Status of Phenix "Local" Polarimeter

B. Fox

RHIC Spin Collaboration Meeting
October 1, 2001
RIKEN BNL Research Center, Brookhaven National Laboratory

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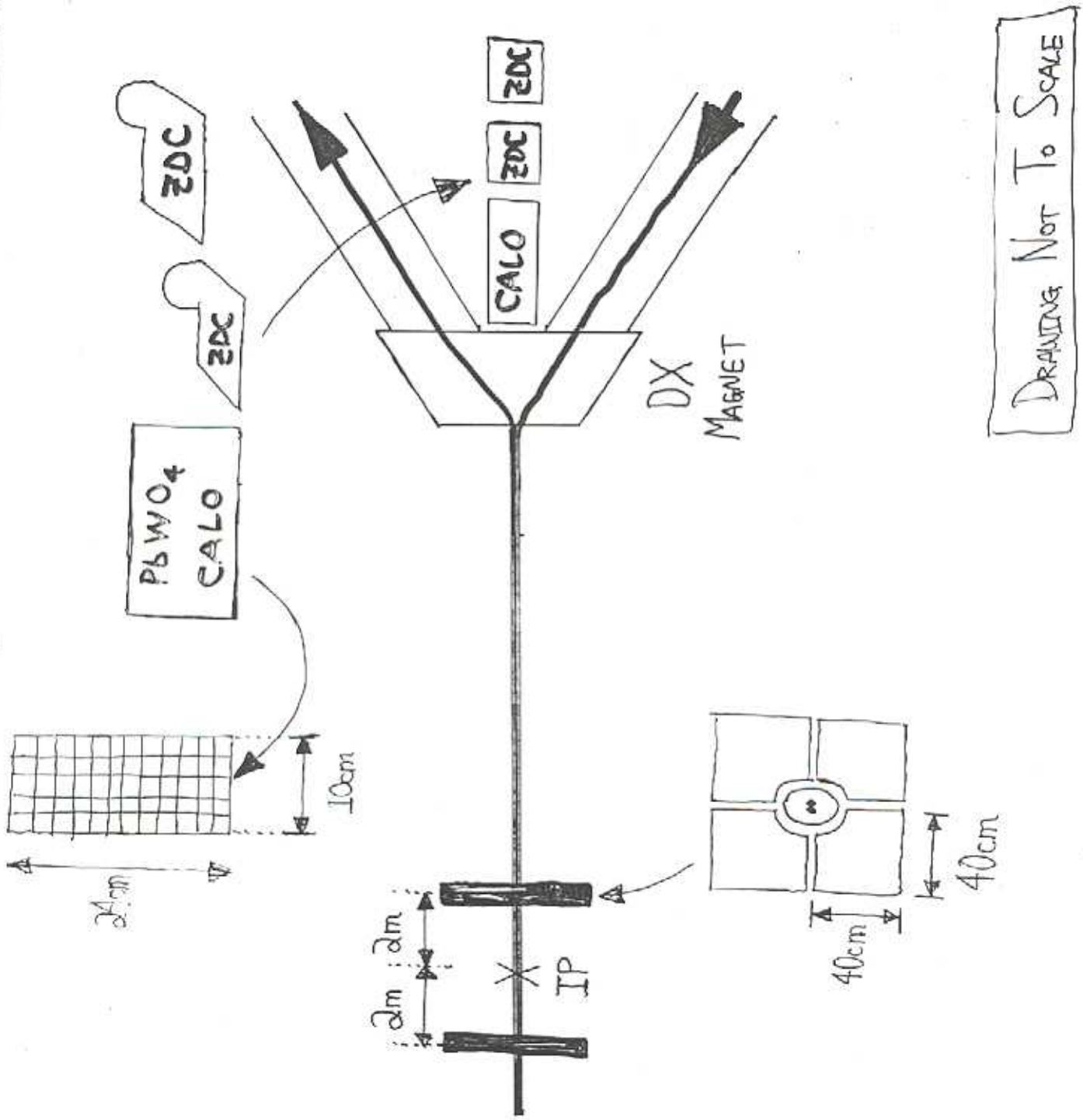
For

L. Bland, G. Bunce, A. Deshpande, Y. Fukao, Y. Goto, K. Imai, R. Muto, E. Pascuzzi, N. Saito, F. Sakuma, M. Togawa, J. Tojo

