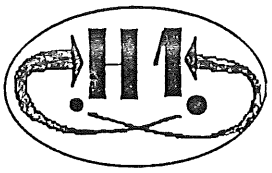
30 PRC meeting
8-Oct-1991



Status report

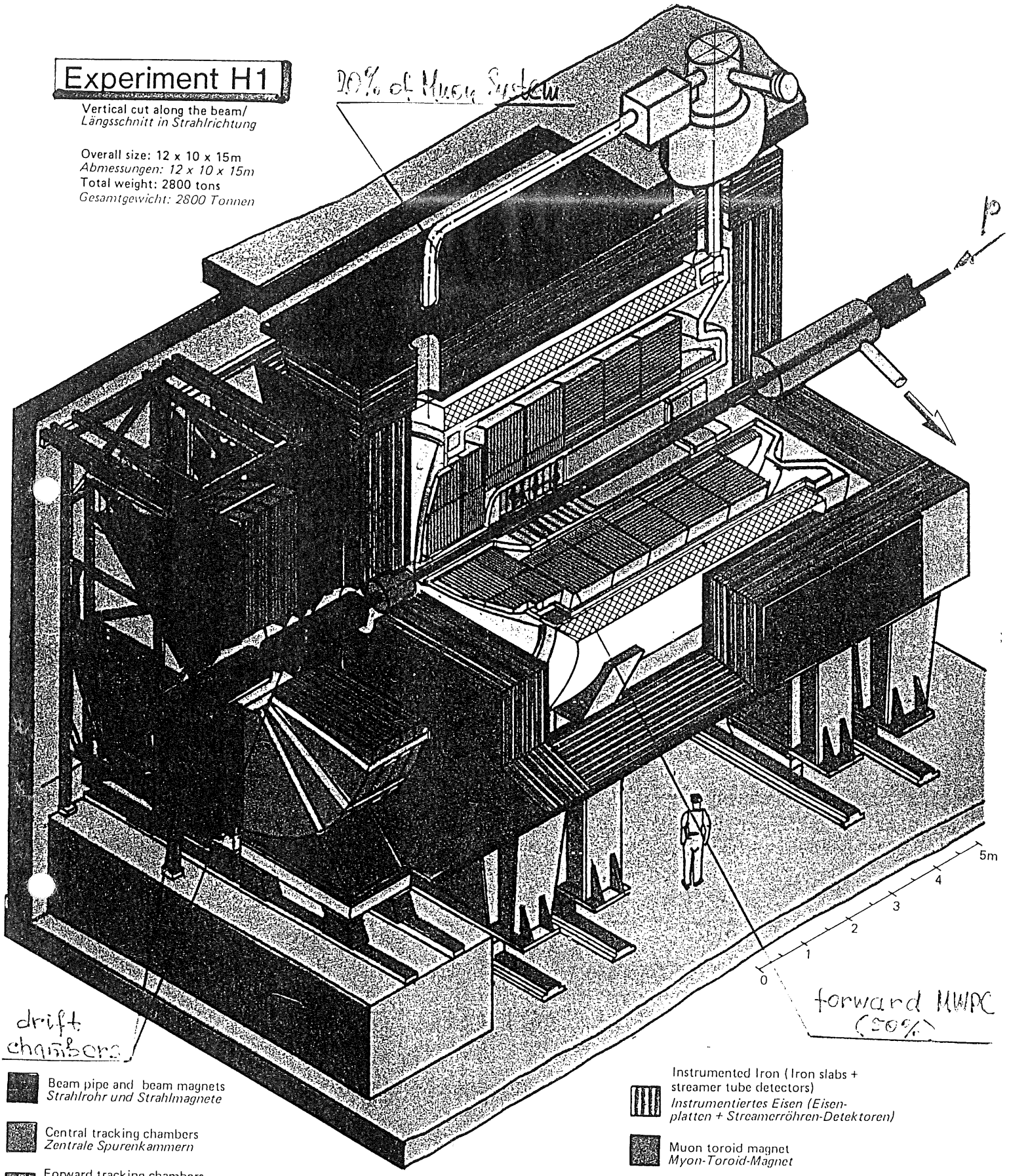
1. Status of detector operation
2. Measured performances
3. First experience with HERA Beams
4. Work in progress:
   - Streamer tube system
   - Slow control & monitoring
   - H1 triggers
5. Data processing and analysis
6. Conclusions

S.Levonian
DESY/LPI

Experiment H1

Vertical cut along the beam/
Längsschnitt in Strahlrichtung

Overall size: 12 x 10 x 15m
Abmessungen: 12 x 10 x 15m
Total weight: 2800 tons
Gesamtgewicht: 2800 Tonnen



- Beam pipe and beam magnets
  Strahlrohr und Strahlmagnete
- Central tracking chambers
  Zentrale Spurenkammern
- Forward tracking chambers and transition radiators
  Vorwärtsspurenkammern und Übergangsstrahlungsmodul
- Electromagnetic Calorimeter (lead)
  Elektromagnetisches Kalorimeter (Blei)
- Hadronic Calorimeter (stainless steel)
  Hadronisches Kalorimeter (Edelstahl)

  (Liquid Argon / *Flüssiges Argon*)
- Superconducting coil (1.2 Tesla)
  Supraleitende Spule (1,2 Tesla)
- Compensating magnet
  Kompensationsmagnet
- Helium cryogenics
  Helium Kälteanlage
- Muon chambers
  Myon-Kammern
- Instrumented Iron (Iron slabs + streamer tube detectors)
  Instrumentiertes Eisen (Eisenplatten + Streamerröhren-Detektoren)
- Muon toroid magnet
  Myon-Toroid-Magnet
- Warm electromagnetic calorimeter
  Warmes elektromagnetisches Kalorimeter
- Plug calorimeter (Cu,Si)
  Vorwärts-Kalorimeter
- Concrete shielding
  Betonabschirmung
- Liquid Argon cryostat
  Flüssig Argon Kryostat

— not available in 'DAHLIA'

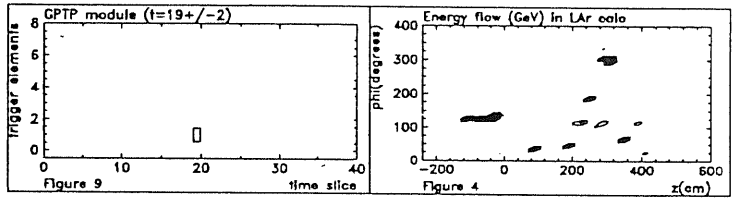
Look – Run number 4187 Event number 1737 , > 4 sigma in liquid A Date 3/06/1991

