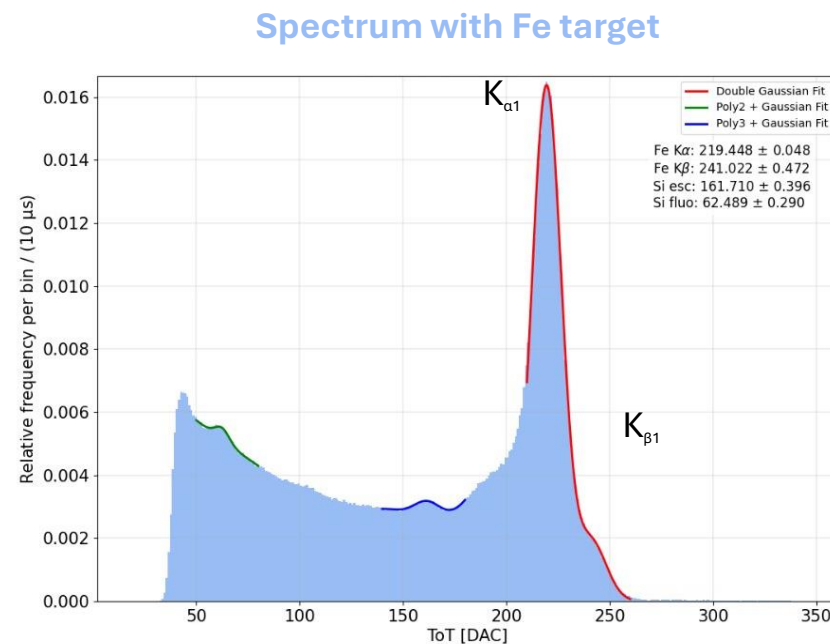
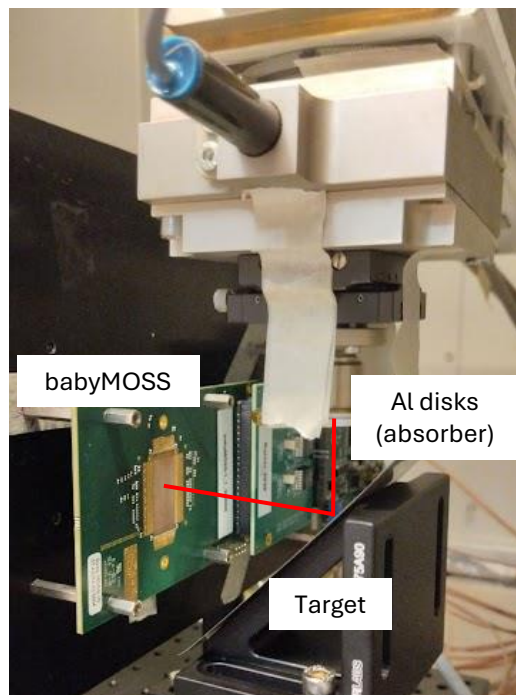
Next:

- SIF – 111° Congresso Nazionale (Palermo, 22-26 September 2025)
 - **Talk:** "Tracking performance of the ARCADIA fully depleted MAPS"



Research activities carried out: babyMOSS

- Performance assessment through parameter scans and measurements with radioactive sources such as ^{55}Fe or fluorescence (Fe, Mo)
- **Next:** try targets of different materials

