Status of the Luminosity Spectrometer

- Hardware
  - Beam Line
  - Spectrometer
  - LED Tests
- First Events
  - Single hits, proton beam events, coincidences
- Analysis
  - Exit Window studies
- Summary

People: S.Paganis,M.Helbich,B.Schmidke,A.Caldwell,F.Sciulli

Beam Line

- *Exit Window* is installed.
- *Moving Collimator* is installed. The table is connected to the Slow Controll and tested.
- *Fixed Collimator* is installed and positioned.
- *Dipole Magnet* is installed and the current of 200A was turned on with no effect on the proton beam.
- The new *proton beam pipe* is installed.
  - The position survey showed the displacement by 6mm. This will be corrected during the next access.
- *Gas System* for the *Helium Bag* has been installed.
- *Shielding* of the Spectrometer is installed.
  - two walls of steel/lead bricks
  - shielding of Wave Length Shifters

Spectrometer

- The two calorimeters are installed and cabled up
  About 10 channels showed problems after installation. This was due to HV cables/connectors. Blown bases, problem with PMT

- ~70 new HV cables installed (including spares)
  This solved the problems with dead channels + we gained extra length for comfortable setup of HV system

- HV system was repaired at NIKHEF and works!

- All channels have been powered up and work!

- The area has been surveyed for position.
  - More work is needed after moving the proton beam pipe.
  - The precision is ~1mm => Need to make alignement from the data.

LED monitoring

- Two LED's installed. (One for each detector)
- The pulses are used for studying the stability, beam correlated effects, dead channels, noisy channels
- ~ 400 hours of running
- All channels show reasonably narrow distributions (sensitive to light leaks)
- Stability is ~1%
- Beam correlated effects seen during injection or HERA tests

First Events

- Temporary Camac based DAQ running
- Trigger on bcn 0 with prescale (~300Hz)
- Gate 100ns. The timing is not automatized.

We observed:

- ✔ Single hits
- ✔ Coincidence (not a conversion in the window)
- ✔ Hadronic showers

Analysis

A number of studies are on–going:

- A magnetic field map was surveyed at set of currents and points.
  - We need a handle to deal with interpolations
  - The shielding was moved compared to survey
- Physics of the exit window:
- Energy corrections due to leakage and attenuation
- Lumi Fast – a fast simmulation of the spectrometer
  - First look at the systematic uncertainties, sizes of corrections, understanding of the system.

Exit Window

Basic facts:

- thickness 9.883±0.003mm => precise
- density 2.82gcm^{-2}
- conversion rate = 8.77±0.18 (theoretical)
- 0.12 X0 dead material => radiation loss 5.85% on average
- multiple coulomb scattering
  - $\theta \sim 2.8\ 10^{-4}$ rad=> 3.4mm at the spectrometer
  - affects the acceptance by –2.5%,
  - affects profile measurement σ_x=3.4mm, σ_y=4.2mm
- composition uncertainty unknow, one can restrict it to negligible if $\Delta\rho/\rho < 0.7$ %.

Summary

- The beam line is ready (except of He bag)
- The detector is ready – an important **Milestone!**
- LED tests ongoing
- First hits recorded!
- Analysis – first progress

The Spectrometer is installed and ready to take the data.

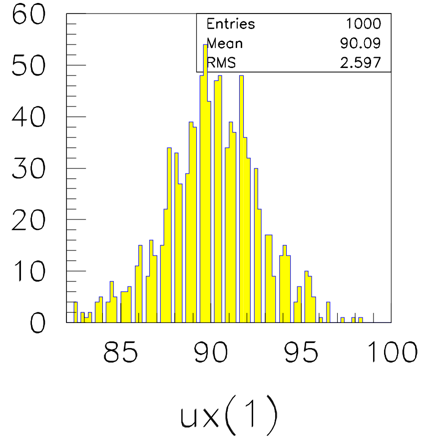
We are eager to get the final electronics.