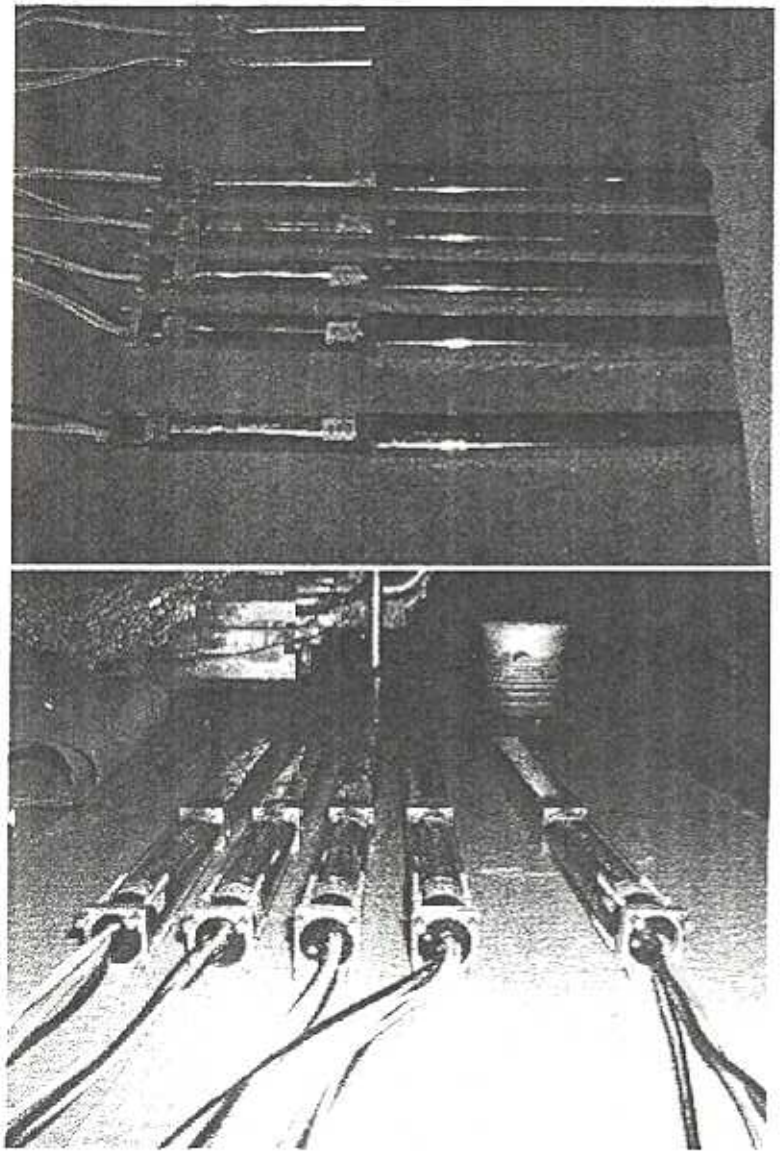
W. Dalton, W. Lenz, D. von Lintig

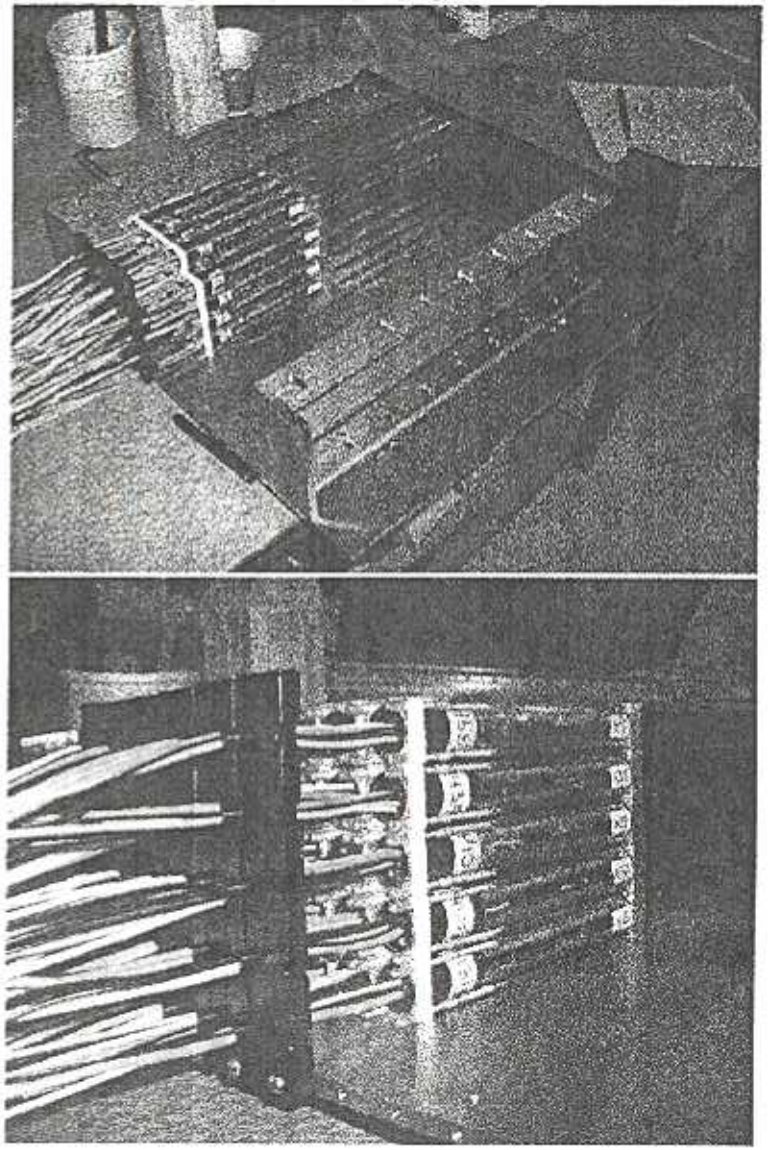
R. Alforque, Aron K., G. McIntyre, T. Curcio


ZDC
ZDC
ZDC
ZDC
CALO
PbWO4
CALO
DX
MAGNET
DRAWING NOT TO SCALE
10cm
24cm
2m
2m
IP
40cm
40cm

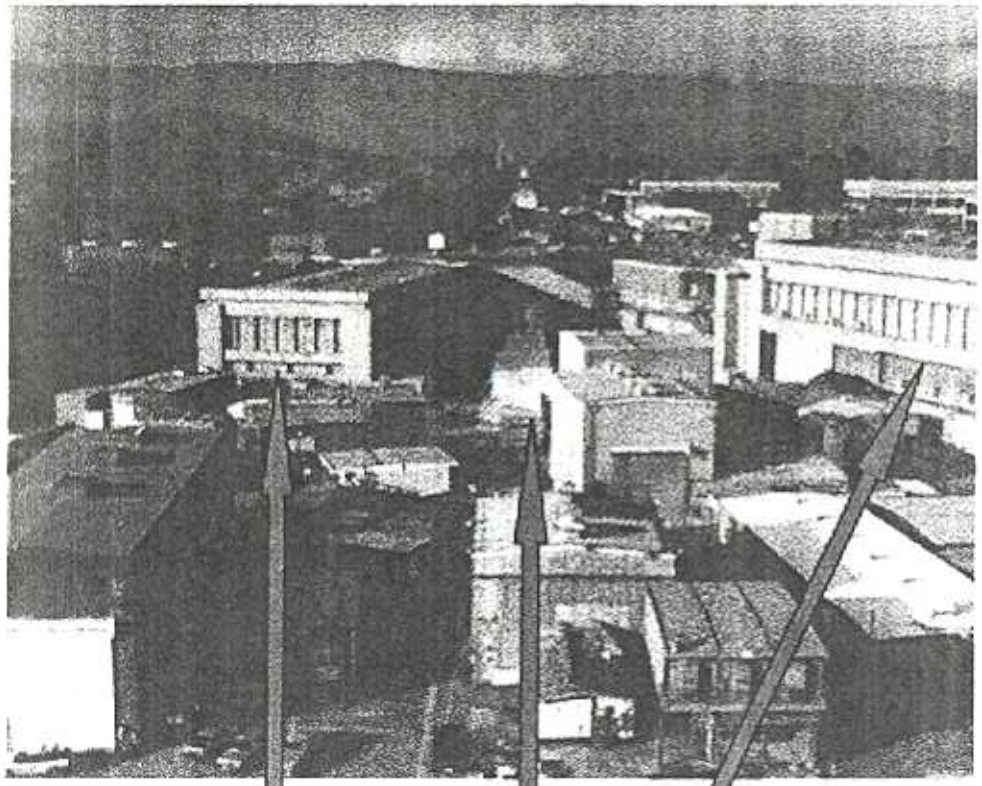
The Towers & The Calorimeter

Don V. L.
Bill D., Bill L.
Rudy A., Aron K.