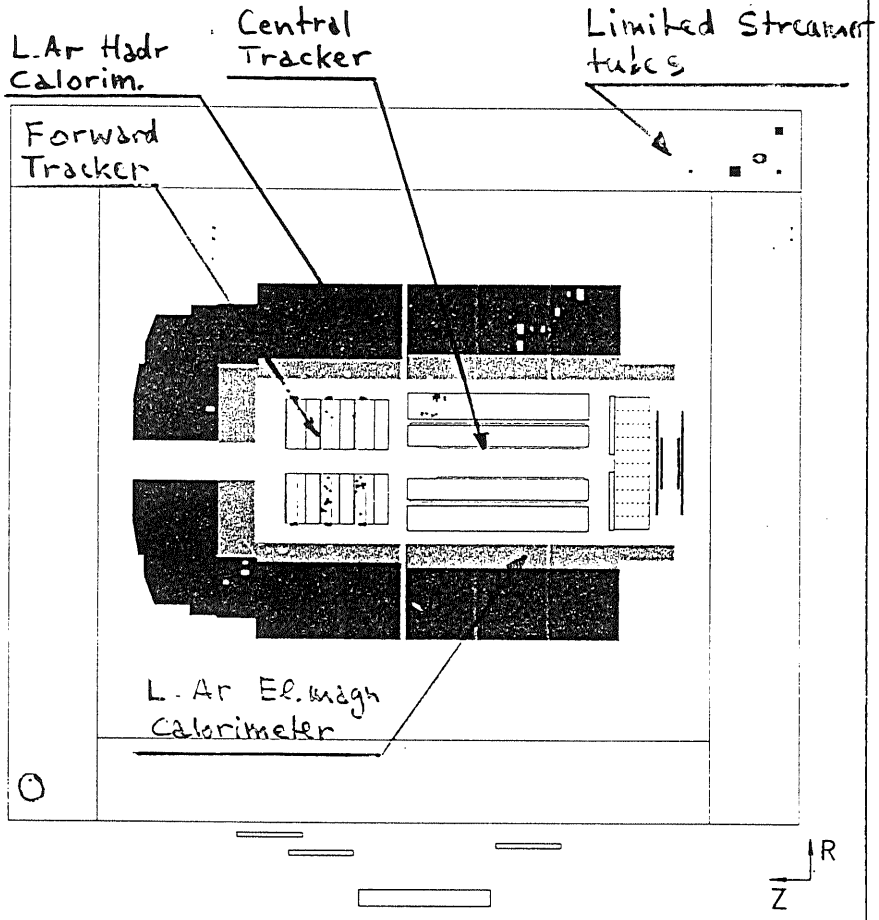
H1 Event Display 1.09/06 910416
DSN=HERA03.H1COSM91.RUN04187
Trigger word = 2

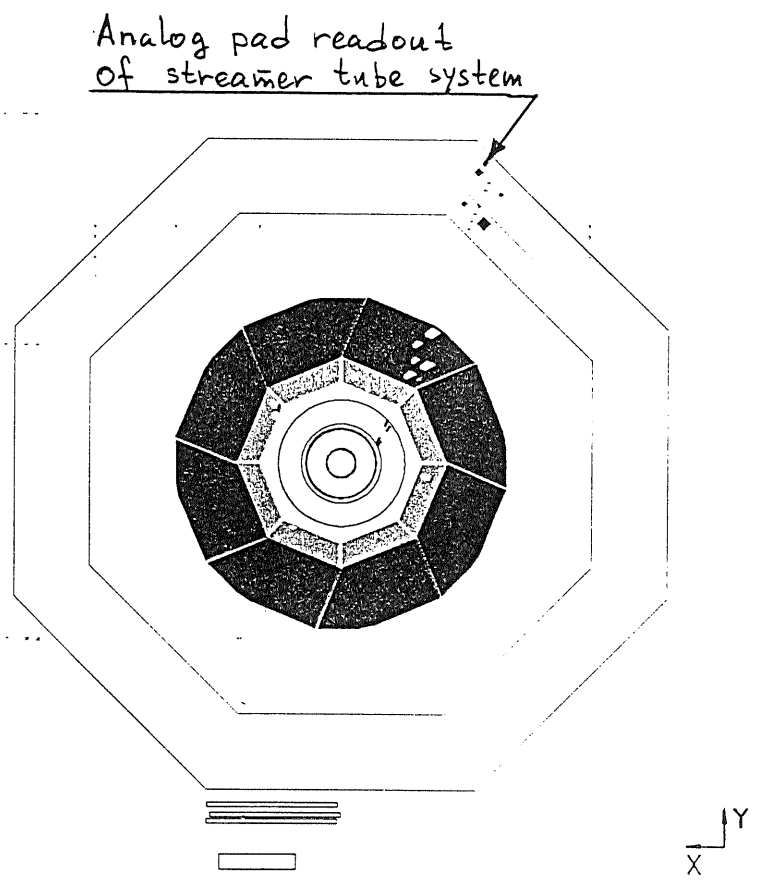
E= 0. x 0. GeV H=11.4 kG
Run date 91/ 4/17 4:21

1		3	4	5		7	8		

CDAQ: branches in readout



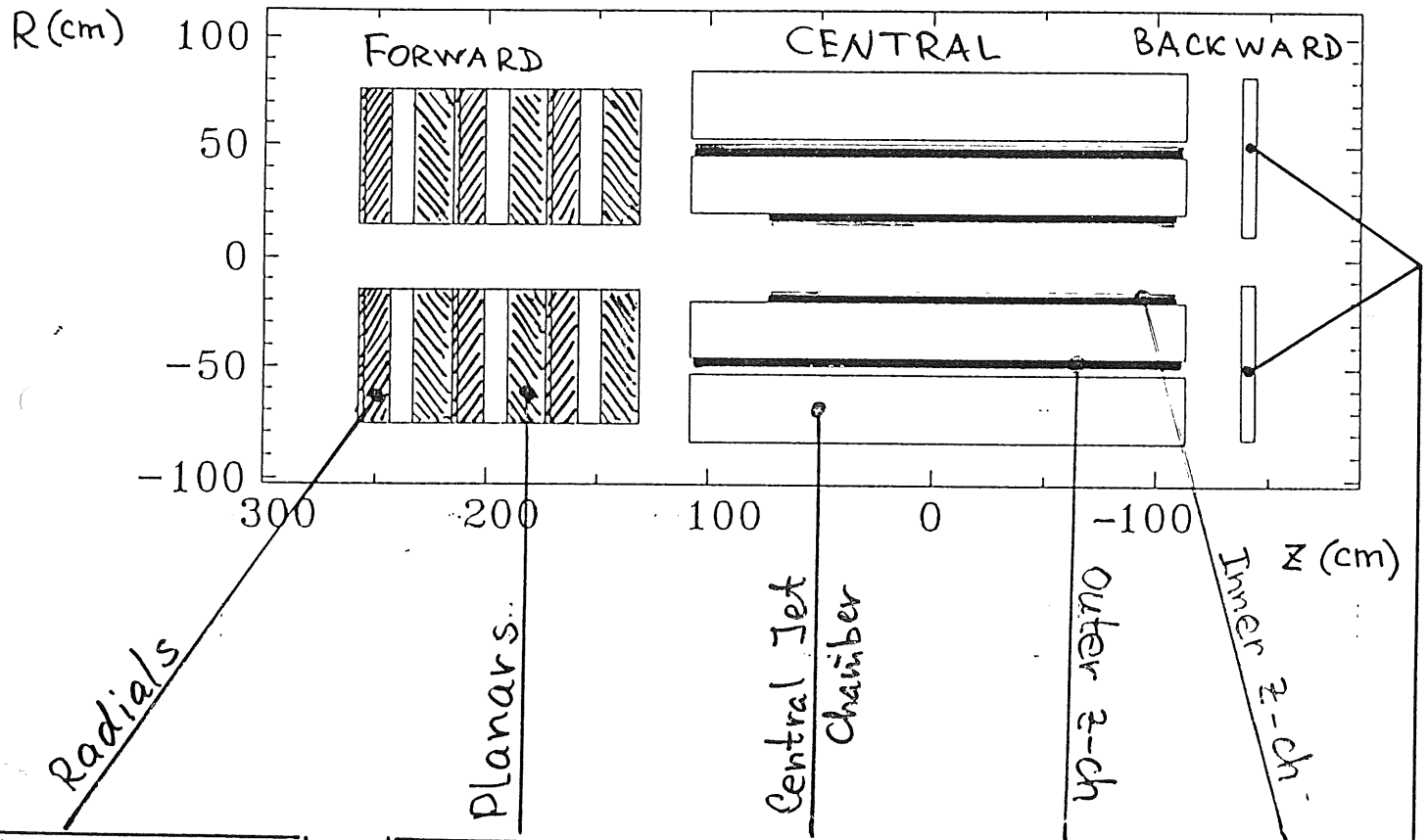




Typical cosmic crossing all subdetectors

H1

Summary on Tracker performance



Radials	Planars	Central Jet Chamber	Outer z-ch	Inner z-ch.
$\sigma_{drift} = 148\,\mu m$ $\epsilon_{rad} = 1.5\,cm$	$\sigma_{drift} = 150\,\mu m$	$\sigma_{r\varphi} = 190\,\mu m$	$\sigma_z = 350\,\mu m$	$\sigma_z = 320\,\mu m$

