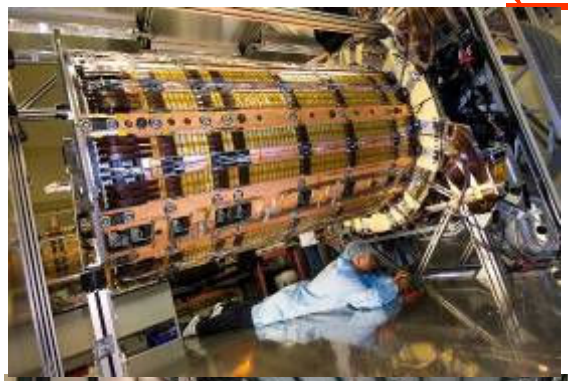
A short introduction to the

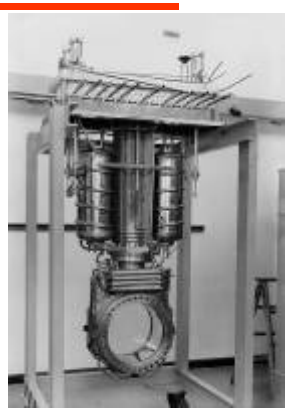
2009 Summer Student Hardware Labs

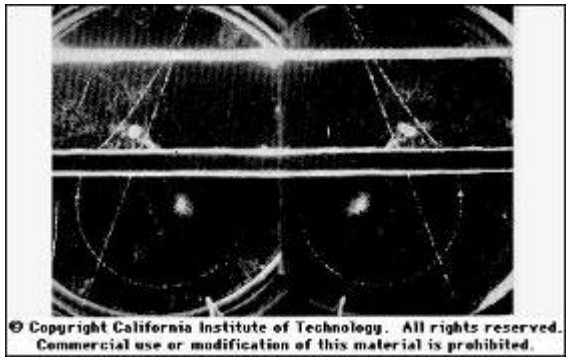
Niko Neufeld, CERN-PH / 1 July 2009
special thanks to Olav Ullaland

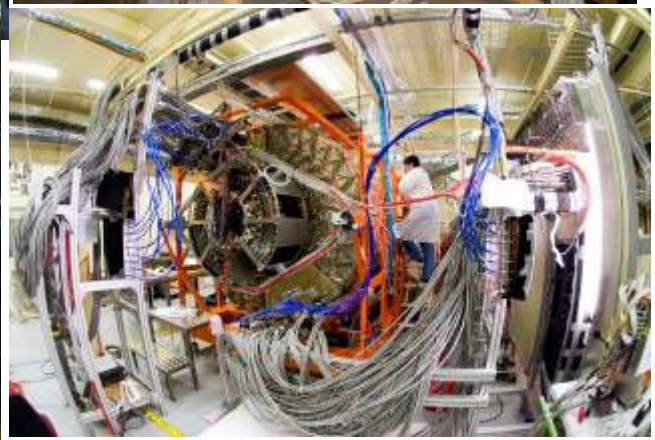
The Summer Student Hardware Labs

(even in software and physics!)









With the size of the experimental tools in high energy physics getting larger and more complicated, it is very hard in some short summer months to get a feeling of the different aspects of an experiment.

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

Who are "we" :

Matteo Alfonsi
Tito Bellunato
Andre Braem
Bruno Chauchaix
Gabriele Croci
Carmelo D'Ambrosio
Ilias Efthimiopoulos
Manuel Fahrer
Jo-Christophe Garnier
Lau Gatignon
Edda Gschwendtner
Sune Jakobsen
Christian Joram
Beat Jost
Katharina Kaska
Fabio Maltoni
Alessandro Mapelli
Olivier Mattelaer
Michael Moll
Niko Neufeld
Nicola Pacifico
Leszek Ropelewski
Tim Stelzer

As a Menu*, we can offer:

Accelerator Technology

Inorganic Scintillator Detectors
Organic Scintillator Detectors
Silicon Detectors
Gas Detectors

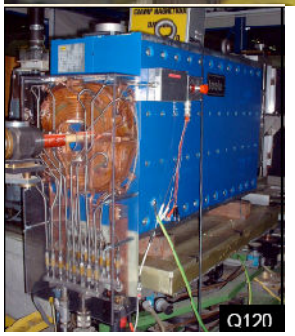
Data Acquisition

High Energy Physics Monte-Carlo Techniques

* Coffee is included!