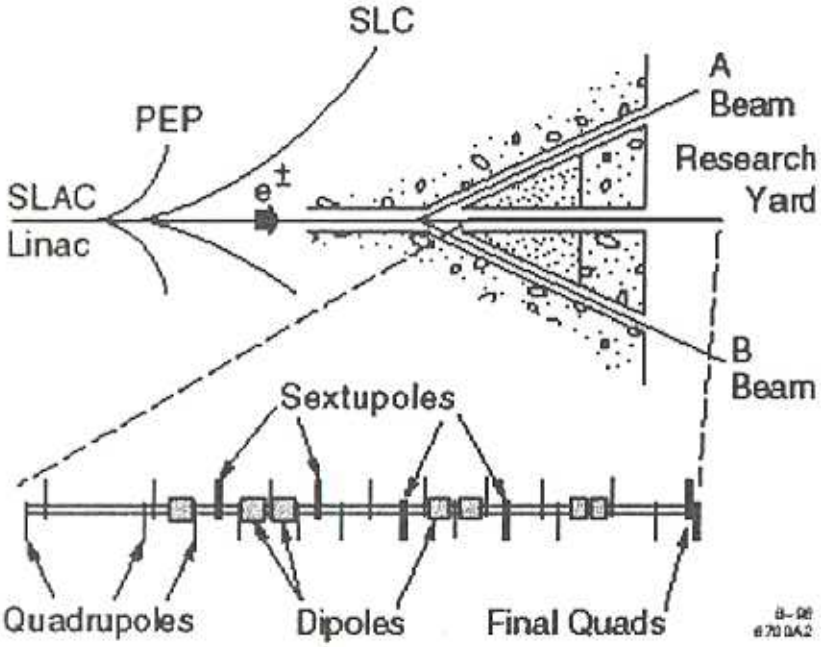
Final Focus Test Beam



End Station B

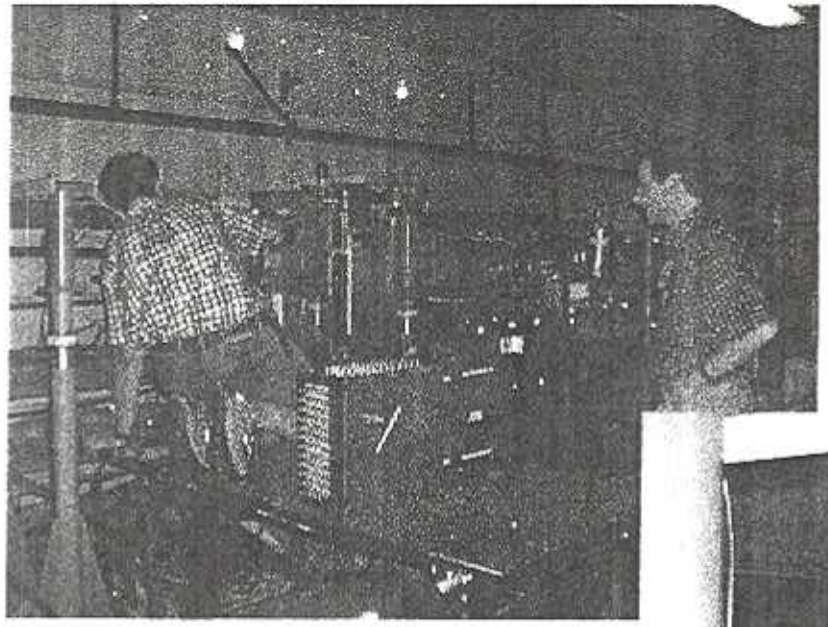
FFTB

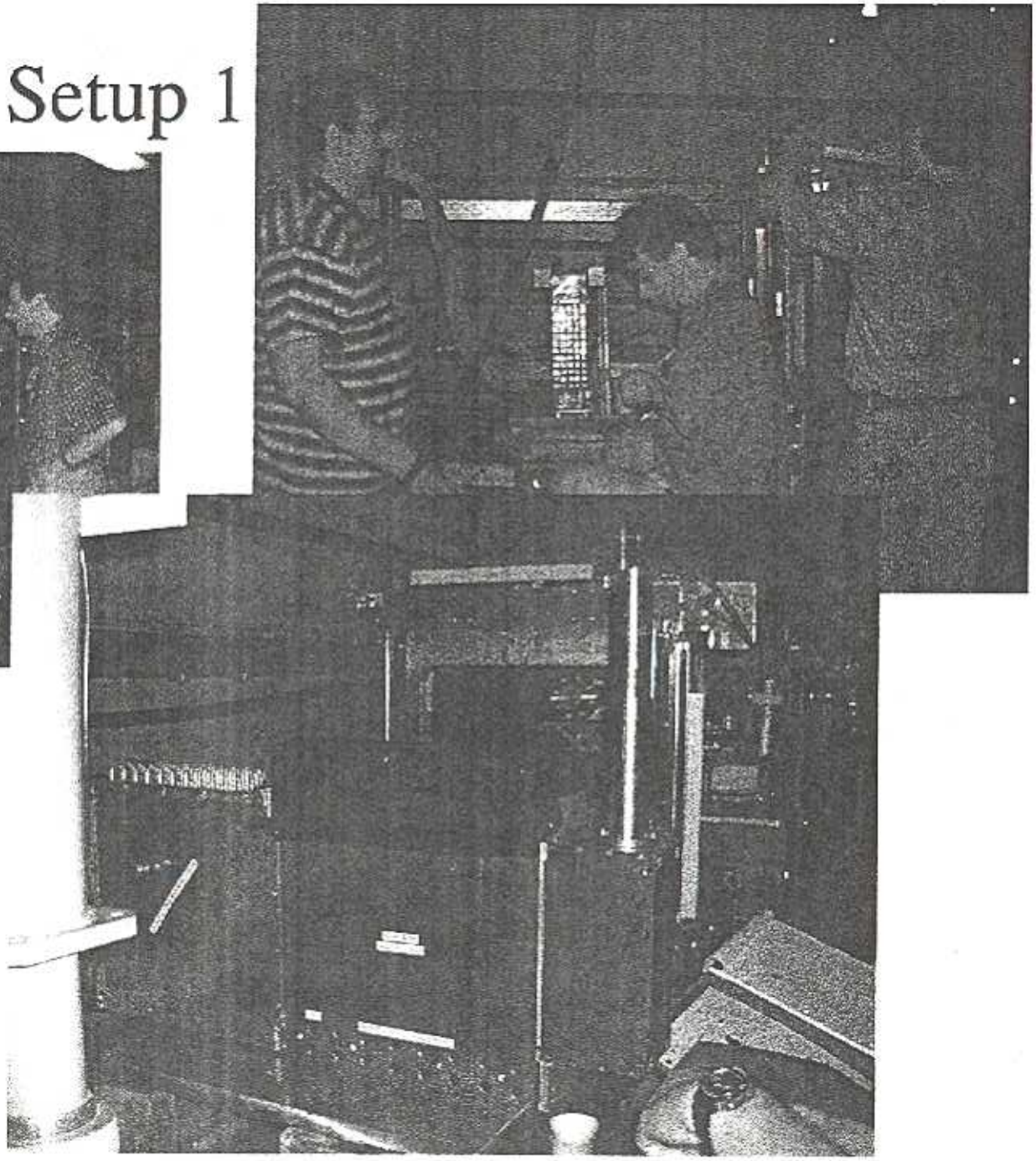
End Station A



Built by an international collaboration
to work on achieving minute beam spots
For work on NLC:
1998: 1micron(wide) by 0.06 micron(height)