Fully operational in April and dedicated alignment run

with Ar. Eth. → 120μ aim

aim 2-3 cm, 2mm Länge

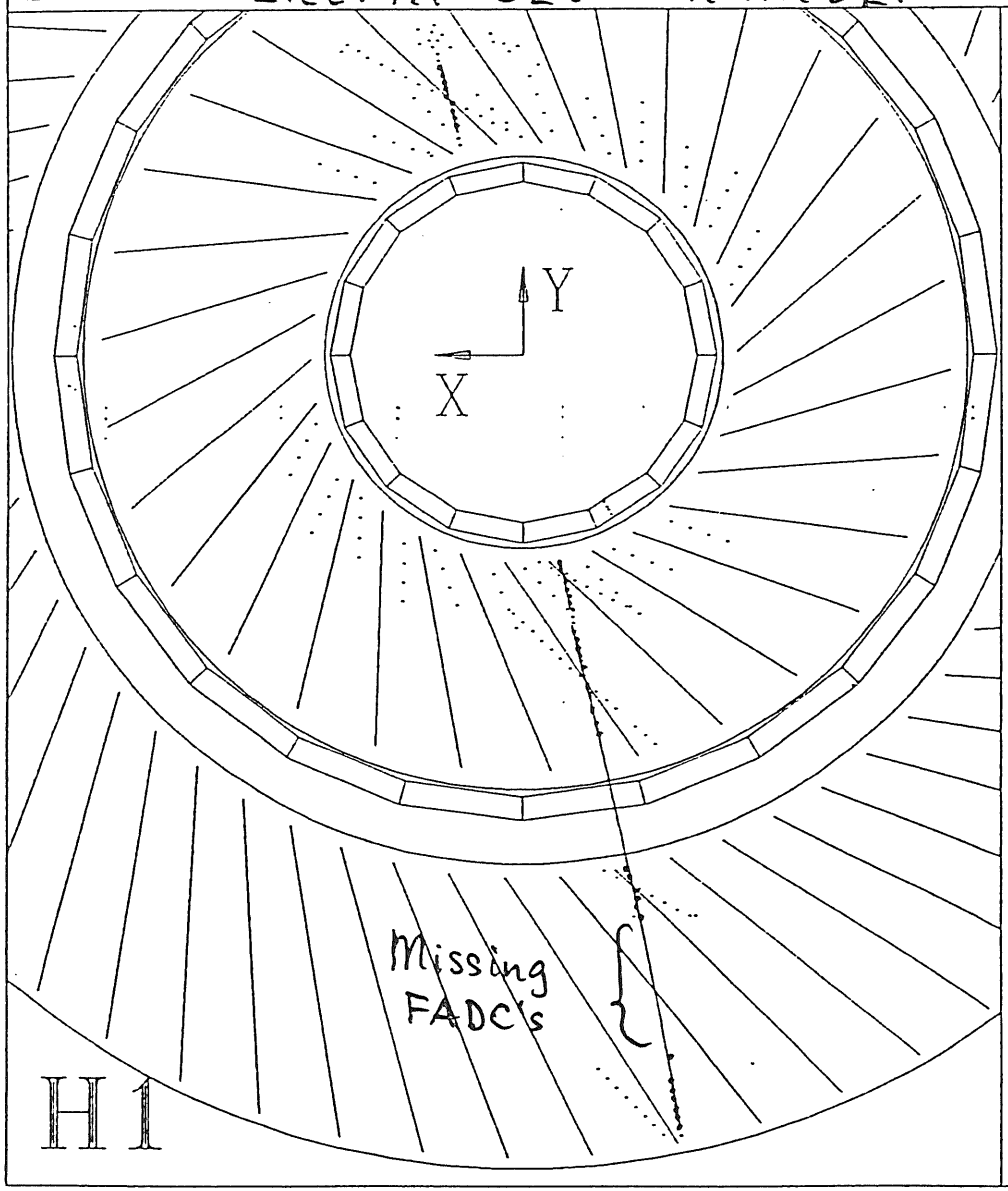
5cm Δz achieved

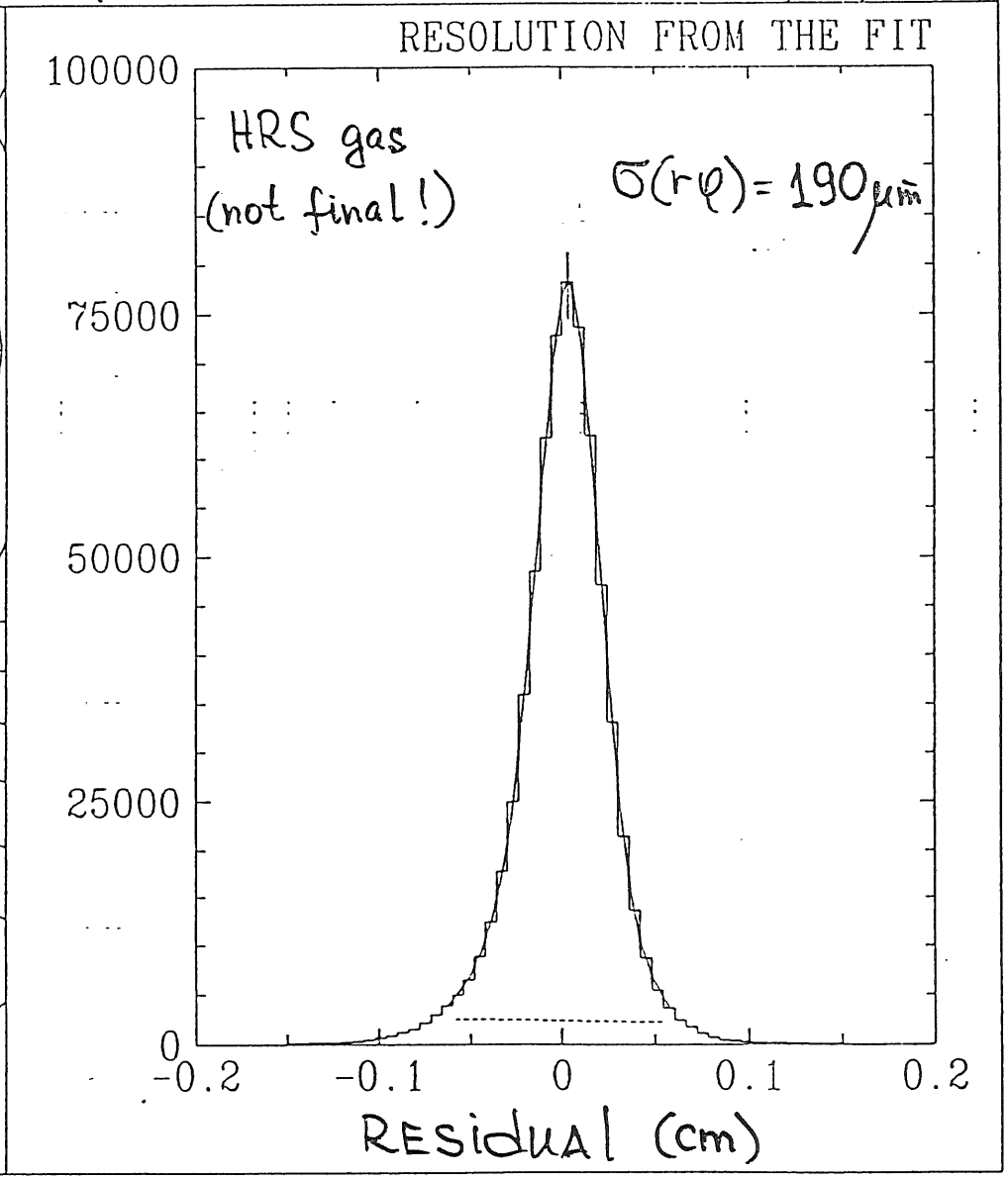
Central Jet Chamber now fully equipped with electronics for the 1st phase.