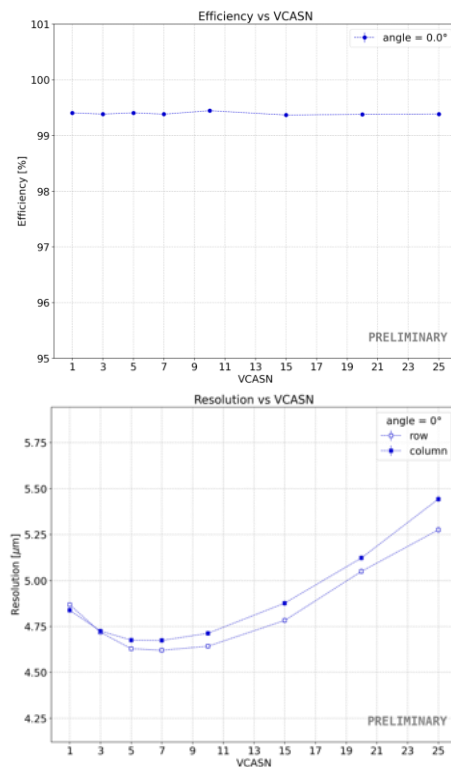
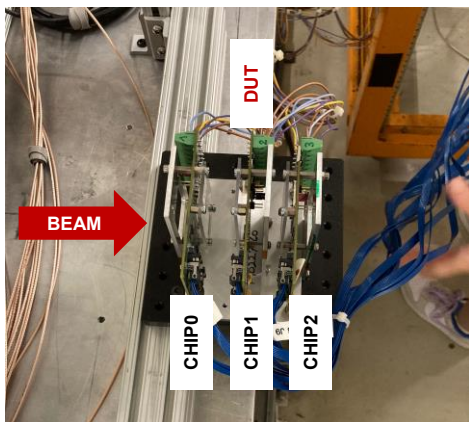


Target	Energy [keV]
Fe	6.40 (K $_{\alpha 1}$)
	7.06 (K $_{\beta 1}$)
Mo	17.48 (K $_{\alpha 1}$)
	19.61 (K $_{\beta 1}$)

Research activities carried out: ARCADIA

→ Analysis of data taken at testbeam at FNAL with 120 GeV protons
Setup: telescope of 3 ARCADIA MD3 planes (2 tracking planes, 1 device under test)

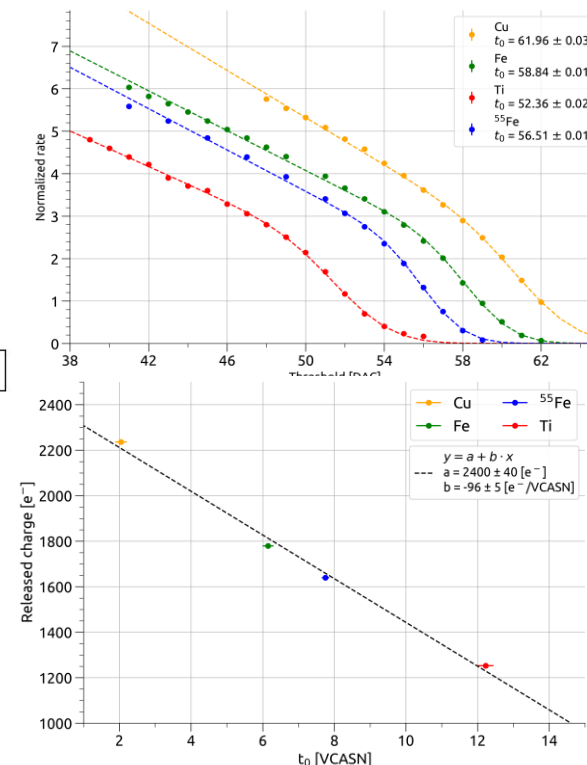
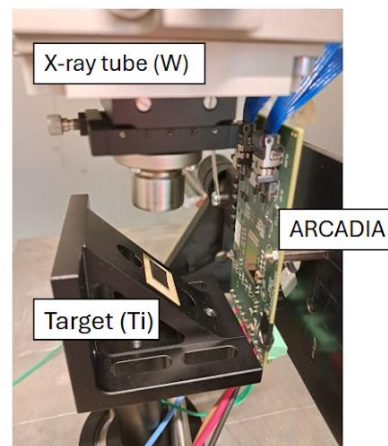
- **Paper on test beam work in progress...**



→ Calibration of chip response with test pulses, ^{55}Fe and fluorescence data, ...

Setup: X-ray tube, target of different materials (at 45° wrt beam), ARCADIA MD3

- **Paper on calibration work in progress...**





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**Thank you for your
attention!**