Silicon Strip Sensors, a Gentle Introduction with Alibava's EASy system

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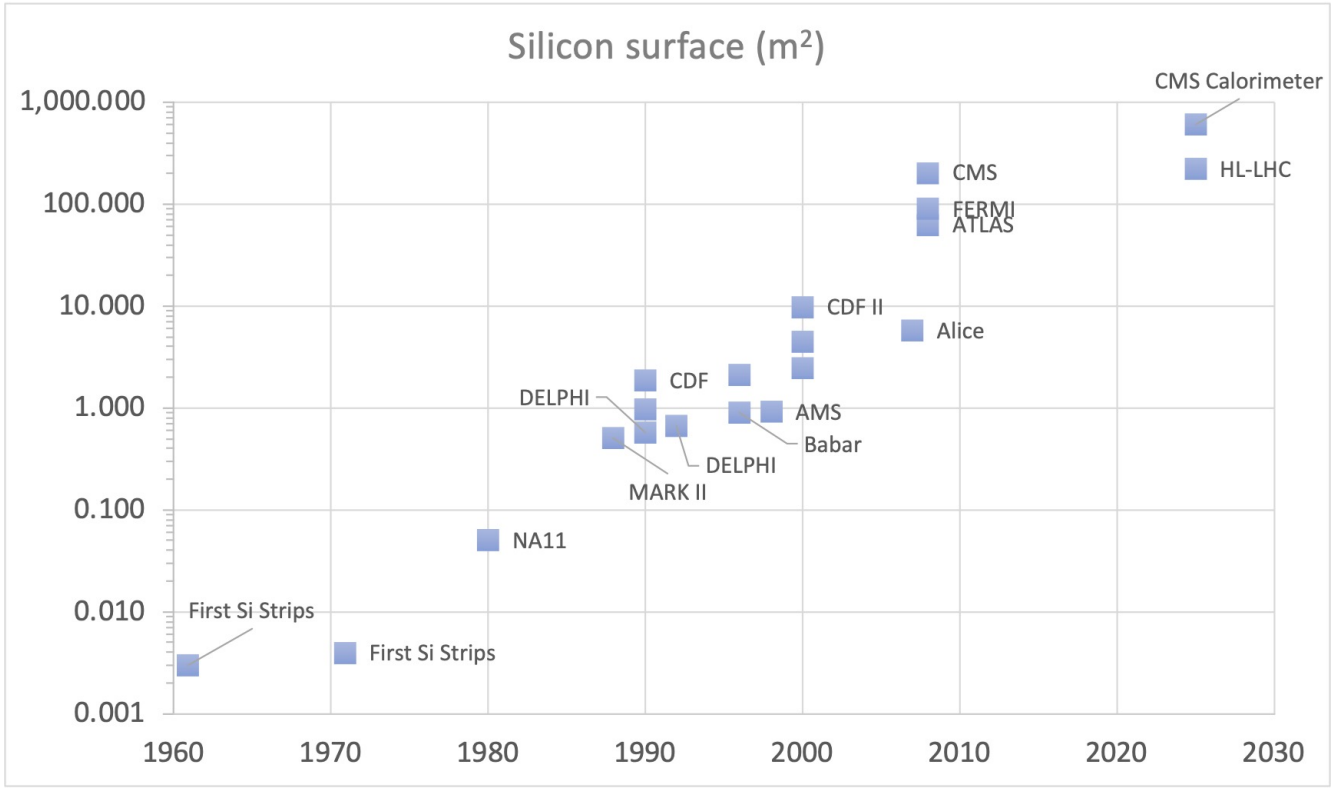
Silicon Trackers

Silicon Strip sensors are at the heart of Silicon Trackers.
Silicon trackers are **everywhere** in recent, current and future experiments.