Beam Lines

4 afternoons with optimisation of a beam line by using collimators, bending magnets and targets. Particle identification with Cherenkov counters and absorbers.



Contact persons : Bruno Chauchaix, Ilias Efthymiopoulos, Lau Gatignon and **Edda Gschwendtner**

5 groups of 4 students

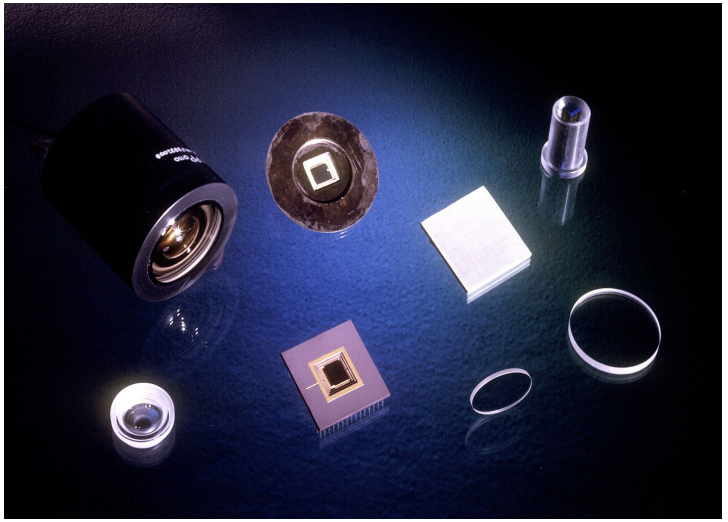
When: 17, 18, 19, 20, 21 Aug

Where: H6

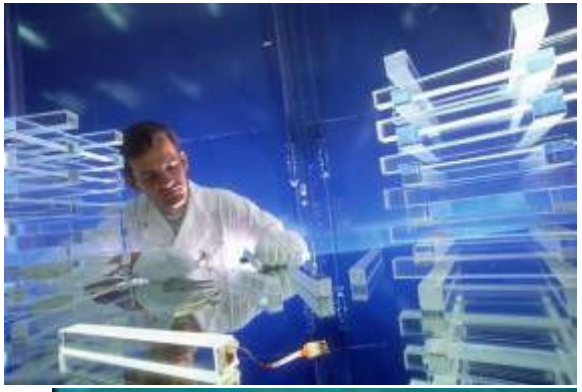
+ Introduction to beam lines: 14 August

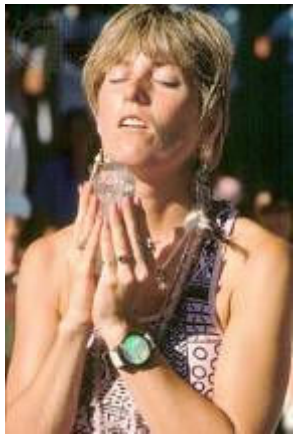
X- and Gamma- rays detection with a Hybrid Photon Detector

Contact person: Carmelo D'Ambrosio
Requirements: a film badge
Time : one afternoon, 14:30 – 17:30
3 groups of 3 students
Dates : 28, 30 and 31 July
Place : 29-1-021
Please note that gamma sources and high voltages are present on the set-up.



New Scintillating Crystals are being developed for bio-medical applications, which were first developed for high energy physics or material science. With a new generation of photodetectors being made available for the same applications (HPDs, APDs, SDCs, etc.), these gamma detectors (crystal + photodetector) represent an important contribution in the evolution of instrumentation for physics and non-physics applications.