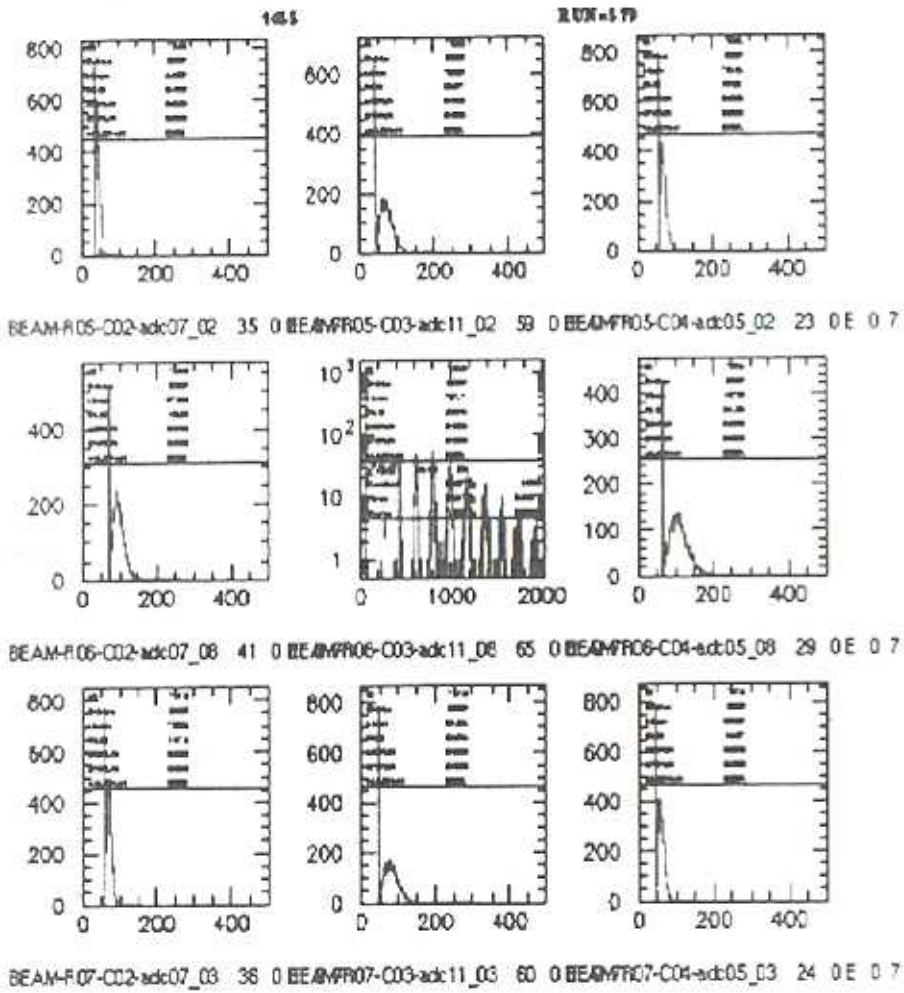
Inside FFTB… Setup 1



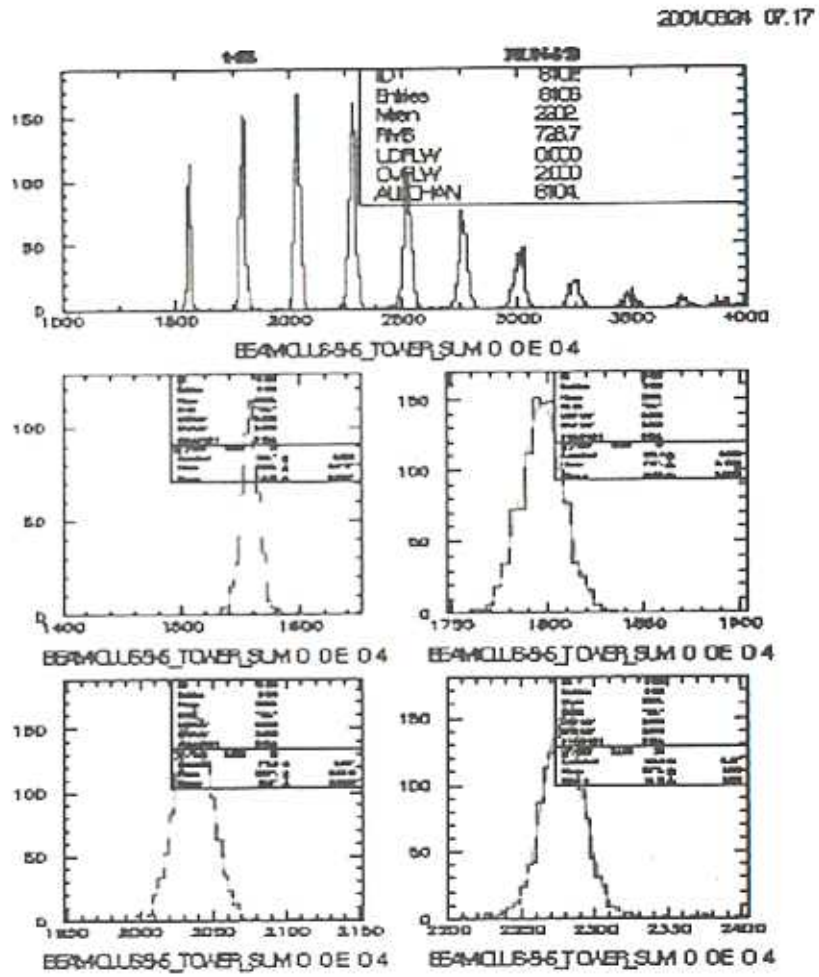


Calorimeter arrives
At SLAC

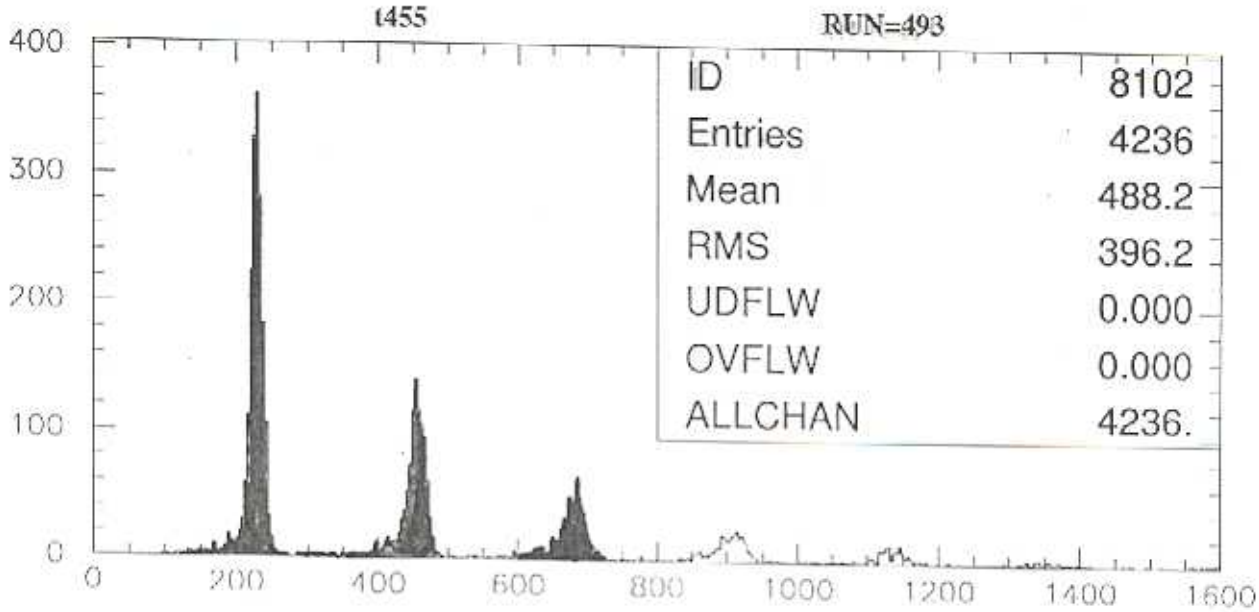
1st Look at what we had…

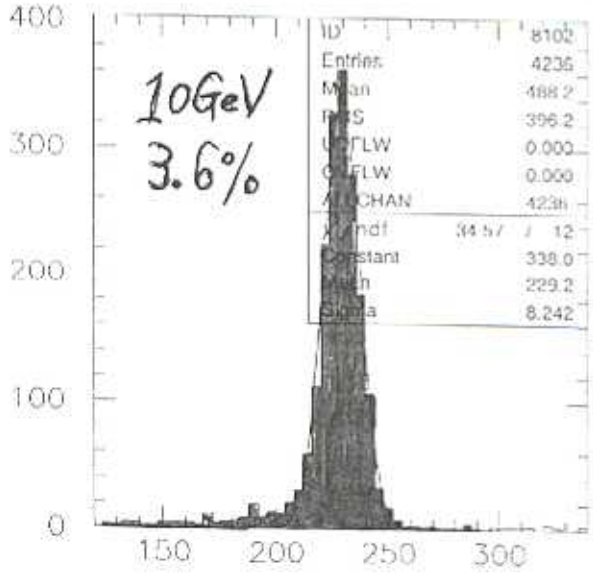


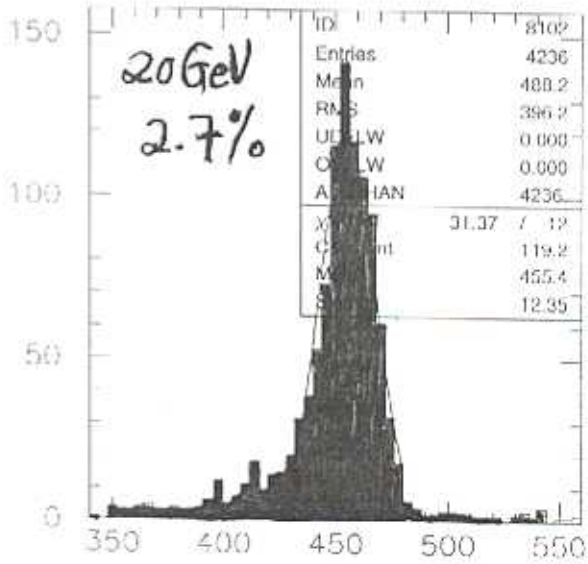