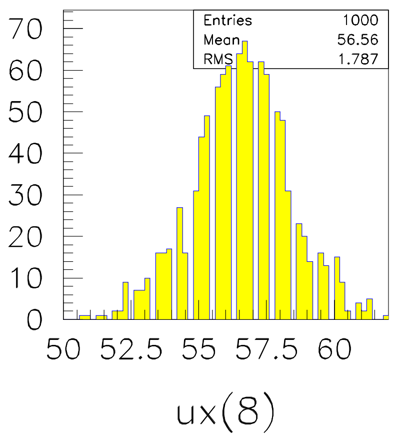
LED Tests

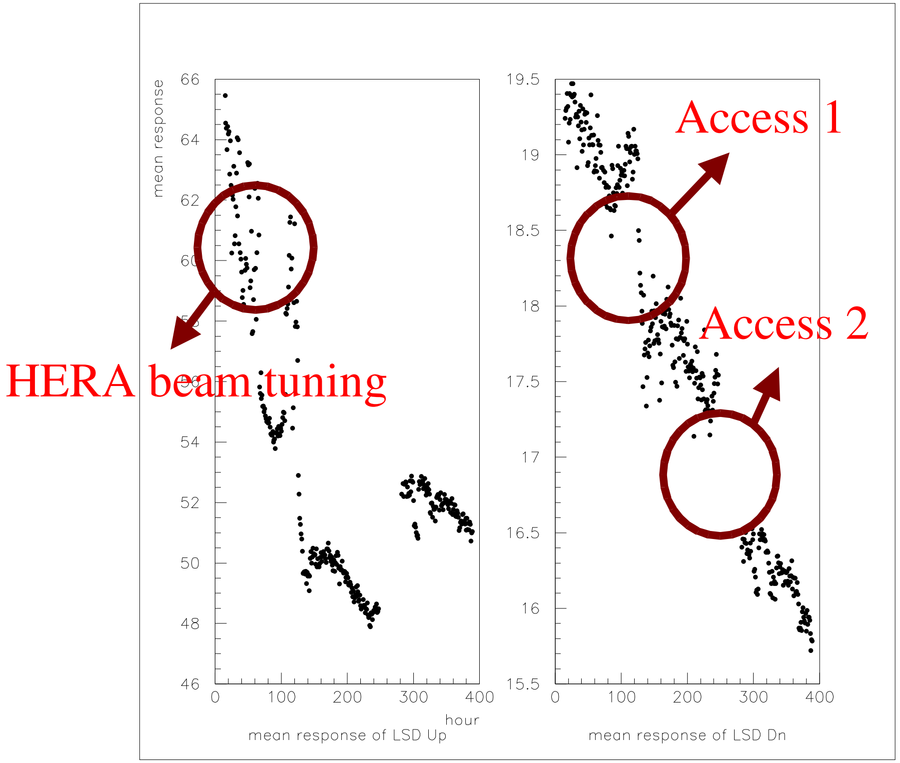
Overall mean response of the calorimeters

Distributions of measured charge for single channels.

