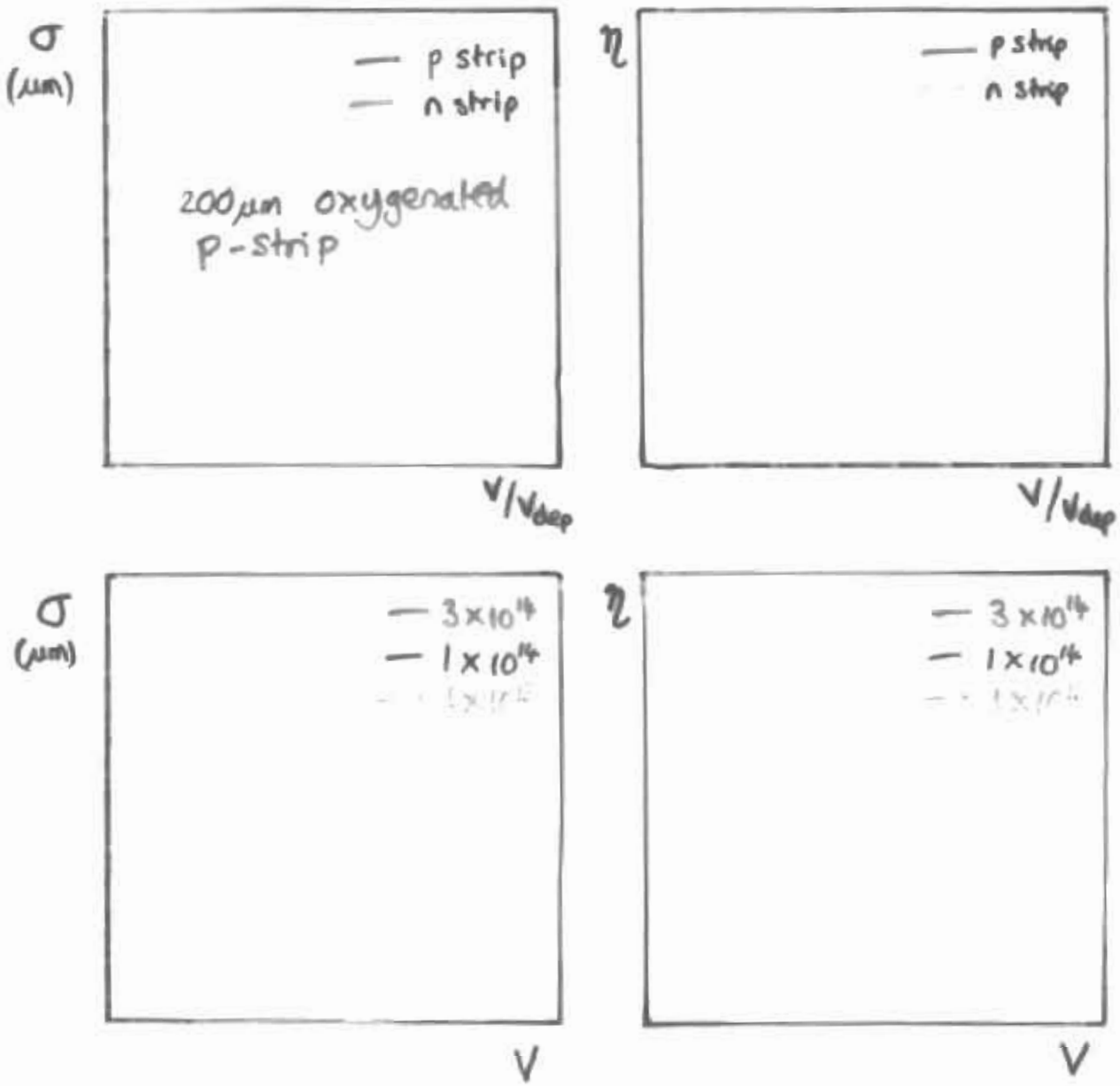
Designing for Y2K

"The best of all possible test beams"

P. Collins
16/04/00

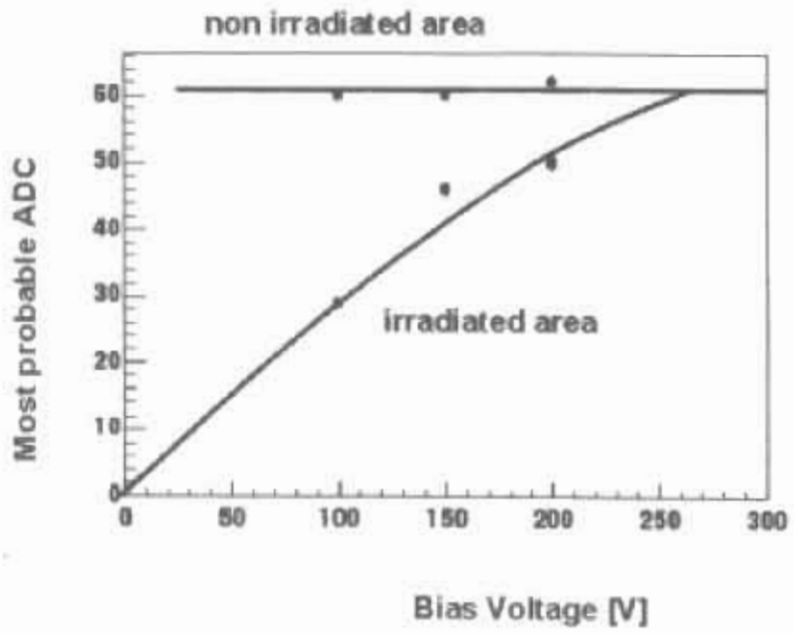
Aim for TDR is to fill these plots:



- Extract all possible info from previous data
- Design Y2k test beam

Educated guesses from previously presented data:

Test beam very first results



Cooling

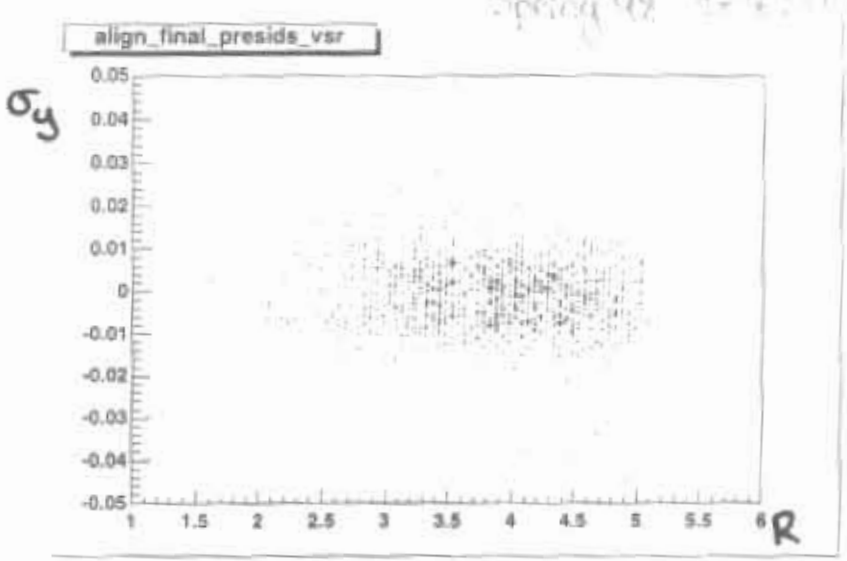
- current cooling box works nicely but some additional features will be nice

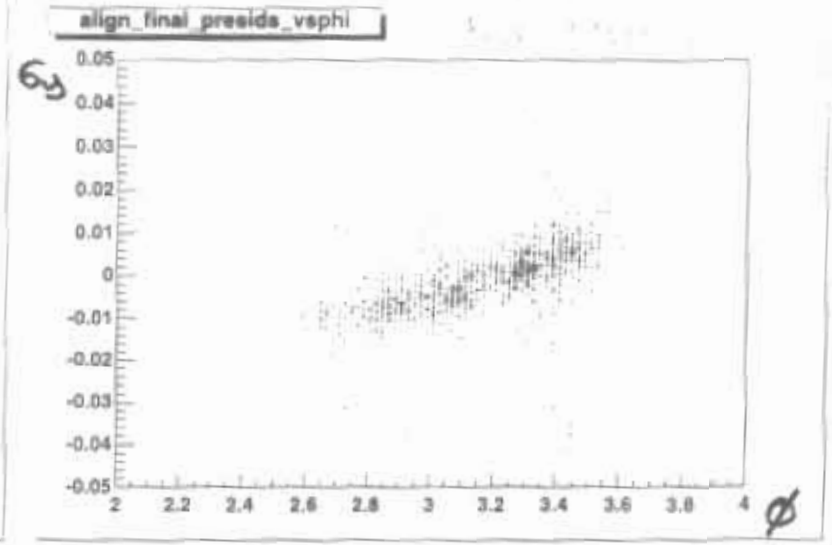
- possibility to 'click' in each test detector w/o leaks - OR - each test detector has individual cooling box (smaller than current)

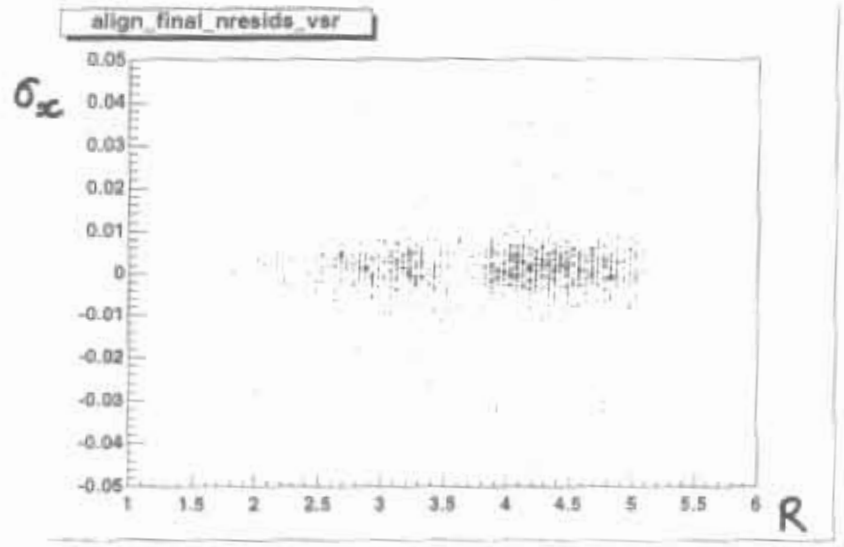
  - mechanical mount with big range of (precise) movement