Last 1920 channels will be added in March '92

Backward MWPC - fully operational

Look - Central Jet Chamber calibration Date 12/09/1991





Liquid Argon Calorimeter

- Fully operetional since February '91
- Stability

  ARGON purity: no measurable degradation since April ($< 0.2\%$ per year) → see fig.

  {HV → 1500 V}: charge collection efficiency very good equivalent to ~0.4 ppm O_2

  Electronic calibration stable to $< 0.5\%$ over 2-3 weeks
  ⇒ el. cal. foreseen once / week

- Operation problems

  Dead readout channels: 110 (0.25%) stable since 2/91, no problem

  HV problem: it was severe problem in April
  66 out of 752 HV channels at 2500 V were 'dead' (affected ~ 30% of readout ch.)

  Status now: HV supply upgraded to full granularity 1504 lines

  no dead segments! ‖ Operating at 1500 V: 1441 channels
  at 800÷1200 V: 63 chan (4.1%)
  (≥ 90% charge collection eff.)

  ~5% of calo. volume needs 'known' s/w corr. ≤ 5%

  Its a nuisance, but no degradation of calorimeter performance

  Trigger is not affected

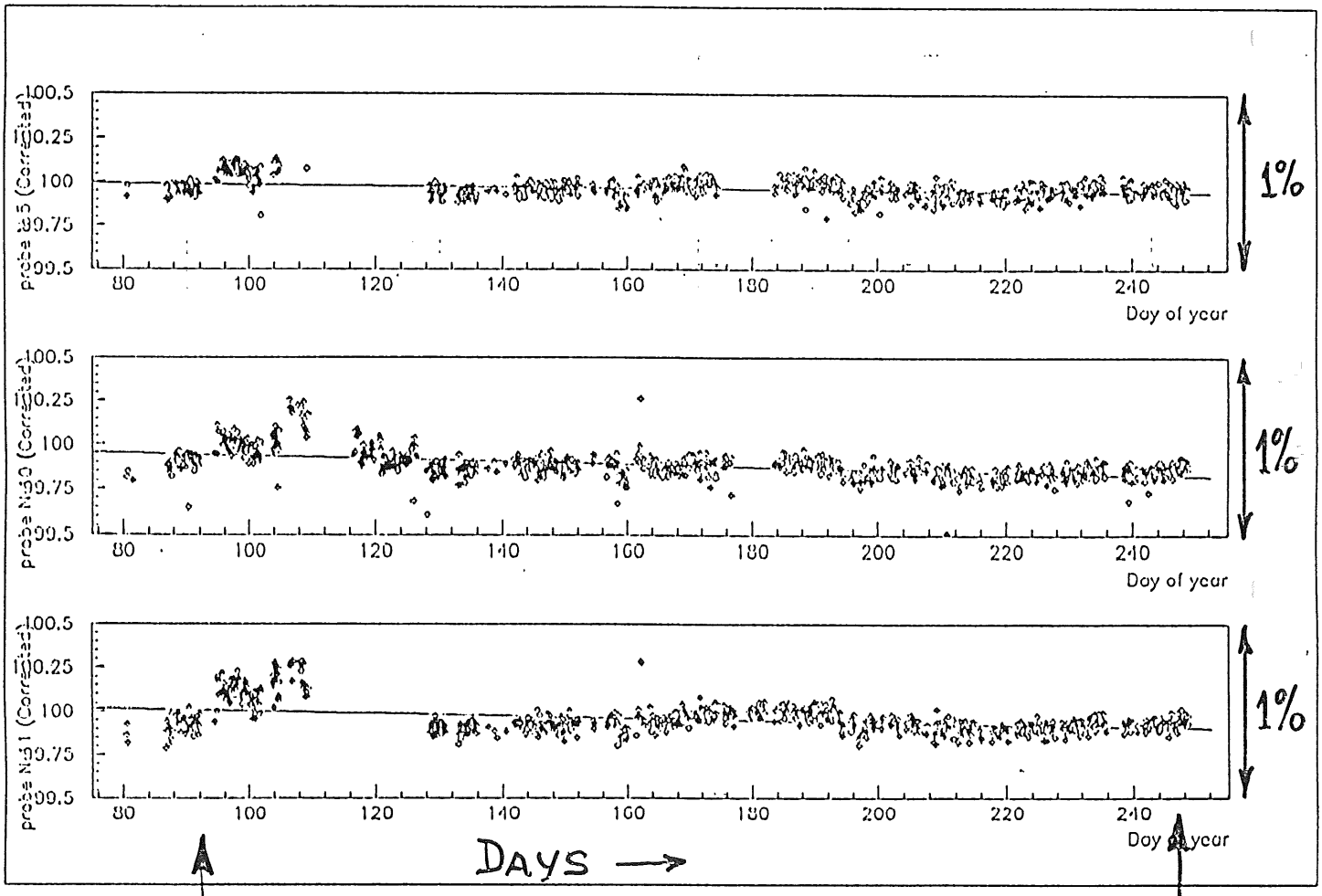
Liquid ARGON purity :

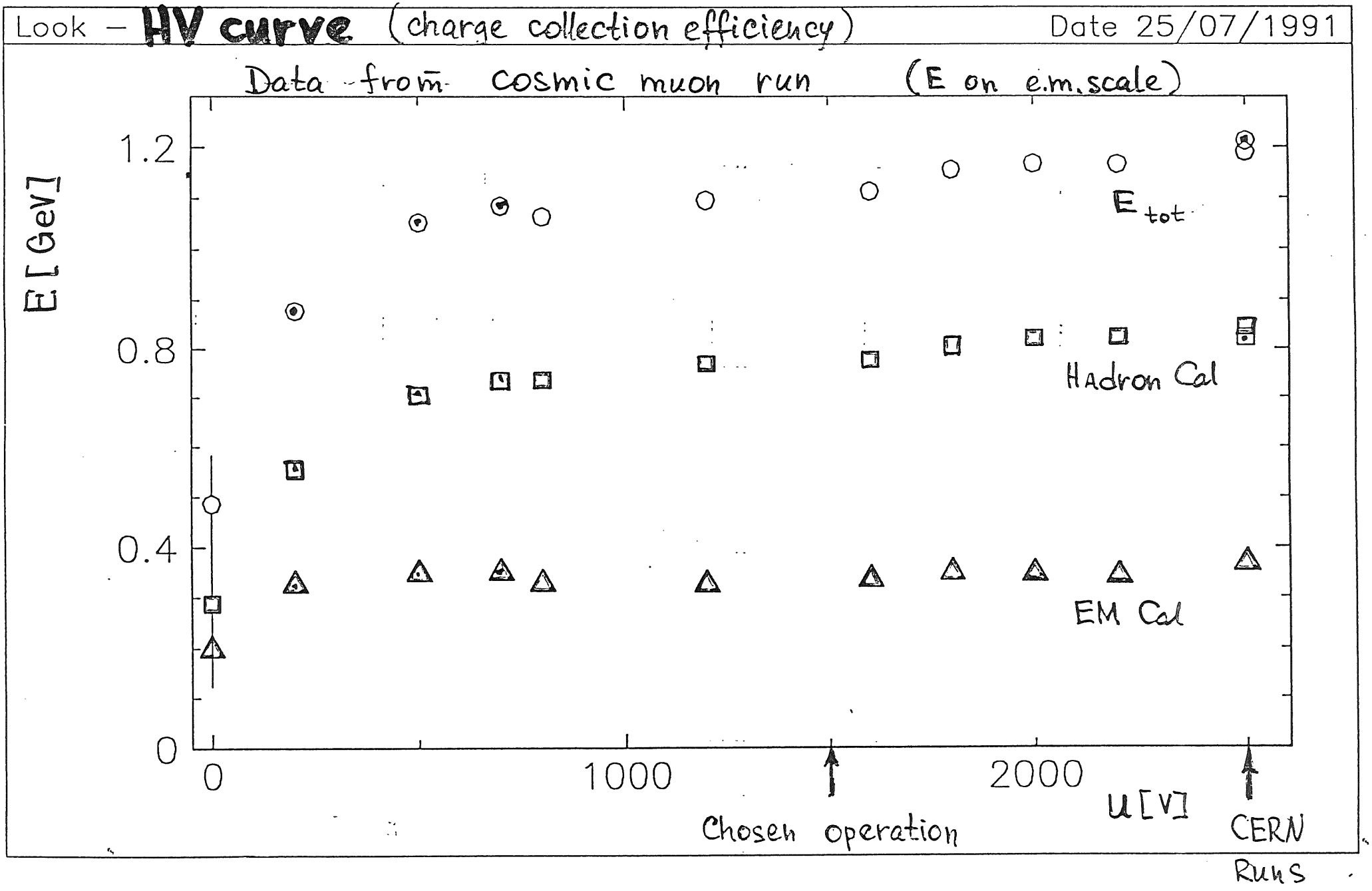
3 examples of the monitoring :