Center block: Column 3, Row 6



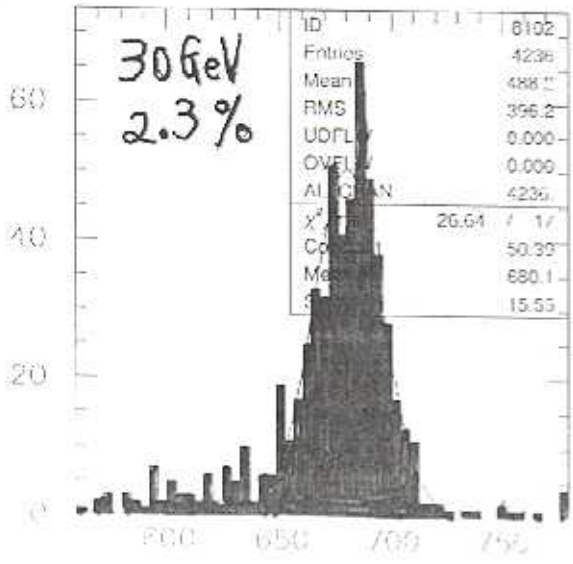
1,2,3,4… electron peaks



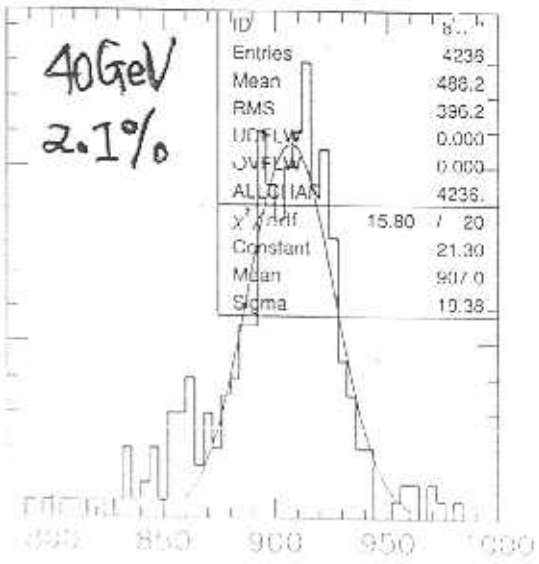




BEAM-CLUS-5x5_TOWER_SUM 0 0E 0 4

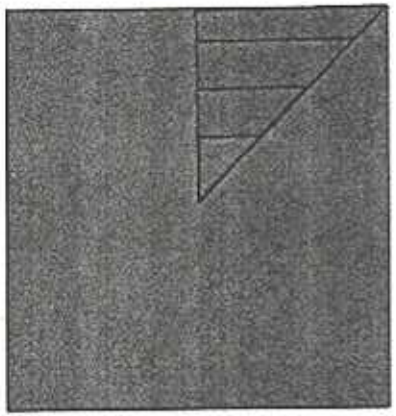


BEAM-CLUS-5x5_TOWER_SUM 0 0E 0 4



