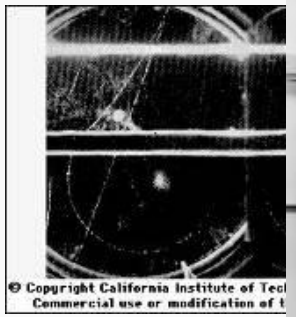
2024 Summer Student Labs

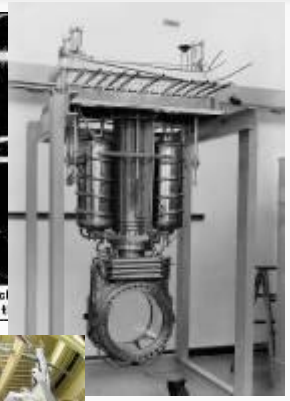
A short introduction

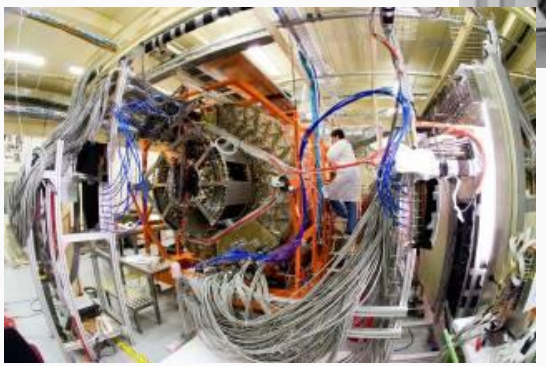
Flavio Pisani, Niko Neufeld
CERN/EP

High Energy Physics Hardware





With the size and complexity of experimental tools in high-energy physics increasing, it is very difficult to grasp the various aspects of an experiment in just a few short summer months.

… but your everyday looks more like this

We would therefore like to invite you into some of our labs and try to show you in few hours what we are doing there and why we are doing it.

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What we will offer you

- ROOT Summer Student Workshop (only two sessions left)
- Data Acquisition and Trigger
- Silicon sensors
- Introduction to Silicon Pixel detectors
- MADgraph
- Web security pen-testing
- Introduction to Semiconductor Detectors for high-energy physics
- Characterisation of a simple detector using cosmic particles
- Cloud chamber workshop

https://indico.cern.ch/category/6274/

ROOT

Contact Persons: Axel Naumann, Jonas Hahnfeld,
Lorenzo Moneta, Marta Czurylo, Vincenzo Eduardo Padulano

10.07. 14:00 – 17:00 (593/R-010 - Salle 11)
24.07. 14:00 – 17:00 (593/R-010 - Salle 11)

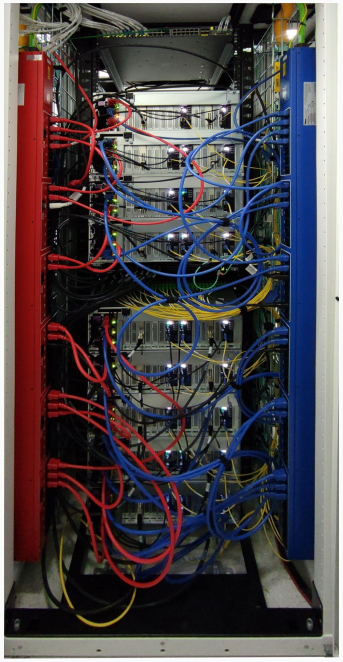
You must bring your own laptop! (To be confirmed with the organisers)

Data Acquisition

Contact Persons: Flavio Pisani, Pierfrancesco Cifra, Alberto Perro, Robert Gulyas, Apostolos Karvelas

23.07. 13:30 – 17:00 (LHCb Point 8)
24.07. 13:30 – 17:00 (LHCb Point 8)
25.07. 13:30 – 17:00 (LHCb Point 8)
26.07. 13:30 – 17:00 (LHCb Point 8)

Transport will be provided to and from the Meyrin site (2/R-002).
Bring a valid ID/Passport.



Silicon Sensors

Contact Persons: Michael Moll, Moritz Wiehe

17.07. 13:30 – 17:00 (28-2-015)
18.07. 13:30 – 17:00 (28-2-015)

You will investigate how radiation damage is influencing the silicon tracking detector in the LHC experiments. You will measure properties of irradiated silicon sensors.
This will give you an impression on how much detectors in the LHC will suffer from radiation damage. In a concluding discussion we will look at some possibilities on how to make detectors radiation harder.