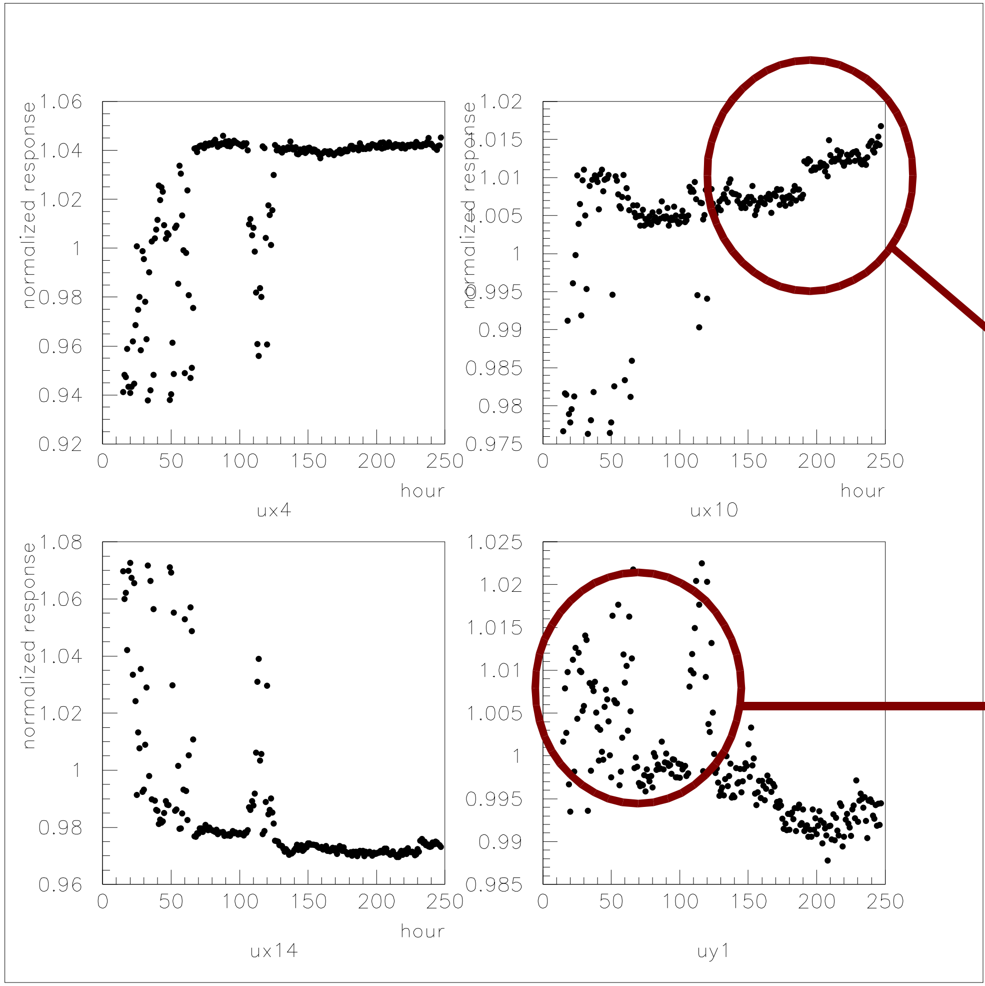
Slow decay due to Pulser or LED?