probe 5 :	middle-high and backward	variation :	- 0.10 % / year
probe 10 :	bottom and forward	variation :	- 0.29 % / year
probe 11 :	middle-high and forward	variation :	- 0.25 % / year

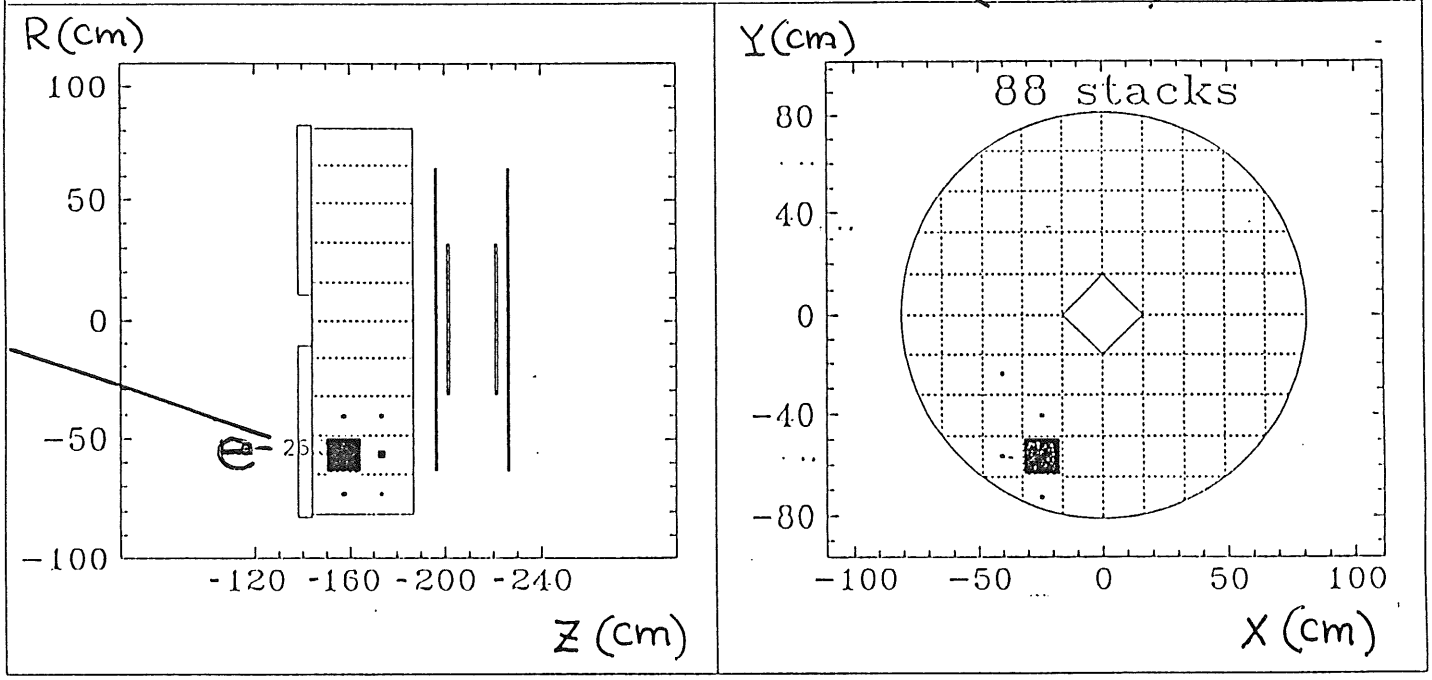
20/09/91

β + α source readout gaps in cryostat




Look – HV curve (charge collection efficiency)
Date 25/07/1991
Data from cosmic muon run (E on e.m. scale)
E [GeV]
1.2
0.8
0.4
0
0
1000
2000
U [V]
E tot
Hadron Cal
EM Cal
Chosen operation
CERN Runs

Look - Backward EM Calorimeter (BEMC)



- Hard background conditions (100 kHz rate expected) → special analog electronics (fast shaping + delay line) created and tested Ready for operation in Dec '91.

- Installed, tested in a stand alone mode, will be used in October run.

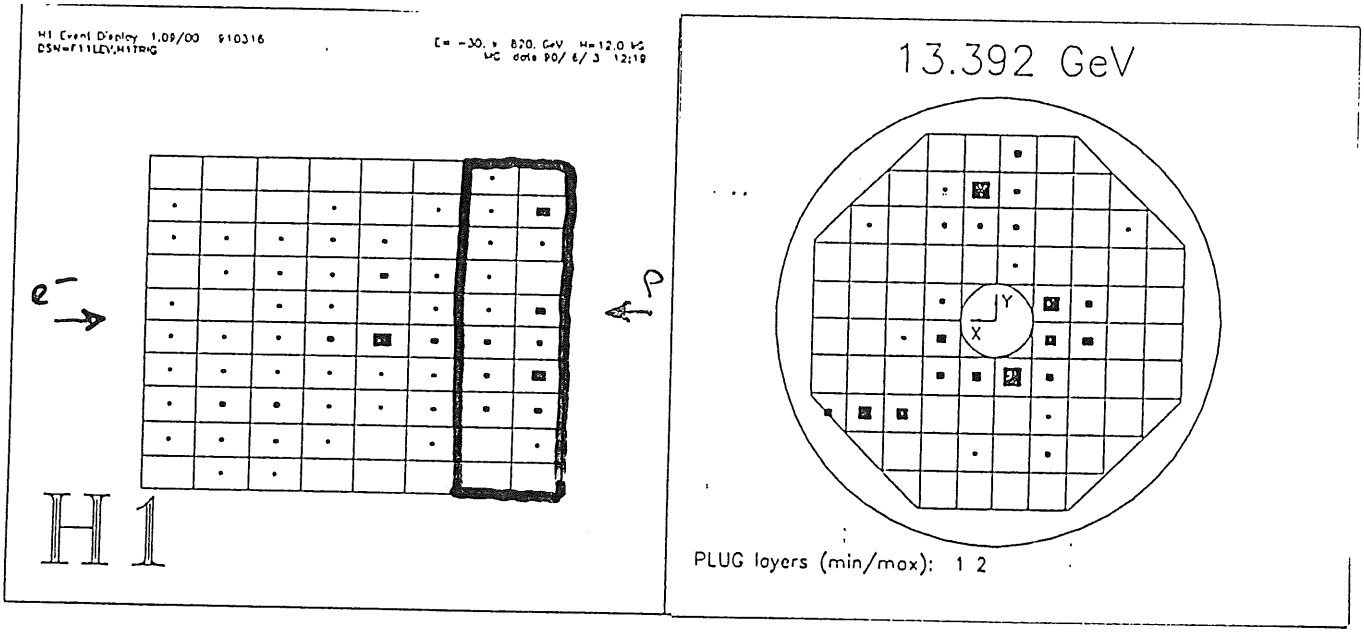
- Calibration runs at DESY and CERN.
  Energy resolution ($1\ GeV < E_e < 60\ GeV$):

  sampling term = $9\%/\sqrt{E}$
  constant term = 1%
  electronic noise = 100 MeV

  → $\Delta E/E = (2 \div 3)\%$ in the $(10 \div 30)$ GeV range

Final aim of 1% energy scale can only be reached with ep data.