Measurements with scintillating fibres.

Contact Persons :

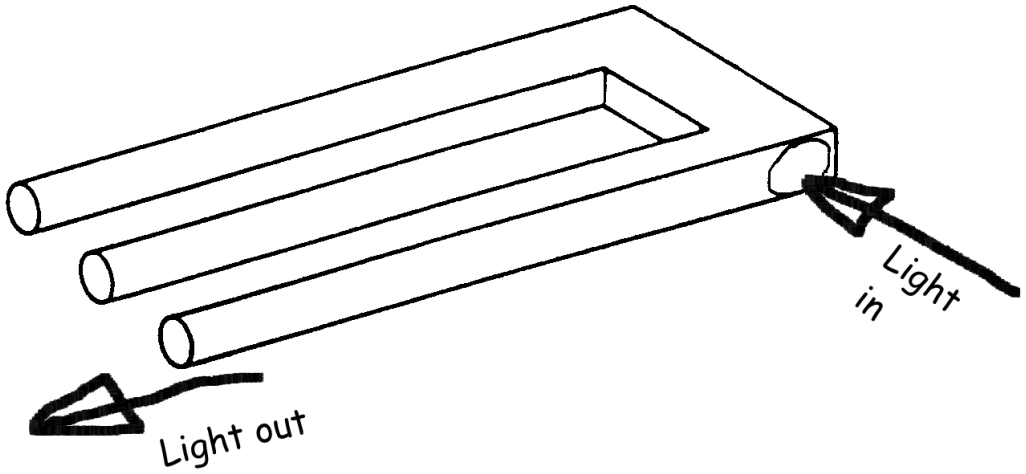
Andre Braem,Sune Jacobsen, Christian Joram and **Alessandro Mapelli**

3 afternoons with 3 students.

When: 17, 19, 21 August 14:00 to 18:00

Where: Meeting room: 3-R-020.

What: Scintillation emission spectrum, light absorption length, reflective coating, photodetectors.



CERN photo CERN-EX-9201043
End part of the scintillating fibre detector of the CHORUS experiment. There are 1 million fibres and each fibre has a diameter of 500 .micron.m.

Characterization of irradiated silicon sensors.

Contacts: Manuel Fahrer, Katharina Kaska, Michael Moll and Nicola Pacifico

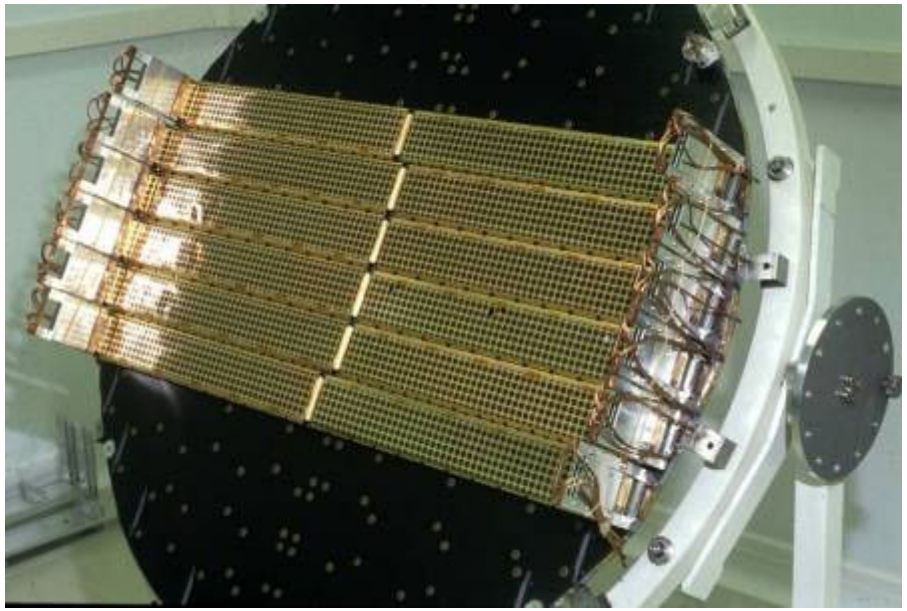
3 afternoons with 3 students.