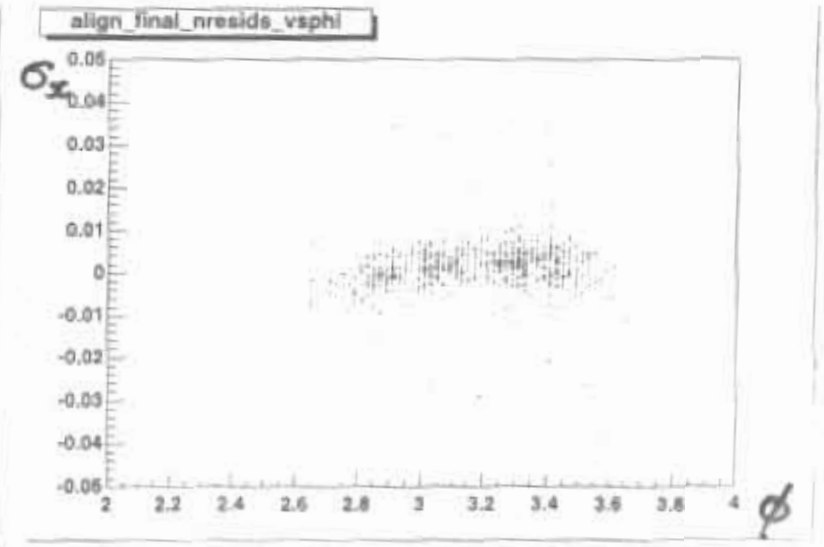
  - monitoring of cooling integrated with DAQ? PT1000's ?

Residuals at FELIX detector
Spring 92









We propose to maintain an

Inventory

Inventory (contd...)

- Repeater cards
  11 @ CERN - untested after mods

- Chips
  ~ 40 exist at CERN - UNTESTED
  + ? elsewhere

- hybrids
  - how many modified hybrids exist?
  - are single chip "hybrids" available from Peter?

Manpower

EXPERTS ON CALL: Chris, Odie, Guido, Jan, Hans, Tjeerd, Uli, etc.
Yuri, Frank, Pawel, Mariosz, GianLuigi, Themis, Raymond etc etc

MECHANICS (May-June)

|

DESIGN CHOICE (all)

NEW SCINTILLATORS NIKHEF?

NEW STATION Paula, Guido, Lausanne/NIKHEF

COOLING Guido, Paula, Lausanne

IRRADIATION – Frederic/GianLuigi

Data Acquisition [May - Sep]