- PLUG -



- Two out of eight detector planes are instrumented and installed and will be used in the first stage

  168 (5 cm x 5 cm) silicon detectors

  Reason: unknown radiation conditions around the beam-pipe

- Tests of electronics for DAQ and TRIGGER are in progress

Tail catcher

[Instrumented Iron : analog pad readout of streamer tube system]

- Total number of channels = 4608
  - HAVE been fully operated in April = 828 (18%)
  - In October run will be = ~1700 (37%)
  - Expected at the beginning of ep = 4170

  (limited by installation)

- Strong variation of pulseheight with atm. pressure: $\Delta E/E \simeq -\frac{2\%}{\text{torr}}$

  will be actively compensated by changing HV (in progress)

- Magnetic field dependence:

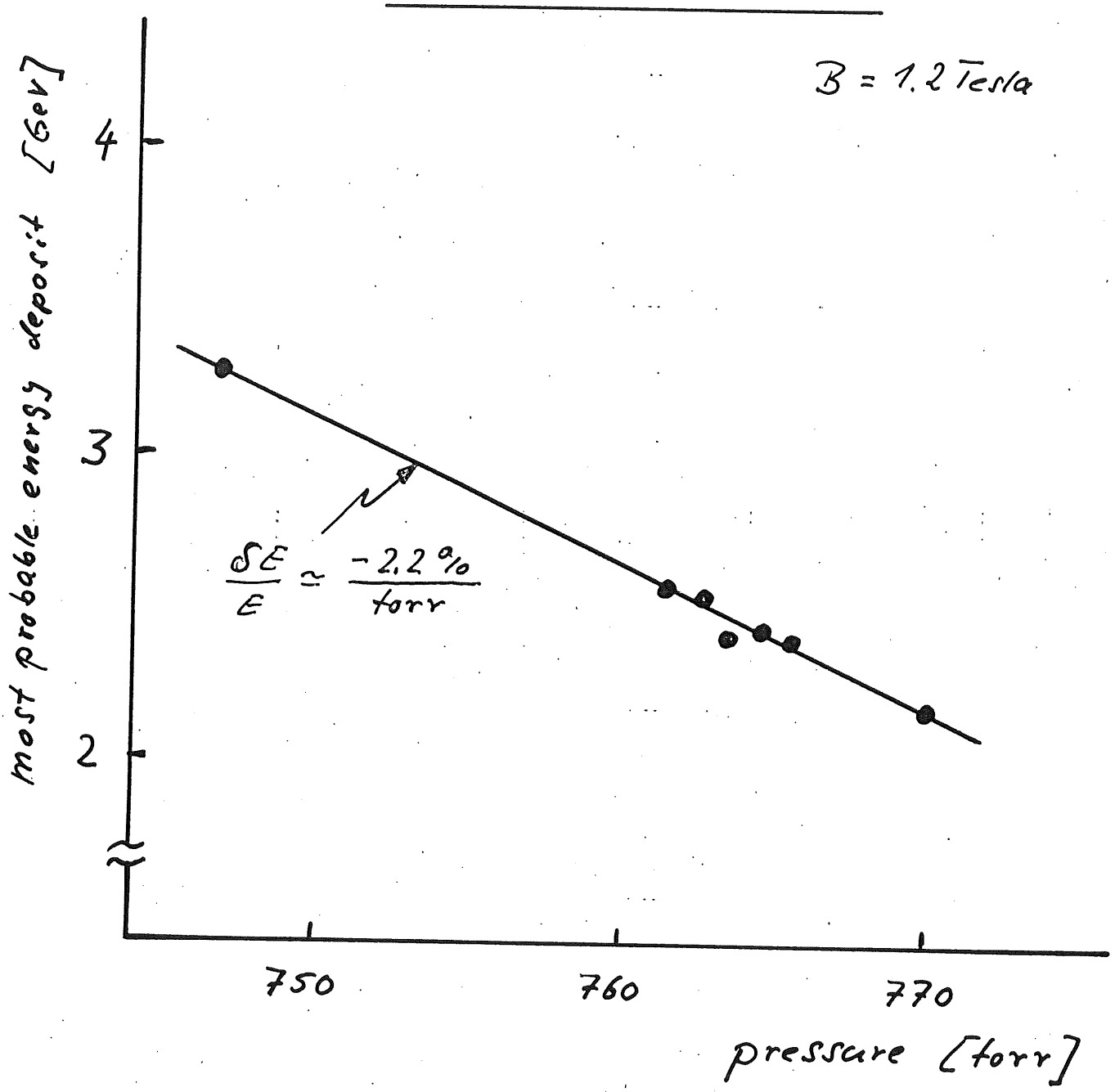
  $\overline{E}\,(B=0) < \overline{E}\,(B=1.2\,T)$

  barrel: $\Delta E \lesssim 10\%$

  endcap: $\Delta E \lesssim 5 \div 10\%$

  needs more cosmic data to calculate precisely.

Pressure dependence of μ signal in IRON barrel towers



Status of energy calibration for calorimeters

- L. Ar. is stable, and el. calibration works very well
- We have adequate test beam data from CERN(DESY) for Liquid Argon Calorimeter, Tail Catcher and Backward E.M. Calorimeter for first data taking
  [exeption: φ-cracks in L.Ar. stacks → Summer '92]
- Test data is understood (detailed MC simulation exists)
- Data correction for stack inhomogeneouties, dead material, leakage, dead channels ....
  have been studied in detail.
  Software corrections available and tuned to data

↳ We have reasonably good relative calibration of different calorimeter areas

However...

an absolute energy scale is not transferable from the test beam data to **H1** to the designed precision

↳ We need first ep data to get absolute energy scale to better than ~ 5% !

Calorimeter	Relative energy error over calorimeter	Absolute energy scale error
Liquid Argon		
electrons	< 2%	3%
hadrons	< 3%	5%
BEMC	~ 2%	~ 5%

may be improved

needs e-p data:
(kin. peak, isolated tracks, p_t balance)

MWPC's (Trigger chambers)

- 2 cylindrical chambers in central region
  $(25° < \Theta < 155°)$
- 3 forward planar chambers
  $(\Theta < 20°)$

---

① Central MWPC's
- reliably working since April
- noise level substantially reduced
  (well below muon signal)

⇒ ready for triggering with high efficiency

② Forward MWPC
- fully operational in April run
- however...

  50% of preamps now dead
  for unknown reason

⇒ these chambers will only be of very limited use for the first phase of data taking
Some trigger signals still may be obtained, but no topological trigger

Loss of trigger possibilities at forward angles ($\Theta<20°$) affecting mainly low multiplicity events

DAQ and data logging

- Status
  - fully set up, tested, running stable since Sept '90
  - Event Display improved / upgraded
  - Event Server and Histogram Server added

- Performance
  - Comfortable operator control (can be used by nonexperts, tested by off-line people)
  - Design speed of ~ 500 kbyte/sec achieved 9/90 Since 9/91 sped up to 600 kbyte/sec (data logging to IBM)
  - The F58 link is very stable and reliable
  - A local data storage device (Storage Tek 4280) is presently being commissioned
  - Total amount of data recorded so far:

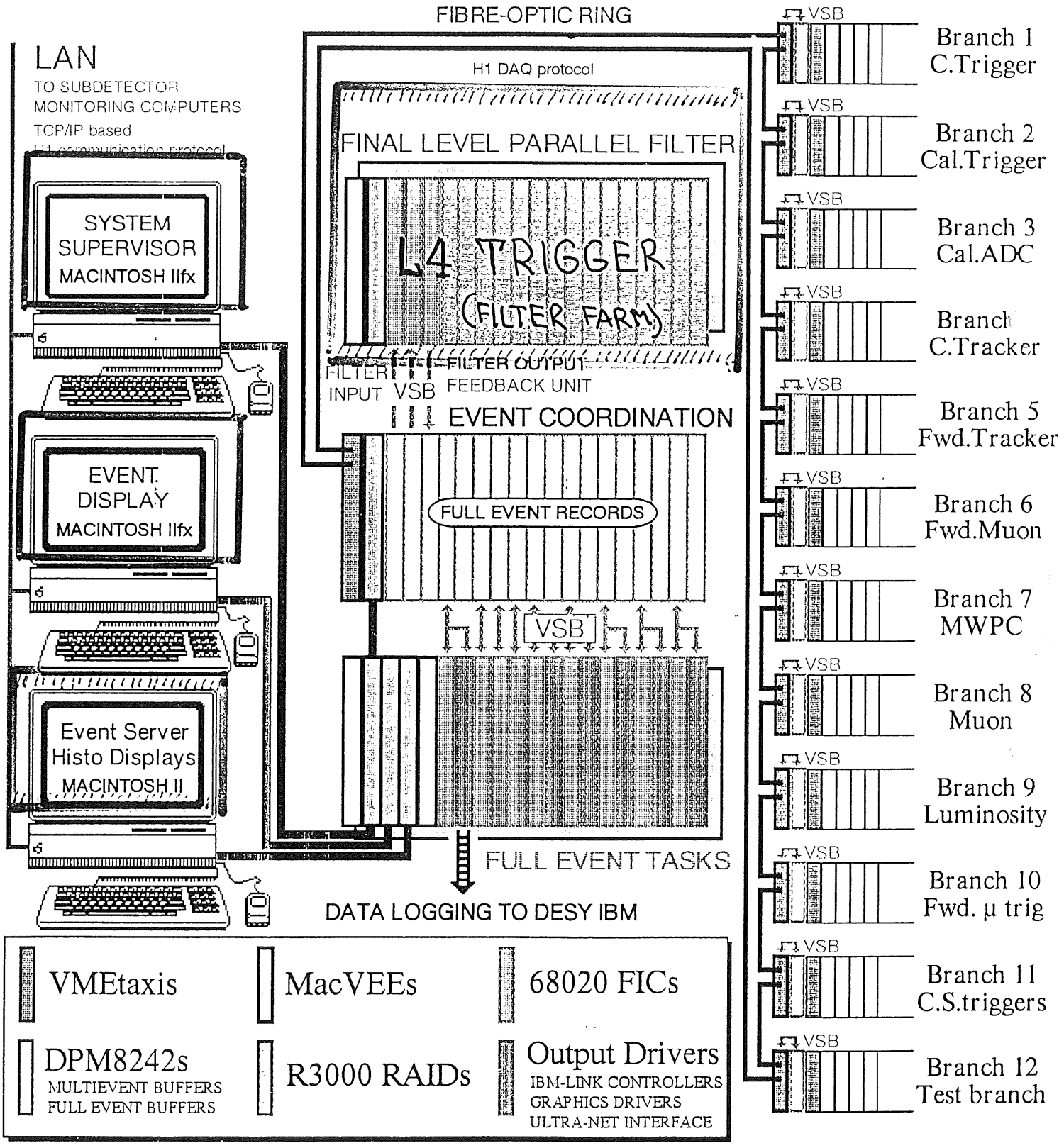
    Since Sept' 90 : 5.000 Gb (25.000 cart.)
    During April '91 run: 130 Gb (650 cart.)

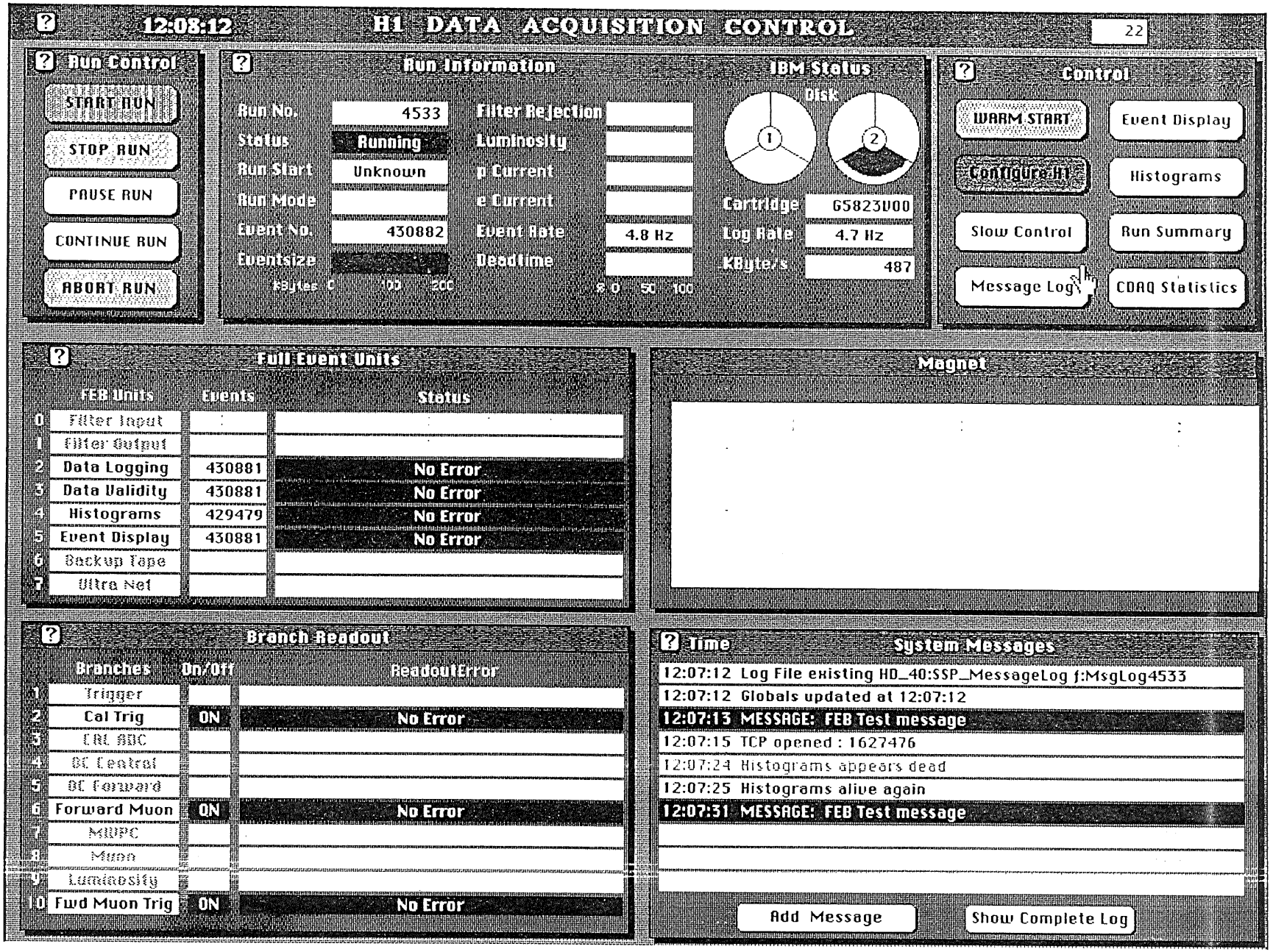
  Expected data volume in October/November run : ~ 1300 cartridges.