Every participant must have a dosimeter
https://dosimetry.web.cern.ch/dosimeters/how-obtain-dosimeter

Introduction to silicon pixel detectors

Contact Persons: Dominik Dannheim, Peter Svihra, Philipp Gadow, Younes Otarid

08.08. 09:00 – 12:30 (1/1-015)
08.08. 14:00 – 17:30 (1/1-015)
09.08. 09:00 – 12:30 (1/1-015)
09.08. 14:00 – 17:30 (1/1-015)

You will learn about the basic principles of silicon detectors and perform measurements with hybrid pixel-detector assemblies. We will discuss the use of segmented p-n junctions coupled to dedicated readout circuits for the detection of ionising particles. You will measure electrical characteristics, calibration of the energy response, as well as detection of minimum-ionising particles from cosmic rays and/or a radioactive electron source.

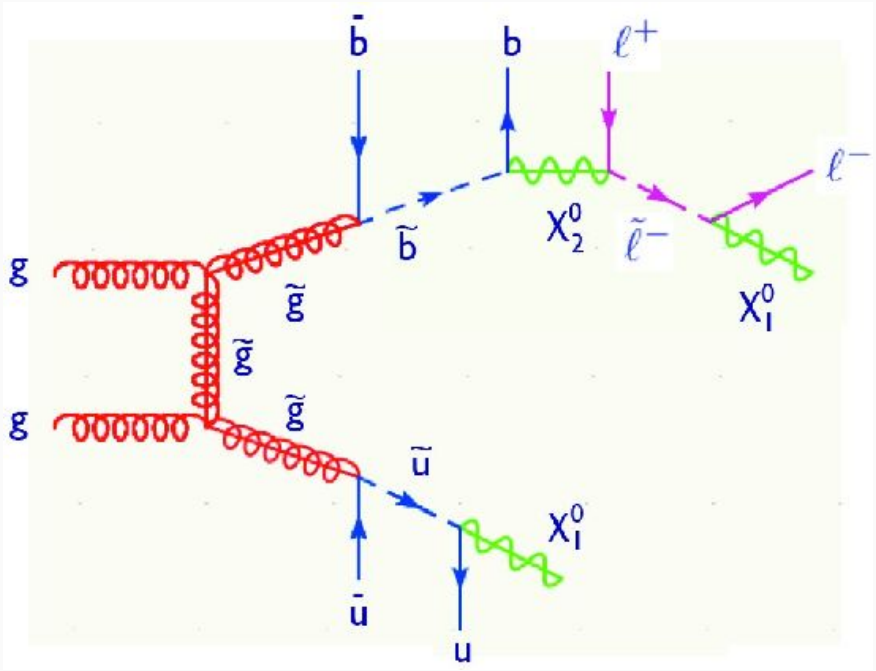
Every participant must have a dosimeter
https://dosimetry.web.cern.ch/dosimeters/how-obtain-dosimeter

MADGraph

Contact Person: Olivier Mattelaer

08.07. 09:00 – 12:30 (593/R-010 - Salle 11)
09.07. 09:00 – 12:30 (593/R-010 - Salle 11)

- Dive into the world of Feynman-diagrams
- Understand how theoretical predictions for HEP experiments are made



Web application security penetration testing

Become a White Hat hacker ☺

Contact Persons: Sebastian Lopienski

07.08. 13:30 – 17:30 (513/1-024)

Bring your own laptop

Introduction to Semiconductor Detectors for high-energy physics

Contact Person: Carmen García

Space-Time coordinates: TDB

This tutorial introduces high-energy physics and particle detectors to physics students with hands-on experiences.
You will learn concepts such as MIP, charge collection, full depletion and charge sharing in strip detectors, among others.

Characterisation of a simple detector using cosmic particles

Contact Person: Sune Jakobsen

01.08. 15:30 – 17:30 (21-1-067)
05.08. 15:30 – 17:30 (21-1-067)
07.08. 15:30 – 17:30 (21-1-067)

Hands-on experience with classic photomultipliers, oscilloscopes, scintillators, light guides, wavelength shifters and monochromators.
You will measure several quantities like light yield and quantum efficiency.

Cloud chamber workshop

Build a particle detector with your own hands

09.07. 14:00 – 15:15 (non Physicists) (82/1-001)
09.07. 15:30 – 17:00 (Physicists) (82/1-001)
11.07. 14:00 – 15:15 (non Physicists) (82/1-001)
11.07. 15:30 – 17:00 (Physicists) (82/1-001)
25.07. 14:00 – 15:15 (non Physicists) (82/1-001)
25.07. 15:30 – 17:00 (Physicists) (82/1-001)

Whats next?

Check and decide which are interesting for you:

1) Sign up https://indico.cern.ch/category/6274/ - first come first served!
2) If you were able to register successfully you will receive a confirmation email from the Summer Student Team

Disclaimer:

- **If you can't attend please let us know ASAP.**
- **In case of any discrepancy between indico and this presentation, assume that the indico pages are correct**
- **Don't be late for the appointments**
- **Have fun!**

Thank you for your attention