Cascade in general Pawel/Mariusz

HALNY readout or CRAMS / data suppr. Pawel

SEQSI timing + Triggering Guido + all

25ns readout ODE board Guido

Event Display ODIE

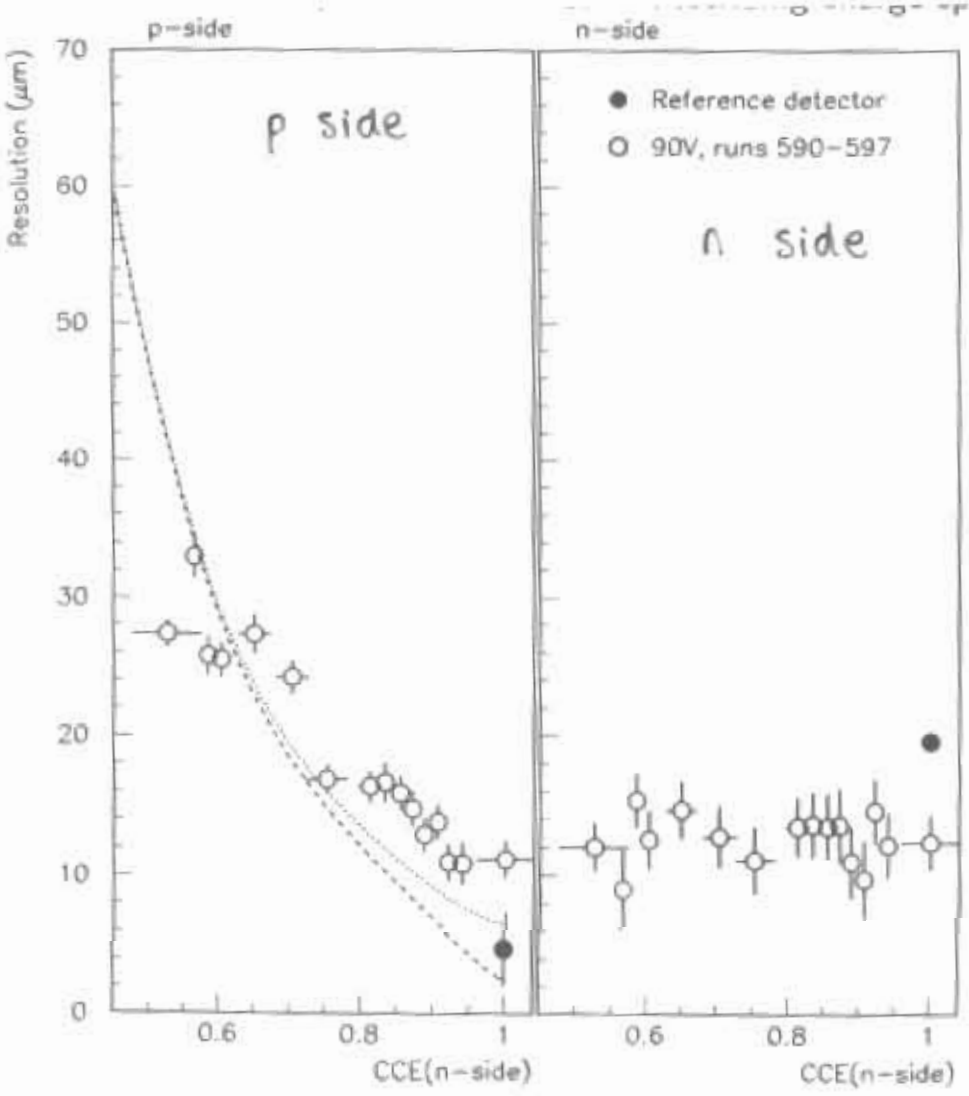
Monitoring Guido/Mariusz + plots provided from other parts of DAQ all

- Offline Analysis Chris + all
- Pre-test of detectors Liverpool

presented by H. Dijkstra
to ROSE collab. 16/3/2000

"Charge Collection efficiency and resolution of an irradiated double sided detector operated at cryogenic temperatures"

- CERN-EP-99-098
- p strip pitch 25 μm : n strip pitch 42 μm
- Non-uniform irradiation → 3.5×10^{14} p/cm²
- ~ 1 μs integration time



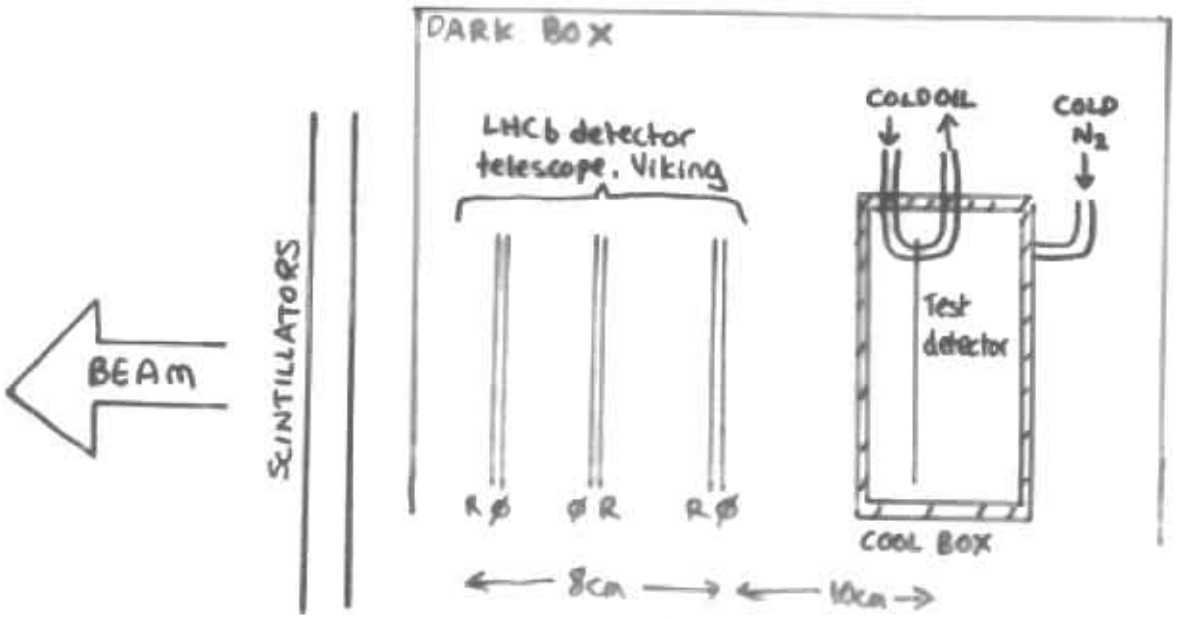
- this information should come from a test beam with
  - our irradiation profile
  - our detector
  - our timing