LED Tests



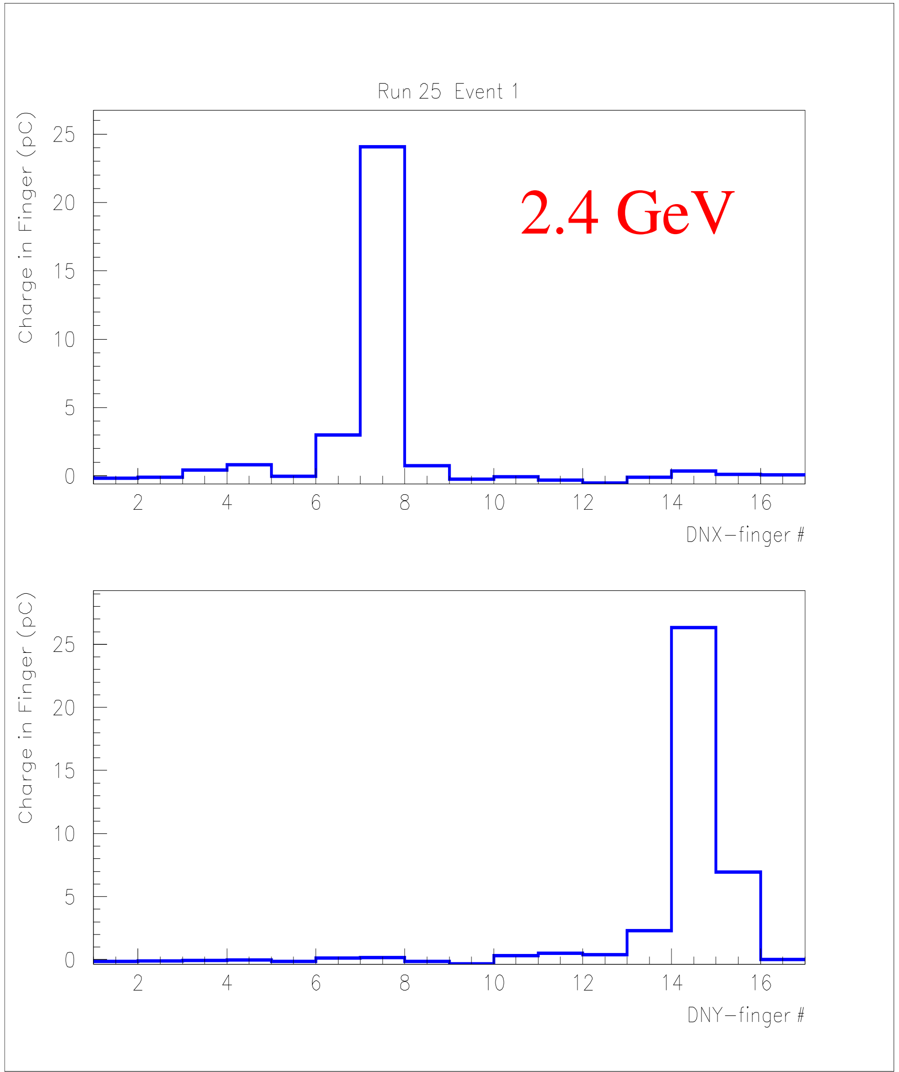
Single channel responses

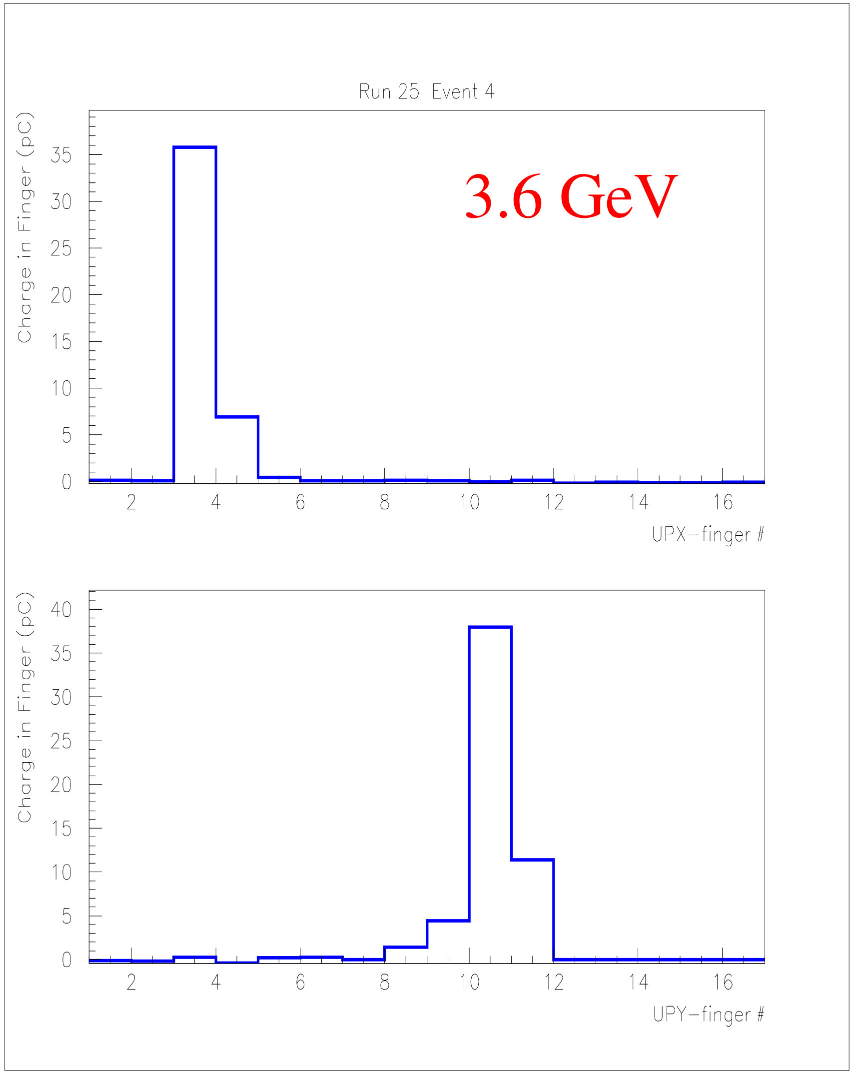
normalized to average response
and scaled to 1