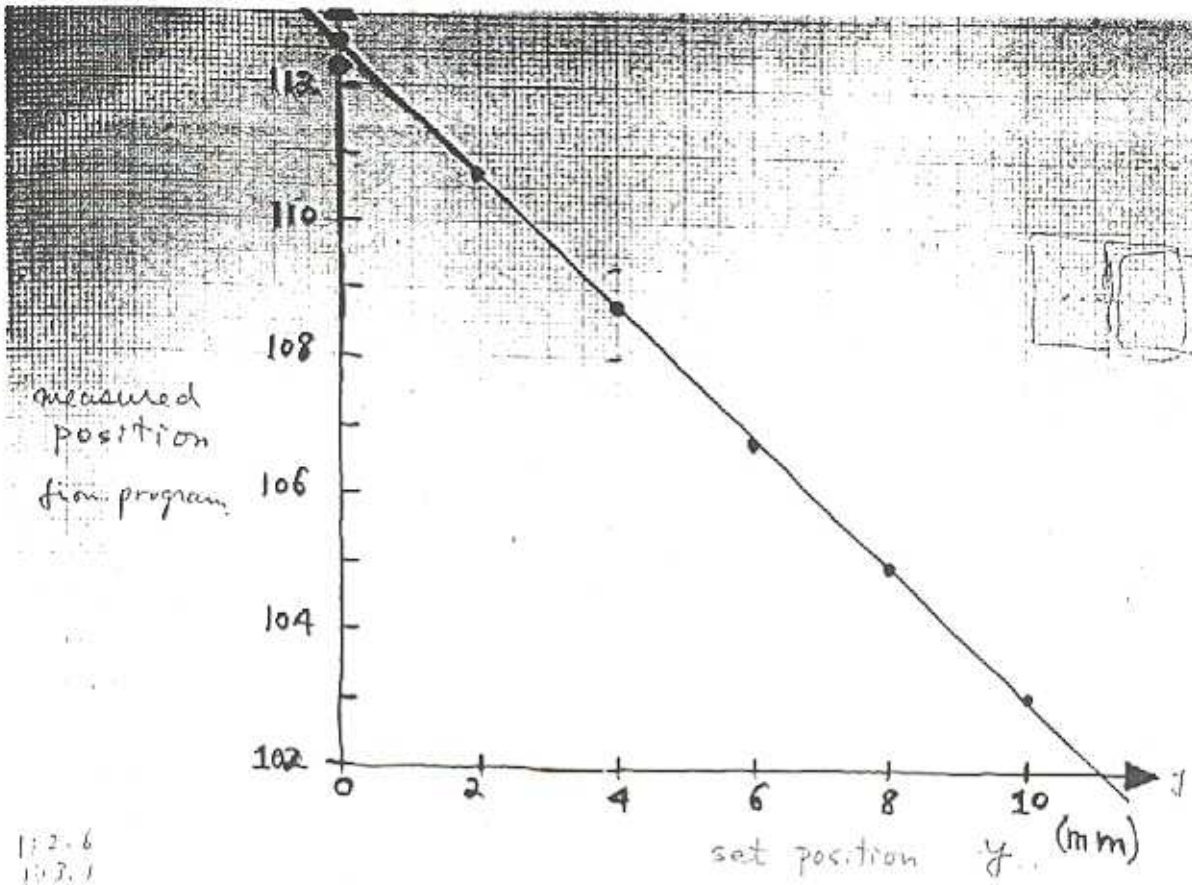
Shower Profile

- Scan the entire calorimeter: all towers at their centers
- Row 3, block 6 (approx. center of the calorimeter)



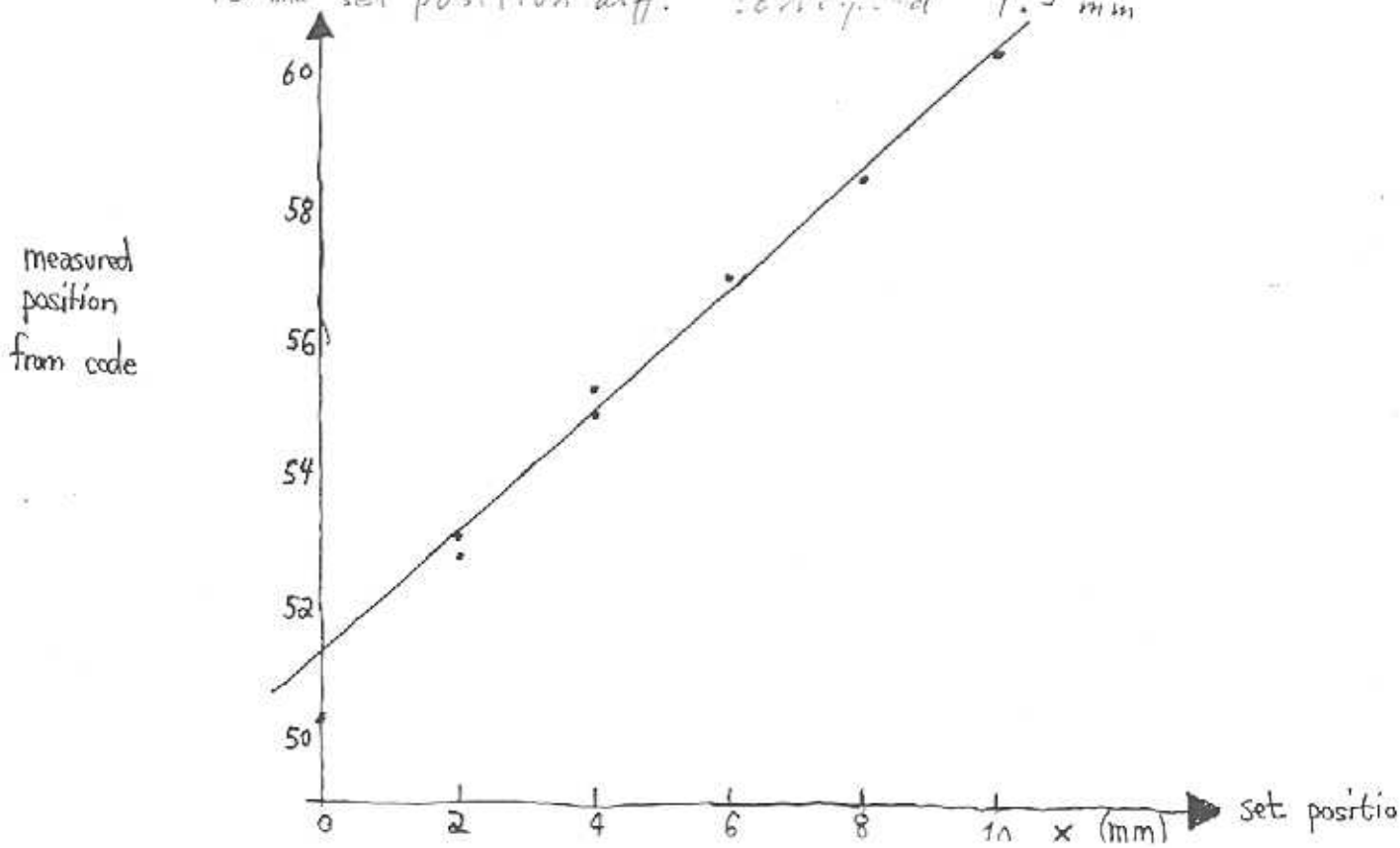
On diagonals, edges and in-between
With 2 mm steps