→ we don't start from scratch:

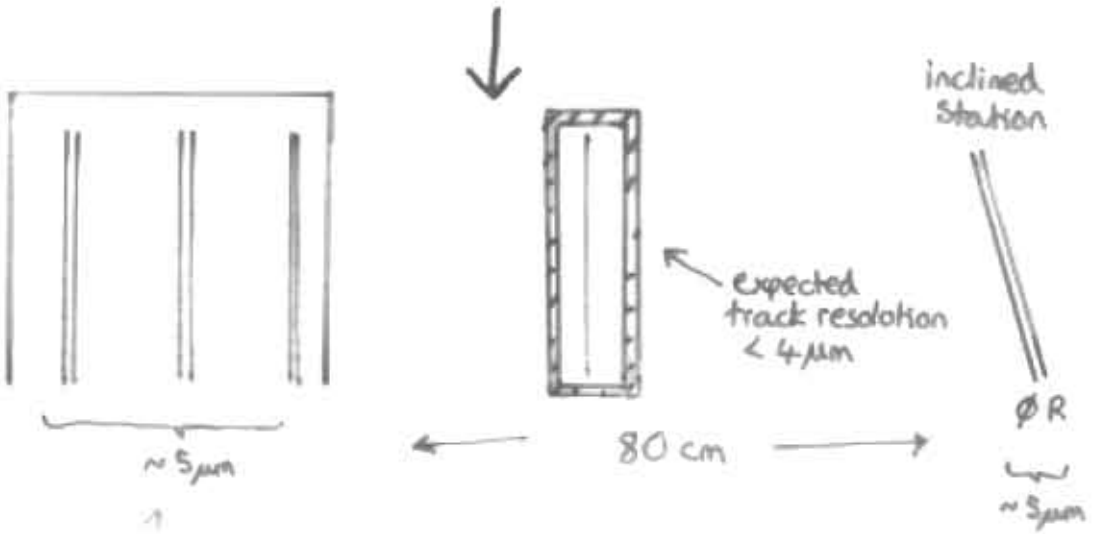
∃
- considerable software development
- telescope
- complete electronics readout chain
- cool box

HOW TO IMPROVE?

Current setup:



- expected track resolution at test detector ~ 20 μm
- access to test detector + cooling parephenalia inside telescope dark box



Triggering

- One of the goals is to measure detector EFFICIENCY but we have problems → plot

- Optimal solution would be
  - mount two scintillators WITH telescope, precisely the same size as telescope detectors
    → expect 5% double tracks
  - read out one non-irradiated telescope detector with 25ns timing
  - optional use of smaller scintillator to study particular areas of test detector

Improving Data Flow

→ cut data size by factor ~ 40

- set threshold in CRAMS
- confirm with analysis of old test beam data that this works
- check new rate at telescope (with new repeaters)

→ Use HALNY

- new module from Krakow
- DSPs running at 500 Hz event rate
- 4 x 64 channel input
- online analysis