Proton beam

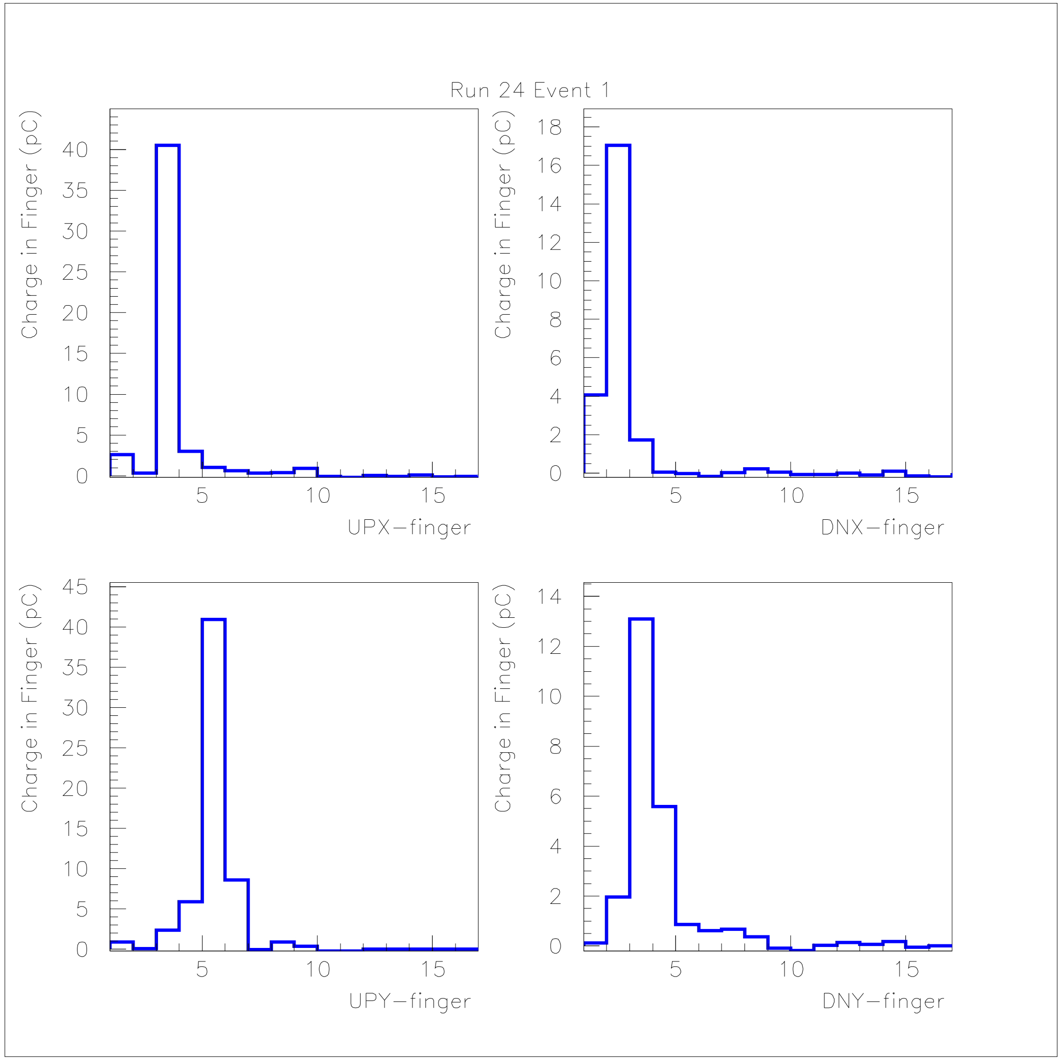
HERA e^+ beam tuning

Single hits


Run 25 Event 1
2.4 GeV
Charge in Finger (pC)
DNX−finger #
DNY−finger #


Run 25 Event 4
3.6 GeV
Charge in Finger (pC)
UPX−finger #
UPY−finger #

Coincidence ?



Eup =1.7GeV

Edn =4.0 GeV

Electromagnetic shower
and
x−position the same
but
Energies too low!

Proton beam induced events