When: 15 and 22 July and 5 August at 14:00

\+ common visit to the Si facility, 12 Aug

Where: Meeting room: 28-2-017

What: We will investigate how radiation damage is influencing the silicon tracking detectors in the LHC experiments. The following properties of irradiated and non-irradiated silicon detectors will be measured: Reverse current, detector capacitance, depletion voltage and charge collection efficiency. 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.



X-Rays Detection with a GEM detector

Contact Persons: Gabriele Croci and Matteo Alfonsi

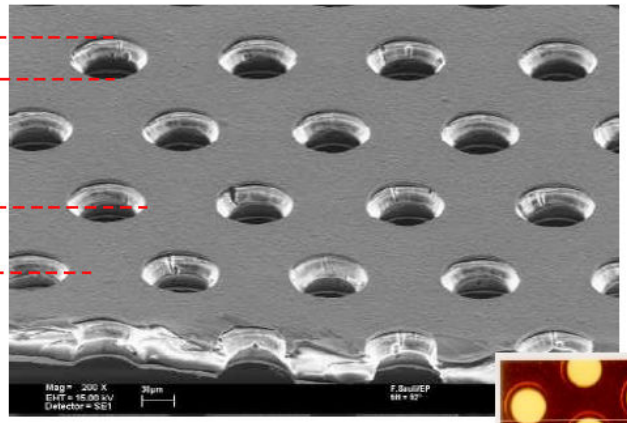
Requirements: Some Lab Experience, Film Badge is mandatory

Time: two afternoons, 14.30 – 17.30
two groups of 4 students

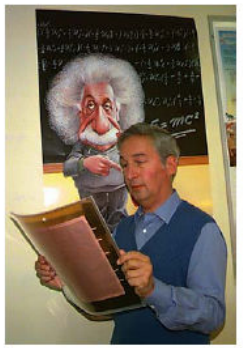
Dates: xx August (General Introduction) + xx and xx

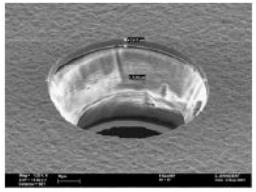
Place: 154-R-007

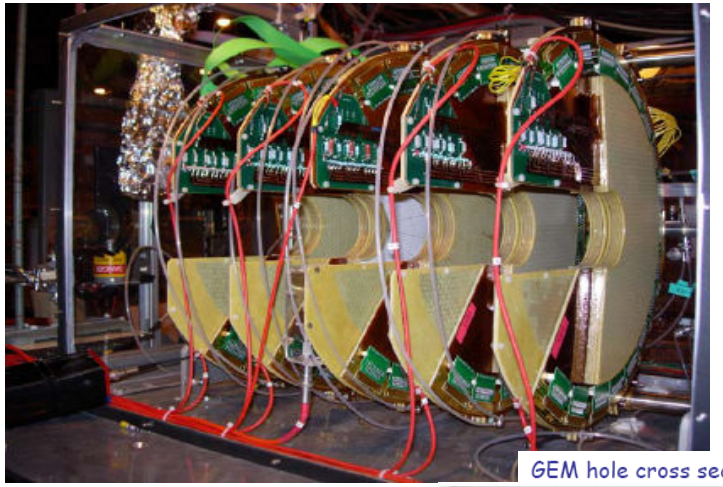
Please note that x-rays source and high voltages are present on the set-up