→ Optimise use of scintillators

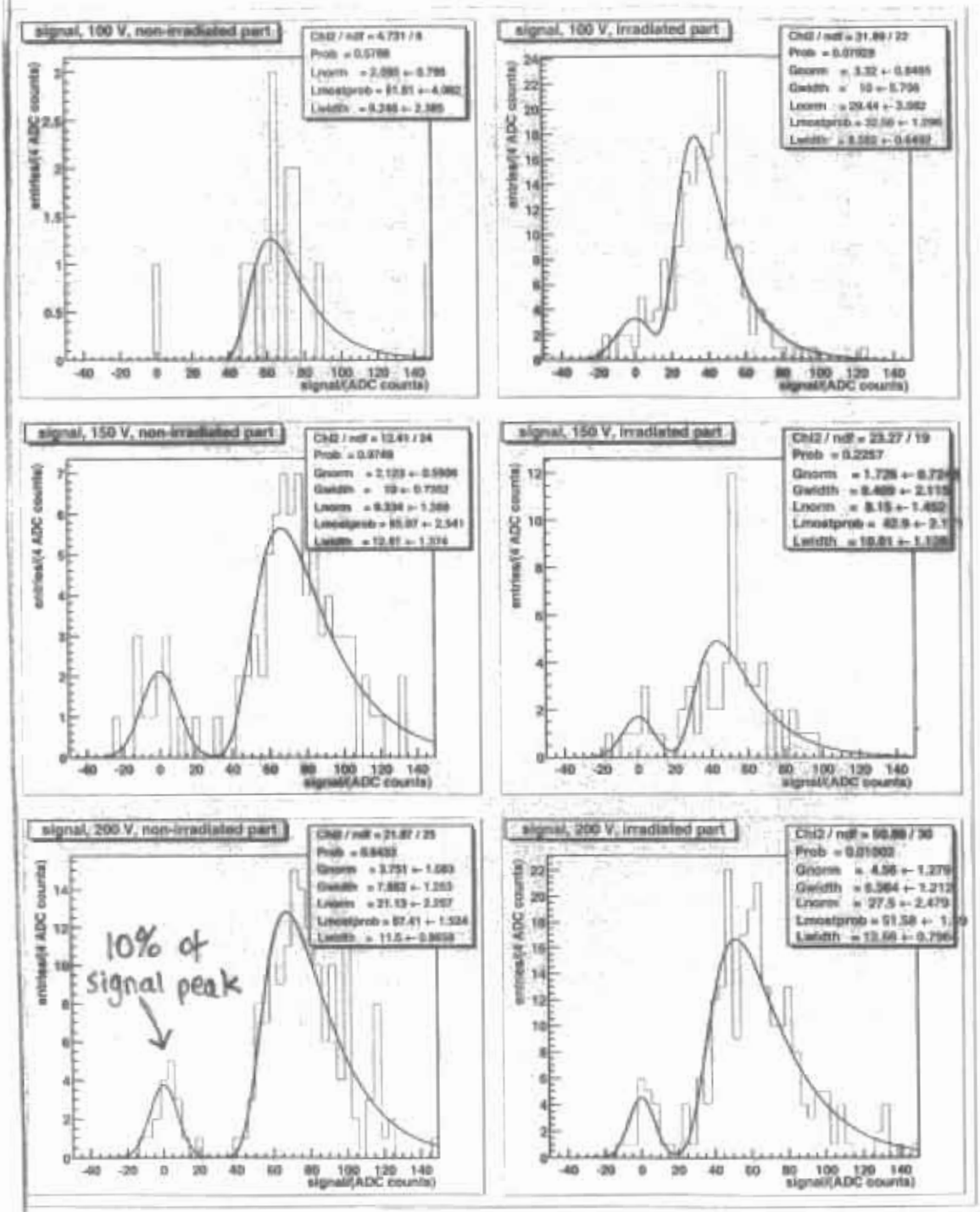


Figure 9: The signals at readout times within $-10\,\text{ns} < t < +10\,\text{ns}$ for the three different bias voltages and for the non-irradiated and irradiated regions of the detector. In each distribution, the signal Landau can be seen clearly, together with some noise which can be parameterised by a Gaussian centered around zero.

Software Development

1.

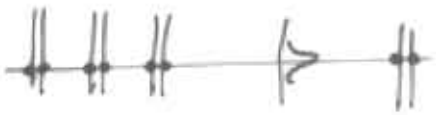
Alignment

- Currently to align telescope from scratch needs ~ 3 tracks and 10 hours CPU time (MINUIT)
- this should be improved by
  - iterative method fitting individual detectors
  - any other idea
  - also I worry about old alignment. Some det. not sensitive? (Ion Transfer note)

2. Online monitoring

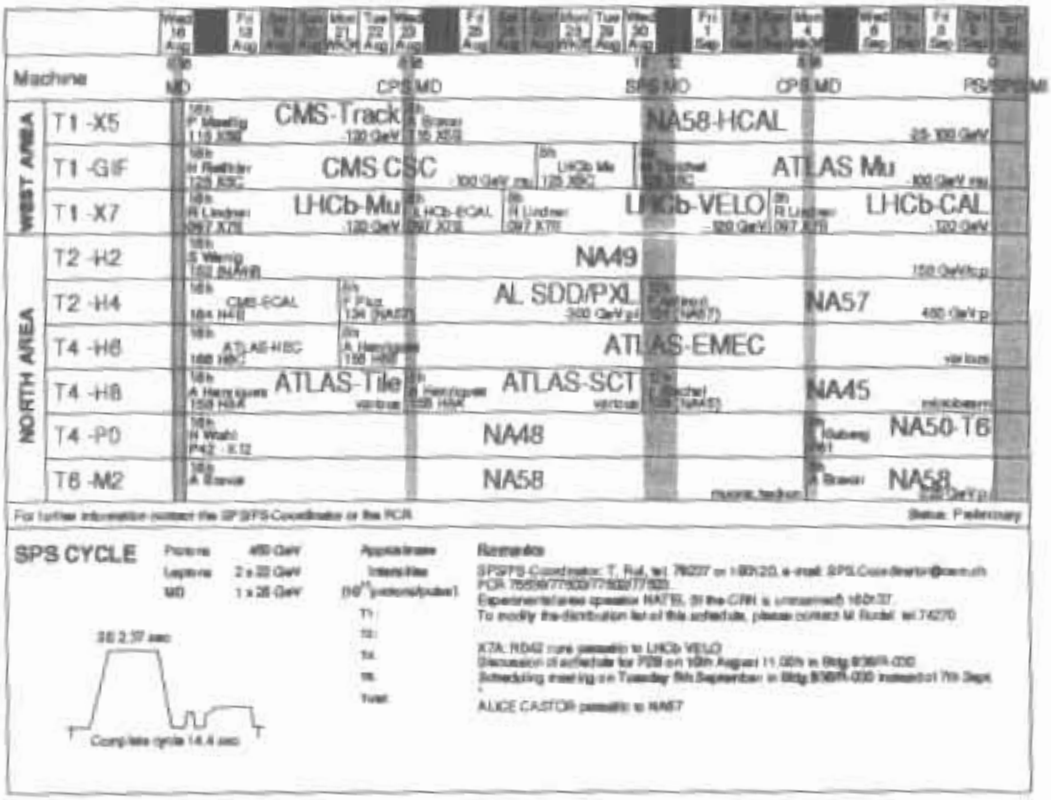
- noise, pedestals, occupancy, beam position, fast track finding etc. etc.
  - available online
- analysis running directly on CASCADE data in memory
- Enhance CASCADE display