Silicon Trackers

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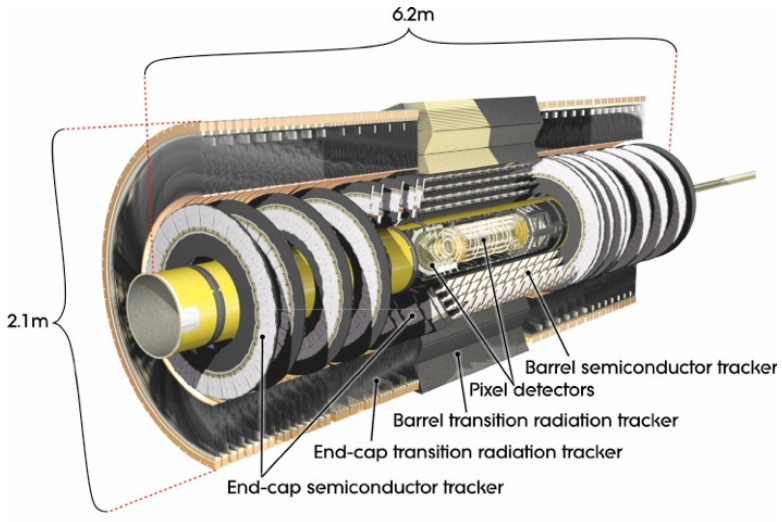
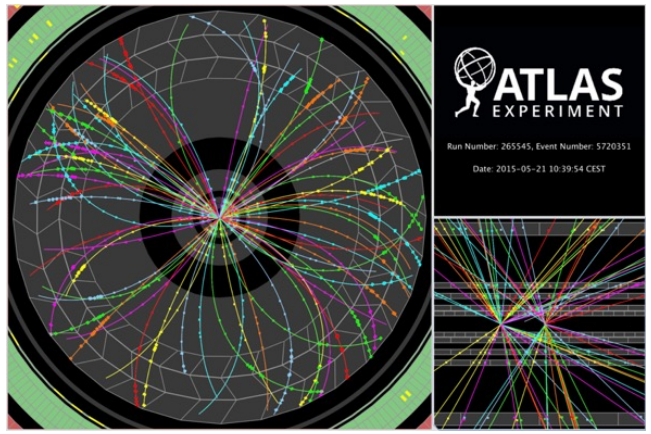
Silicon trackers are **everywhere** in recent, current and future experiments.
We use them to reconstruct the trajectory of charged particles