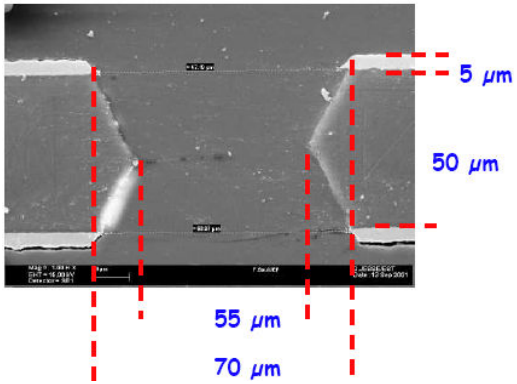
F. Sauli, Nucl. Instrum. Methods A386(1997)531







GEM hole cross section



GEM (Gas Electron Multiplier) detectors belong to the new generation of Micro-Pattern gas detectors. Due to their features, GEMs are used in different fields from medical application to High Energy Physics experiments (for example Compass and TOTEM). Students will be asked to characterize one GEM detector in all its aspects (gain, rate capability,.....) performing some measurements using an X-Ray source.

Data Acquisition (and fun with bits lost and found).

Contact persons:

Niko Neufeld and Jean Christophe Garnier

Requirements: Some basic programming experiences would be good - but that should not deter anyone.

4 sessions with 4 students

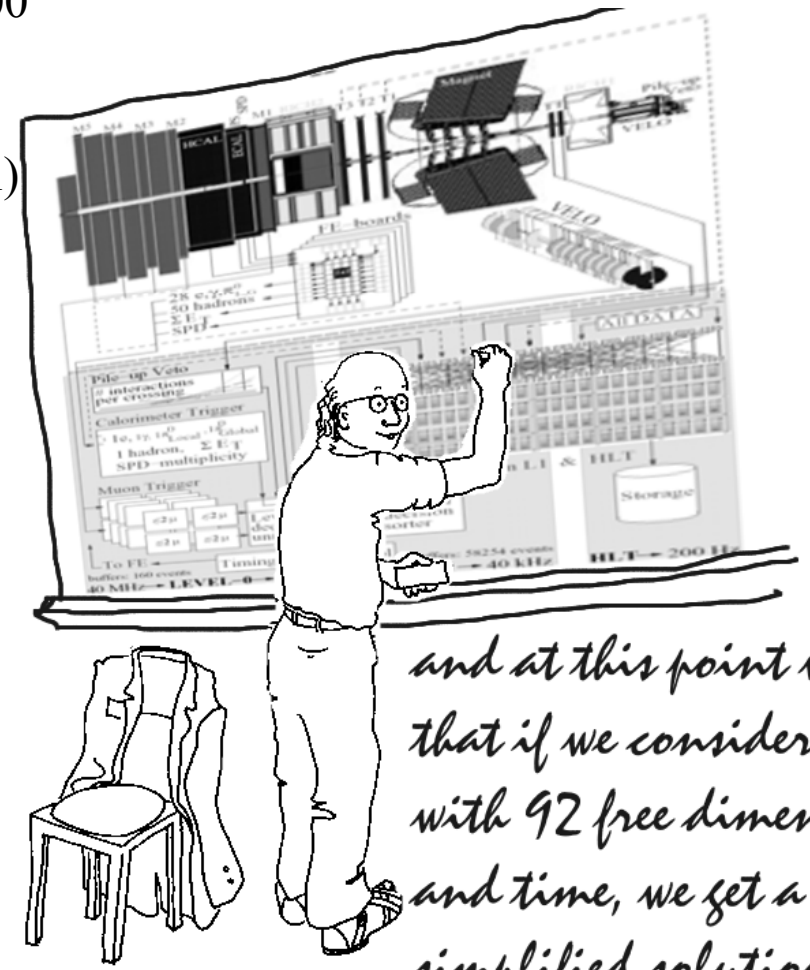
Time : one afternoon, 14:00 – 17:00

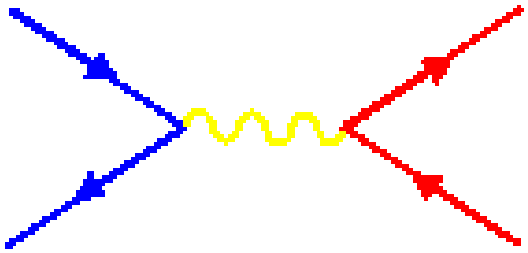
Dates : 28, 29, 30 and 31 July

Place : Point 8

(transport arranged via email)