3. Event Display



- already developed by O.D. and CVS committed
- work continuing

Schedule



SPS Operation **Period 2B 2000 Aug 16 to Sep 10** **SPS226**

Schedule issue date: 30 March 2000 VERSION 1.2 (colour convention: red(dark) = scheduling meeting , green(light) = weekend or holiday)

Machine	Wed 16 Aug	Fri 18 Aug	Sat 19 Aug	Sun 20 Aug	Mon 21 Aug (WKR)	Tue 22 Aug	Wed 23 Aug	Fri 25 Aug	Sat 26 Aug	Sun 27 Aug	Mon 28 Aug (WKR)	Tue 29 Aug	Wed 30 Aug	Fri 1 Sep	Sat 2 Sep	Sun 3 Sep	Mon 4 Sep (WKR)	Wed 6 Sep	Thu 7 Sep	Fri 8 Sep	Sat 9 Sep	Sun 10 Sep
MD	MD					CPS MD							SPS MD				CPS MD					PS/SPS MD
WEST AREA T1 -X5						CMS-Track								NA58-HCAL								
WEST AREA T1 -GIF						CMS CSC											ATLAS Mu					
WEST AREA T1 -X7						LHCb-Mu								LHCb-VELO			LHCb-CAL					
NORTH AREA T2 -H2														NA49								
NORTH AREA T2 -H4														AL SDD/PXL			NA57					
NORTH AREA T4 -H6														ATLAS-EMEC								
NORTH AREA T4 -H8						ATLAS-Tile								ATLAS-SCT			NA45					
NORTH AREA T4 -P0														NA48							NA50-T6	
NORTH AREA T8 -M2														NA58							NA58	

For further information contact the SPSPS Coordinator or the RCR. Status: Preliminary

SPS CYCLE

Protons 450 GeV
Leptons 2 x 22 GeV
MD 1 x 26 GeV

Approximate Intensities (10^{13} protons/pulse)

T1:
T2:
T4:
T6:
Total:

38.2.37 sec

Complete cycle 14.4 sec

Remarks

SPSPS Coordinator: T. Rud, tel. 76227 or +160120, e-mail: SPS.Coordinator@cern.ch
RCR 765967/76929/76927/76977/76925
Experimental area operation HA/TE, at the CRN is unmanned 16h/37.
To modify the distribution list of this schedule, please contact M. Rudel tel.74270

X7A: RD42 runs parasitic to LHCb VELO
Discussion of schedule for PS9 on 16th August 11.00h in Bldg 936/R-030
Scheduling meeting on Tuesday 5th September in Bldg 936/R-030 instead of 7th Sept.

ALICE CASTOR parasitic to NA57

SPS slot

26th August → 3rd September

Idea:

- be prepared with the telescope ASAP and run parasitically before our slot

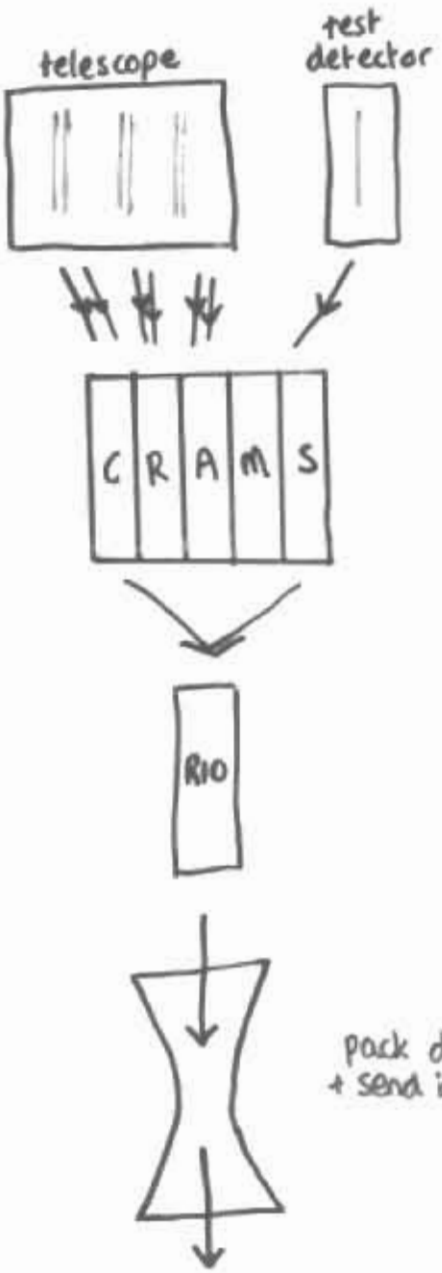
- make best use of our slot

- we have a table top experiment

which, if detectors need testing after Sep. can be packaged up

and taken anywhere!