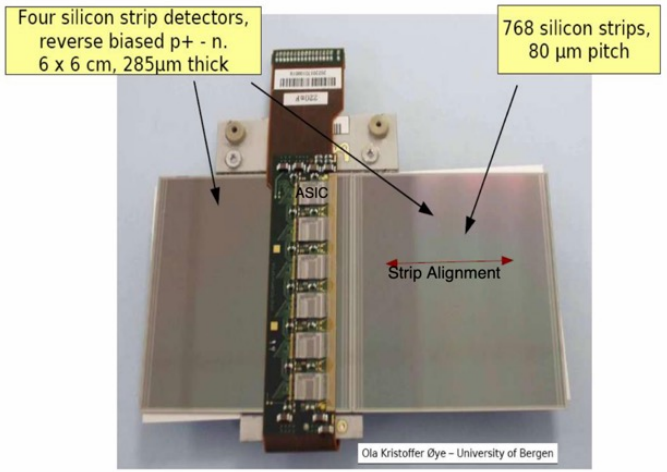
The ATLAS example



Inner Tracker ATLAS



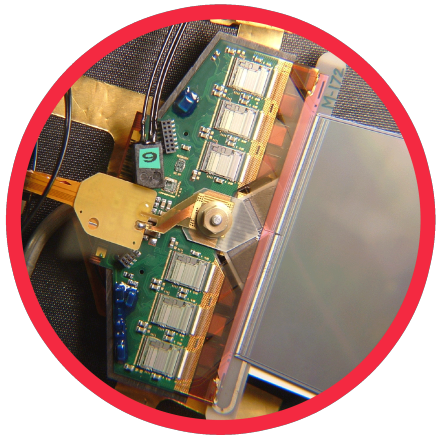
Inner Tracker ATLAS event



ATLAS SCT module

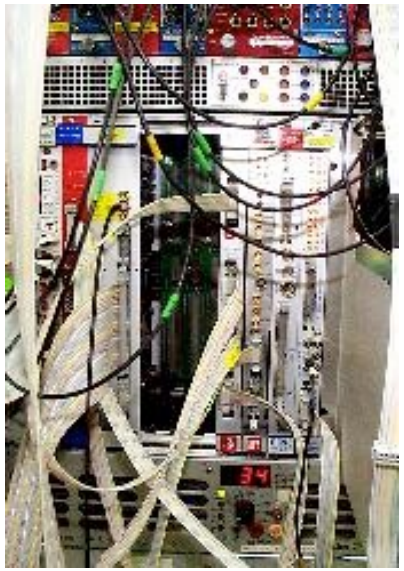
Setup components @ Lab.

Components of a silicon microstrip detectors



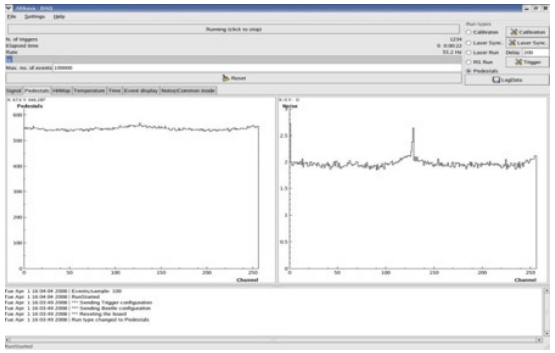
Sensor + ASIC

HV power supply



Control unit

Trigger



Data acquisition and monitoring

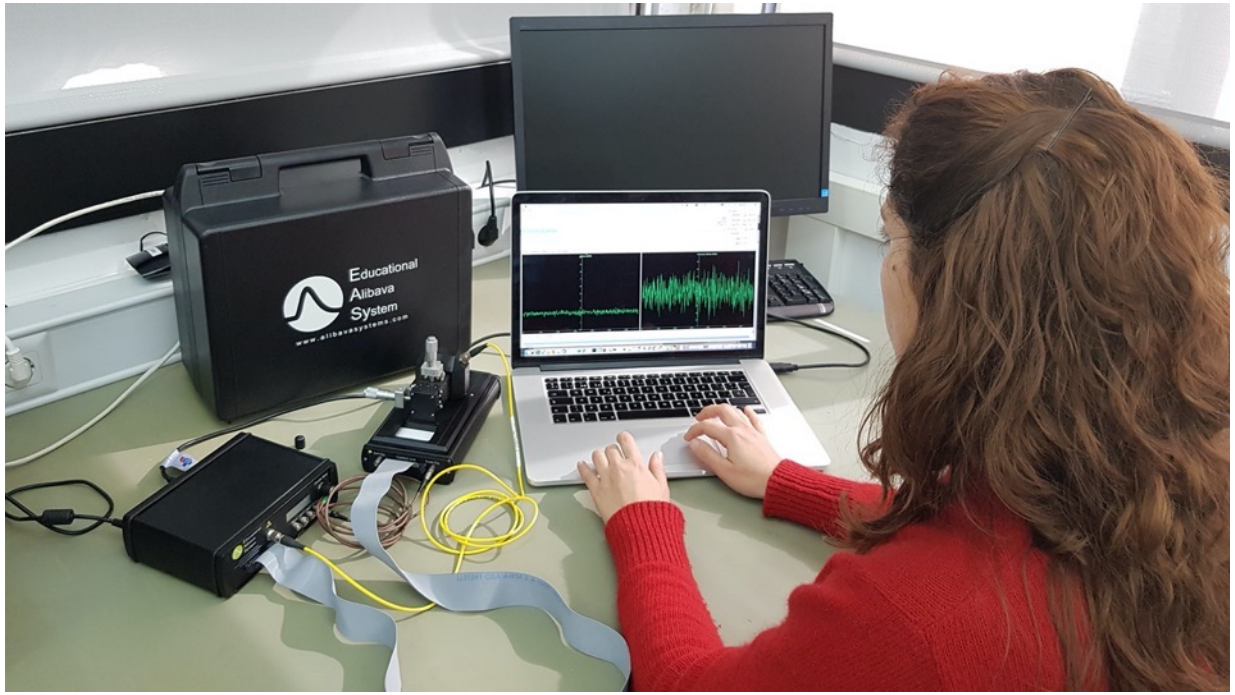
Source of particle

Laser

Radioactive source

EASy

EASY is a portable, compact and complete system for experiments with silicon microstrip detectors. We will use it in the Hands-on lab.