- Edge block (has crystals on 3 sides) and corner blocks (has crystals on two sides only) → See how showers look there
- Ask for 5,10,15 & 20 GeV electrons: 1 electron/bunch, 2,3,4,5 electrons/bunch
- 10 GeV data with pre-shower counter in front of the calorimeter to see what happens to the energy/position resolution by adding material in front of the calorimeter
- Steel plate to simulate the wall of the DX magnet (10 GeV data)



It comes from Run# 623 to Run# 628.

10 mm set position diff. corresponded 9.5 mm



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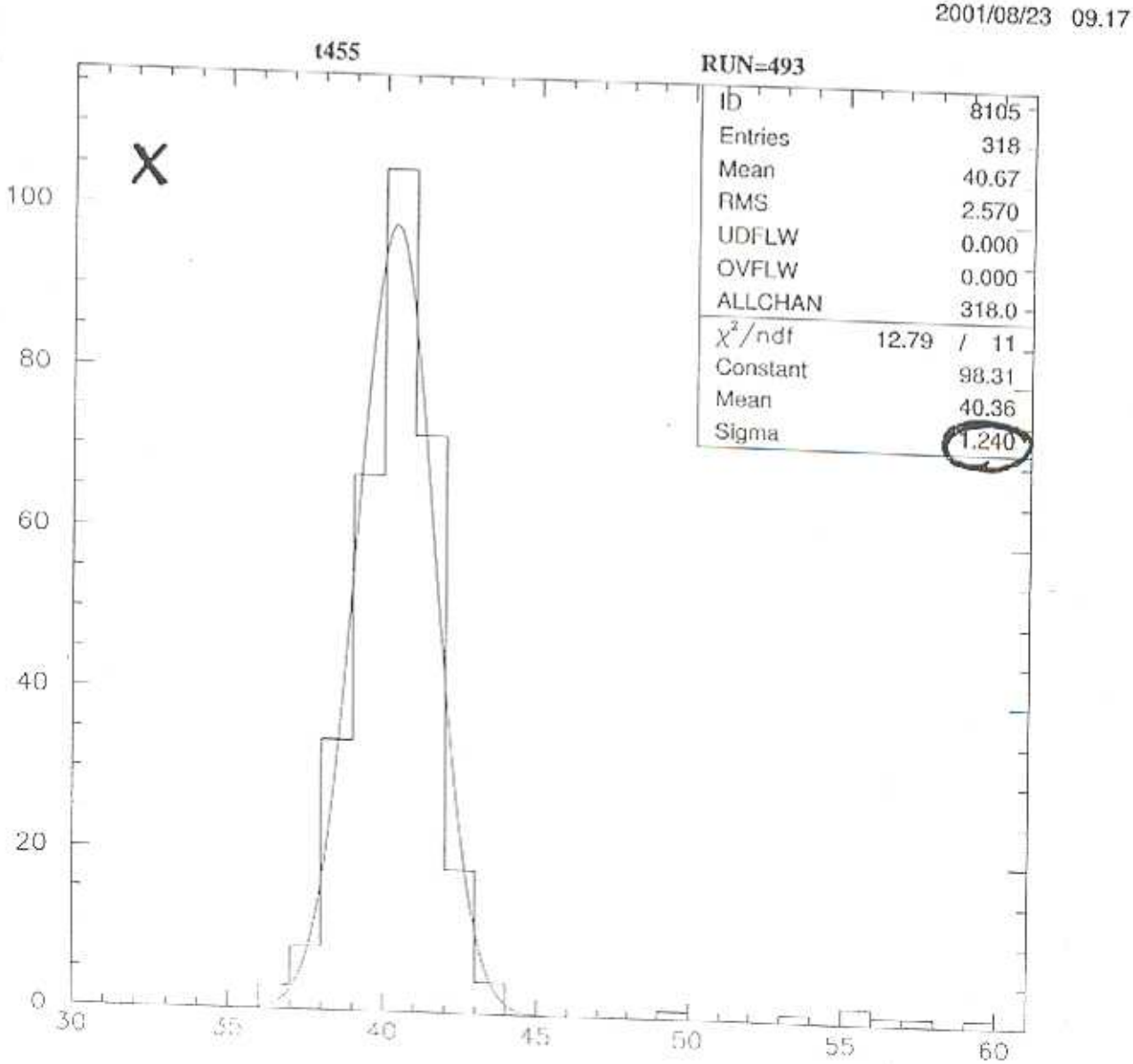
Area work to install 10cm high stage is on-going ...