Data Flow



idle sequence due to Vikings ~ 1 µs

[1024 × 6] + [512] channels
readout at 5MHz → 200 µs

read & storage of data:

$\left[1024 \times \frac{6}{2} + \frac{512}{2}\right]$ = 3328 word at ~60 MHz
CRAM packing
→ 50 µs
× 2 for storage
→ 100 µs

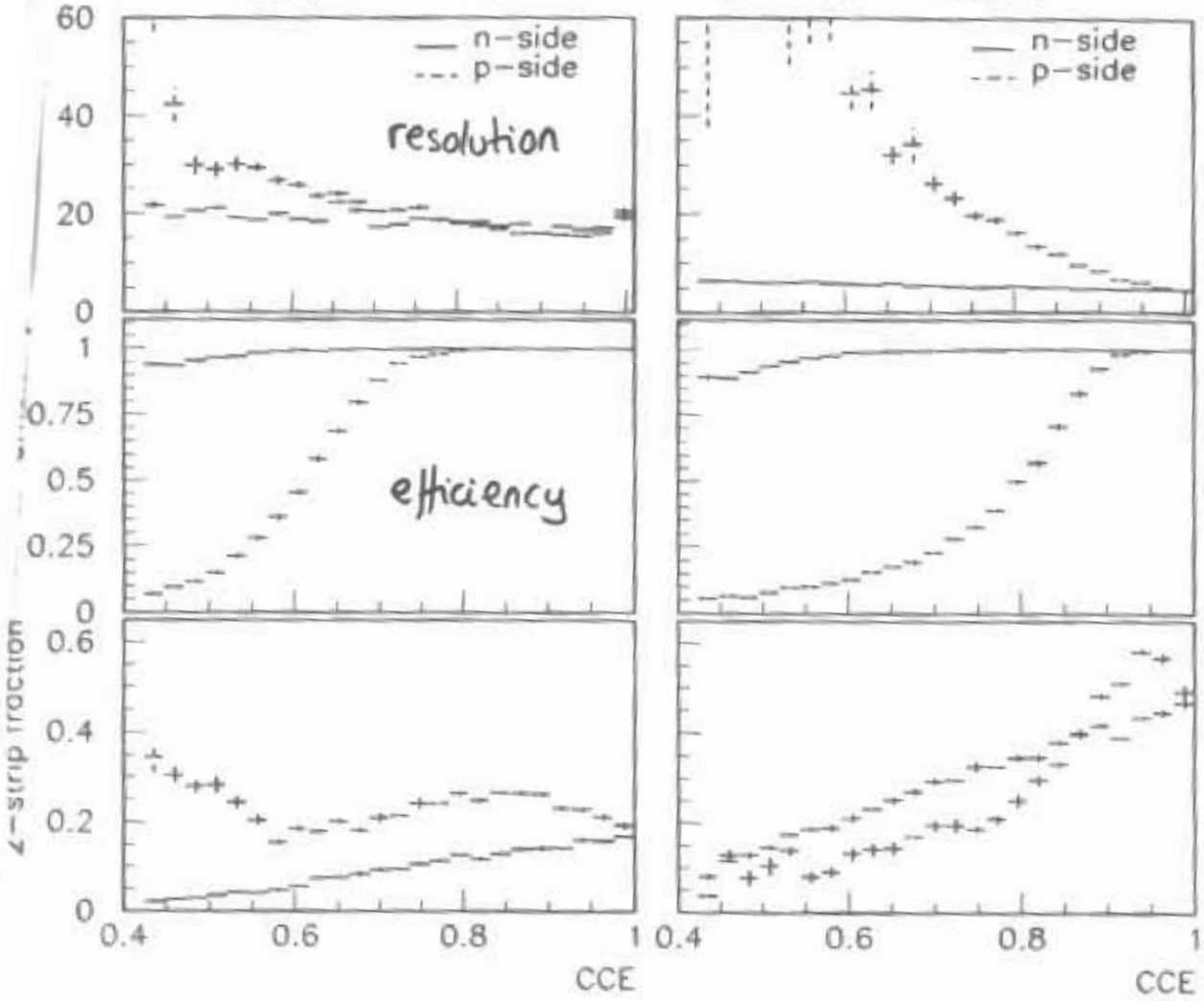
pack data + send it over net

- 1–10 ms
+ 7kb over 100 Mbps lin
+ system memory bookkee
+ interrupt latency
+ process scheduling

→ theoretical limit ~ 100 Hz
→ maximum rate measured in test beam – 1!
→ > 1 hour to collect 10,000 events

"ATLAS"

"LHCb"



- MC expectations based on CCE controlled by N^{eff}