EASy

Control unit

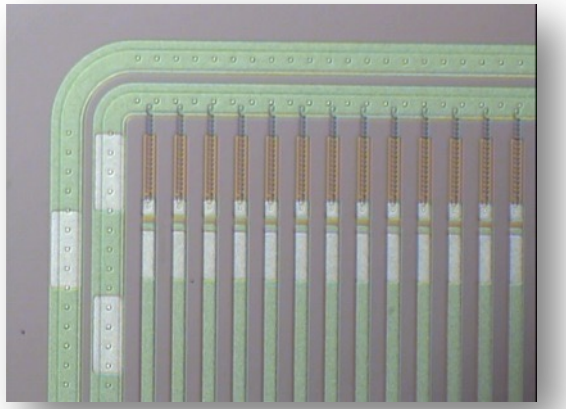
- Data Acquisition Control.
- Process sensor and trigger data
- Adjustable HV unit for microstrip sensor bias, with voltage and current display.
- Include the laser source
- Communication with computer software via USB

Sensor unit

- Silicon micro-strip sensor and the Beetle chip.
- Opaque carbon fibre window to place radioactive source.
- Laser micro-positioner and focus system.
- A diode placed under the detector provides a trigger signal.

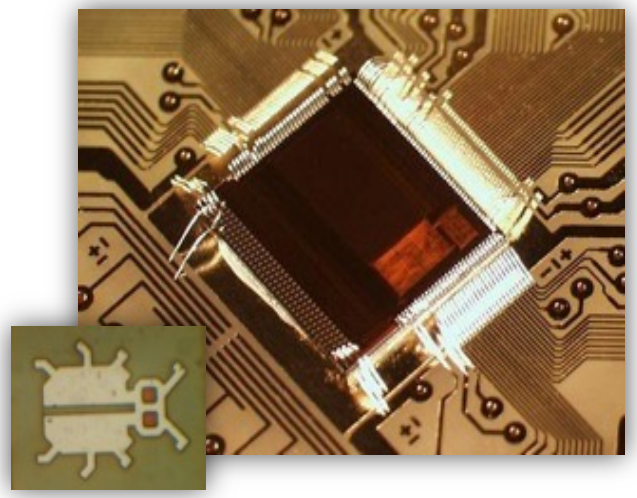
Silicon microstrip

- P-on-N Detector
- Size: 20x20 mm2
- Thickness: 300 µm
- Channels: 128
- Interstrip pitch: 160 µm



Beetle Characteristics

- Low noise ASIC developed for CERN/LHC experiments
- 128 channels



Laser source

- Wavelength: 980nm
- Pulse width: 5 ns
- Laser Spot: 20 µm
- Micropositioner resolution: 10 µm

The hands-on Lab @ INFIERI

- ✓ Understand ***basic principles of silicon strip sensors*** and the signal they produce when a particle traverses them.
- ✓ We will perform 2 experiments to understand:
  - ➔ Exercise 1: Charge collection and depletion voltage with a ***radioactive source***
  - ➔ Exercise 2: Strip structure and charge sharing with a ***laser pulse***

- ✓ We will use Google Colaborative notebooks (https://colab.research.google.com/notebooks/)
  - ➔ Follow the link to get familiar to it.
  - ➔ Having a Google account might be handy if you want to do the exercises in your laptop
- ✓ The Hands-On lab will start on September 30th.

More Information

https://www.alibavasystems.com

Alibava Systems in YouTube

Exercise 1

Exercise 2

Thanks and Enjoy the School !

Carlos & Carmen