☆ splitter on R07C03 / P08C03 were removed

→ pulse hight in DAQ should be twice larger

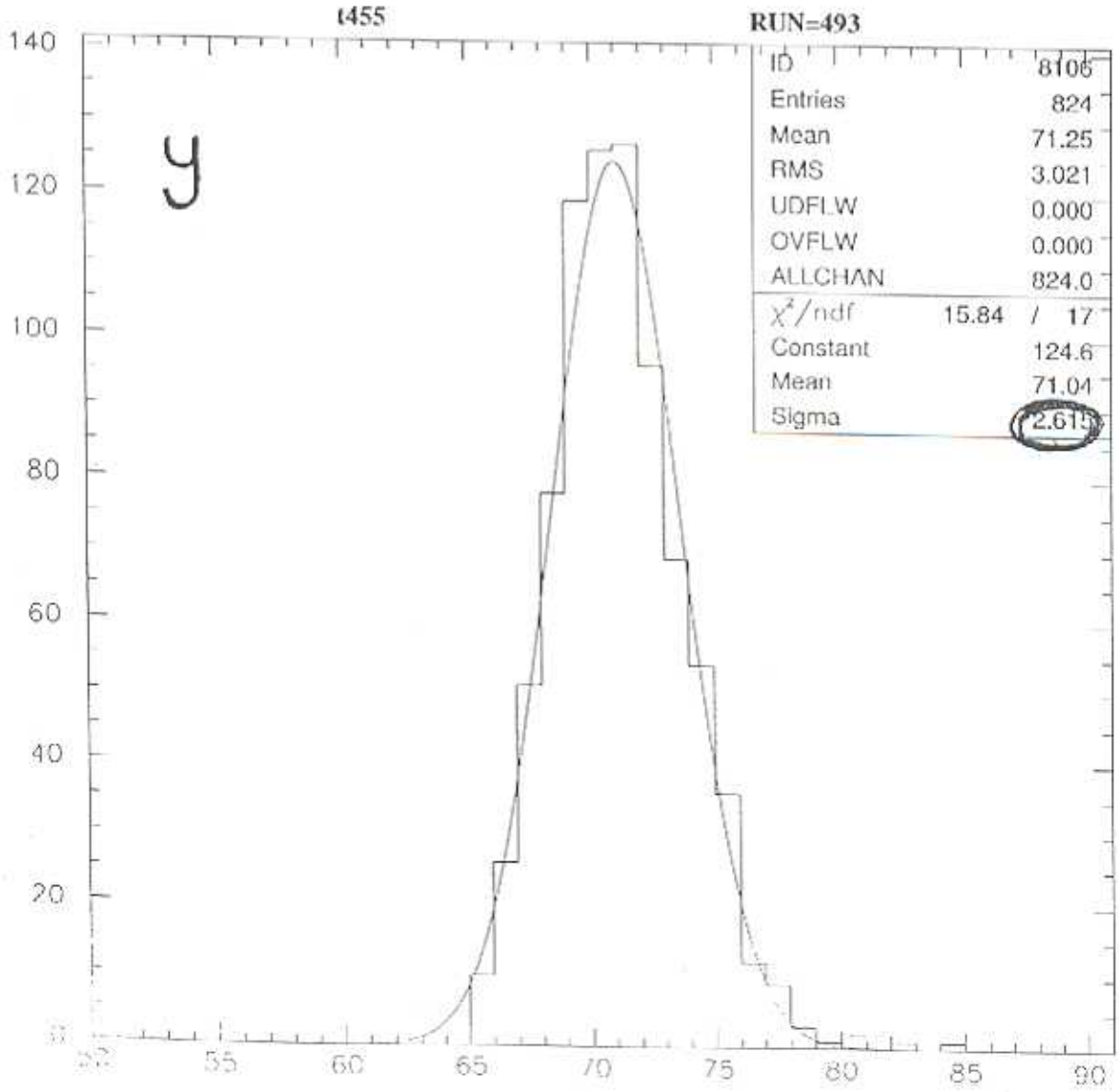


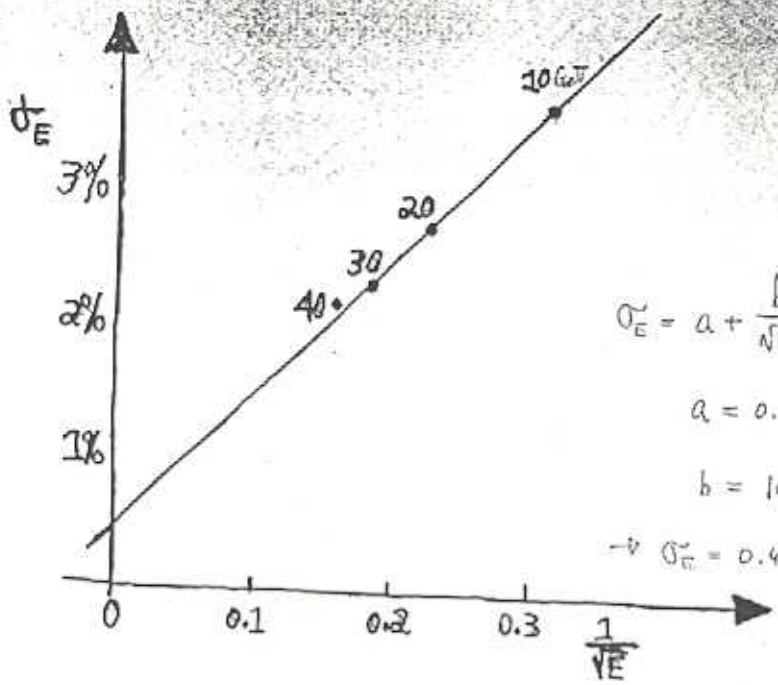
Results from cluster-fitting program using $\ln E$ weights on p. 136-137. The widths are

$\sigma_x = 1.2$ mm, $\sigma_y = 2.6$ mm.

This is consistent with a beam width for $x \approx 1$ mm, and $y \approx 3$ mm. The actual resolution is smaller.

Note that $\pi^2/8F \approx 1 \Rightarrow$ using $\ln E$ as weight seems to be a good estimate. Check by comparing with linear fit.





$\sigma_E = a + \frac{b}{\sqrt{E}}$

$a = 0.45\%$

$b = 10\%$

$\rightarrow \sigma_E = 0.45 + \frac{10.0\%}{\sqrt{E}}$ (%) where E is in GeV

E = 10 GeV $\quad \sigma_E^S$ (statistics) = 3.16% $\rightarrow$ $n_{p.e} = 1000$! at 10 GeV

nominal value of p.e $\quad$ 8~10 / MeV for 5" tube. (Russian data sheet)

5" $\rightarrow$ 3/GSI (15 mm ϕ) $\times$ 0.44

1/10 filter $\times$ 0.1

$\rightarrow$ 80000 p.e at 10 GeV

$\Rightarrow$ 3520 p.e

why 1000 p.e instead of 3520 (expected) ?

- index of cookie
- filtering factor < 1/10 due to not perpendicular light
- ?

cosmic dE/dx $\rightarrow$ 26 MeV / 2cm PbWO $\rightarrow$

ϕ 1000 p.e / 10 GeV $\rightarrow$ 2.6 p.e for cosmic ray

Outlook

- Deign and Safety Review
- Analysis of SLAC test beam data
- Check calibrations at LEGS using ~1 GeV photons
- Temperature Control and Monitoring
- GMS Upgrade
- Bunch bits V124 module
- ZDCs from CAD
- Redesign of the "back" box
- Monte Carlo
- Stand Alone Trigger for the calorimeter
- Trigger counters for IP12
- DAQ