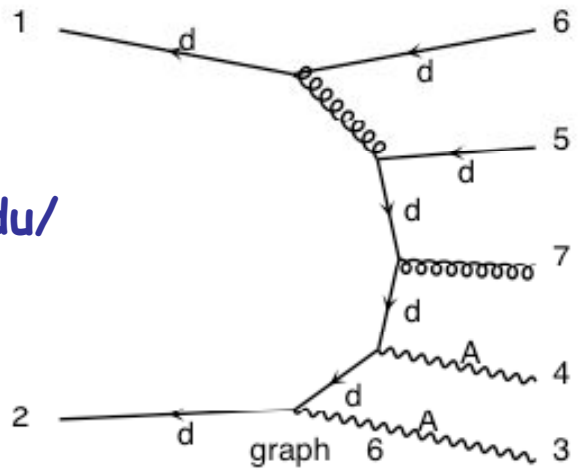
Real data acquisition at 1 MHz. Follow the data through LHCb and try not to lose a single bit! From the front-end electronics, through the readout boards, the network, the farm to tape - and not back.





MadGraph

http://madgraph.hep.uiuc.edu/



Contact Persons: Fabio Maltoni
Olivier Mattelaer

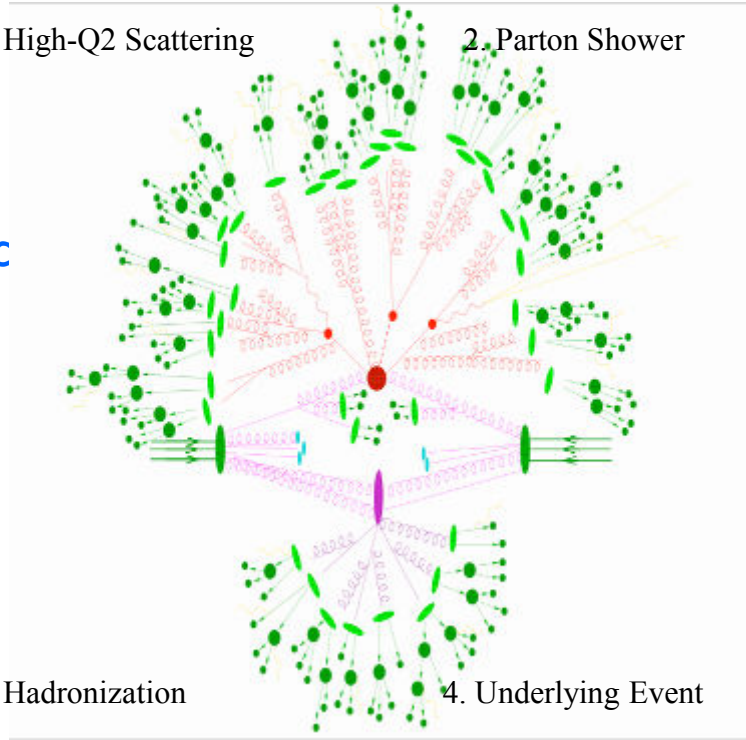
3 afternoons with up to 18 students each time.

Training Centre (bgs. 572), rooms 23 and 24 at 14:00.

4, 5 and 6 August.

In this workshop we will

1) Discuss the various aspects of a hard-hadronic collision using a FLASH simulation.
2) Develop cutting edge Monte Carlo techniques necessary for simulating these collisions.
3) Use MadEvent's new web-based capabilities to produce event simulations for processes important to LHC physics.



What you have to do:

① Do what Ingrid et Laura will tell you to do by e-mail

② Try not to forget your rendez-vous…,

③ **Have fun!**