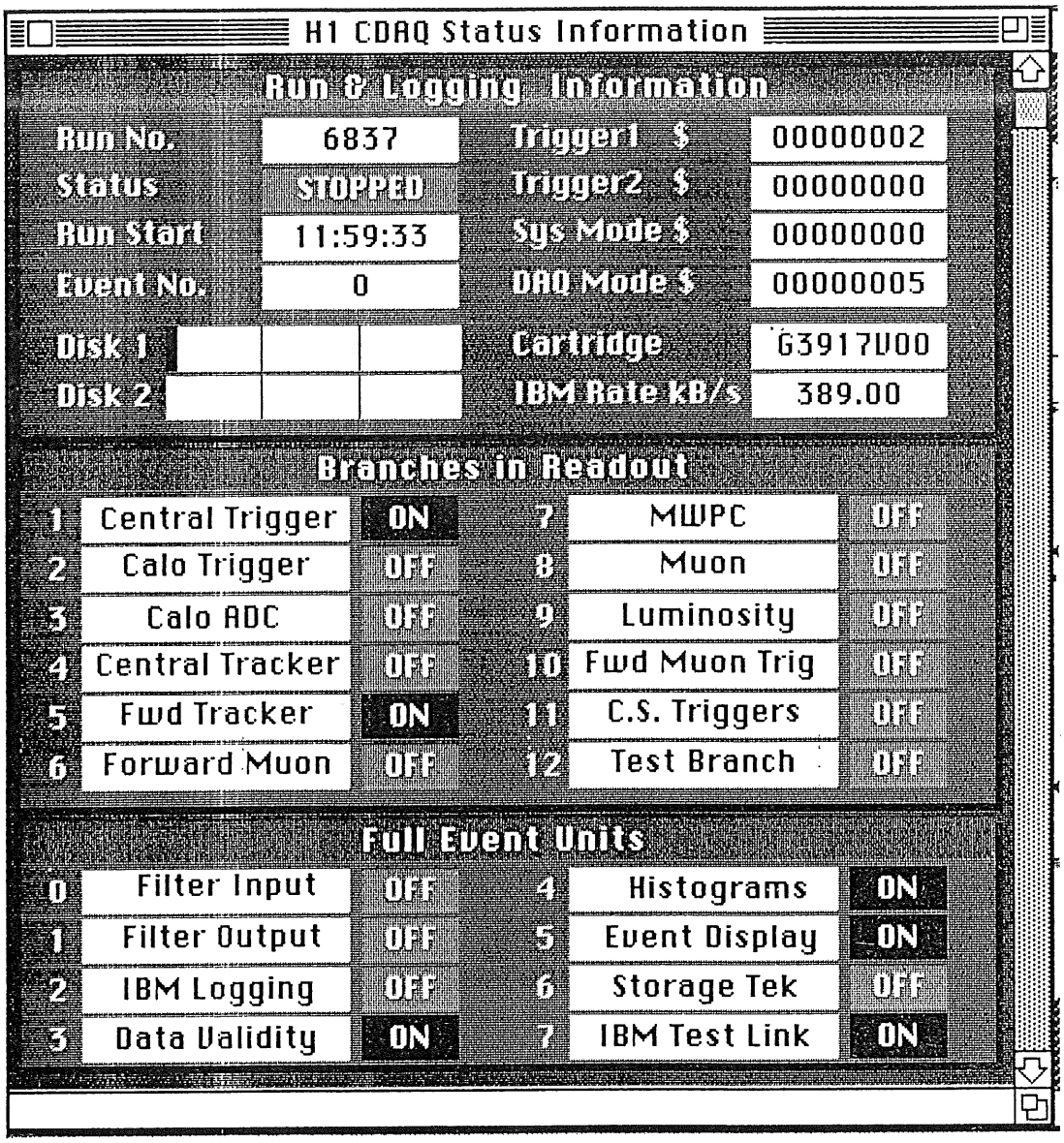
New compared to April run

upgraded

H1 CENTRAL DATA ACQUISITION : PHYSICAL LAYOUT




12:08:12
H1 DATA ACQUISITION CONTROL
22
Run Control
START RUN
STOP RUN
PAUSE RUN
CONTINUE RUN
ABORT RUN
Run Information
Run No. 4533
Status Running
Run Start Unknown
Run Mode
Event No. 430882
Eventsize
KBytes 0 100 200
Filter Rejection
Luminosity
p Current
e Current
Event Rate 4.8 Hz
Deadtime
0 50 100
IBM Status
Disk
1
2
Cartridge G5823U00
Log Rate 4.7 Hz
KBytes 487
Control
WARM START
Configure H1
Slow Control
Message Log
Event Display
Histograms
Run Summary
CDAQ Statistics
Full Event Units
FEB Units
Events
Status
0 Filter Input
1 Filter Output
2 Data Logging 430881 No Error
3 Data Validity 430881 No Error
4 Histograms 429479 No Error
5 Event Display 430881 No Error
6 Backup Tape
7 Ultra Net
Magnet
Branch Readout
Branches
On/Off
ReadoutError
1 Trigger
2 Cal Trig ON No Error
3 CAL BBC
4 DC Central
5 DC Forward
6 Forward Muon ON No Error
7 MUPC
8 Muon
9 Luminosity
10 Fwd Muon Trig ON No Error
Time
System Messages
12:07:12 Log File existing HD_40:SSP_MessageLog ƒ:MsgLog4533
12:07:12 Globals updated at 12:07:12
12:07:13 MESSAGE: FEB Test message
12:07:15 TCP opened : 1627476
12:07:24 Histograms appears dead
12:07:25 Histograms alive again
12:07:31 MESSAGE: FEB Test message
Add Message
Show Complete Log


H1 CDAQ Status Information
Run & Logging Information
Run No. 6837
Status STOPPED
Run Start 11:59:33
Event No. 0
Disk 1
Disk 2
Trigger1 $ 00000002
Trigger2 $ 00000000
Sys Mode $ 00000000
DAQ Mode $ 00000005
Cartridge G3917U00
IBM Rate kB/s 389.00
Branches in Readout
1 Central Trigger ON
2 Calo Trigger OFF
3 Calo ADC OFF
4 Central Tracker OFF
5 Fwd Tracker ON
6 Forward Muon OFF
7 MWPC OFF
8 Muon OFF
9 Luminosity OFF
10 Fwd Muon Trig OFF
11 C.S. Triggers OFF
12 Test Branch OFF
Full Event Units
0 Filter Input OFF
1 Filter Output OFF
2 IBM Logging OFF
3 Data Validity ON
4 Histograms ON
5 Event Display ON
6 Storage Tek OFF
7 IBM Test Link ON

Look - **LUMI** measurements with e^- Beam at **26.6** GeV. July '91. H1

- Luminosity for ep-collisions:

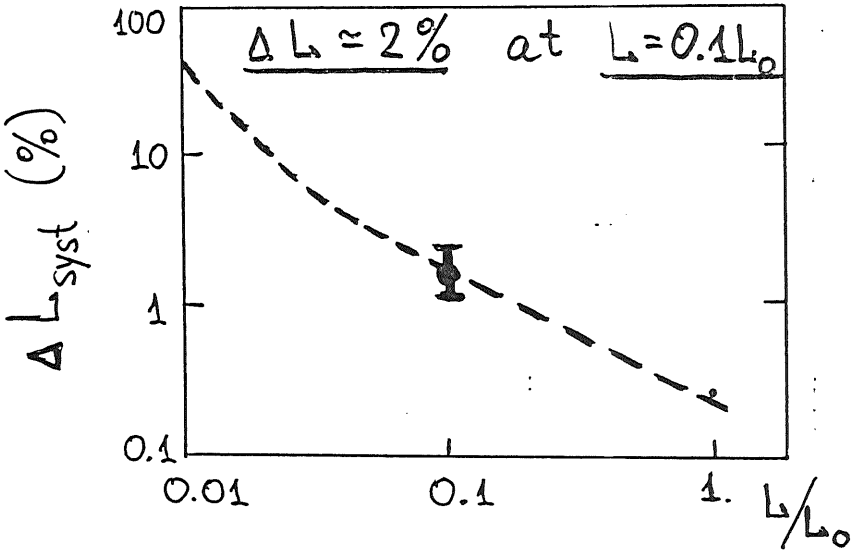
  $ep \rightarrow ep\gamma$ $\Rightarrow$ 30kHz at nominal L

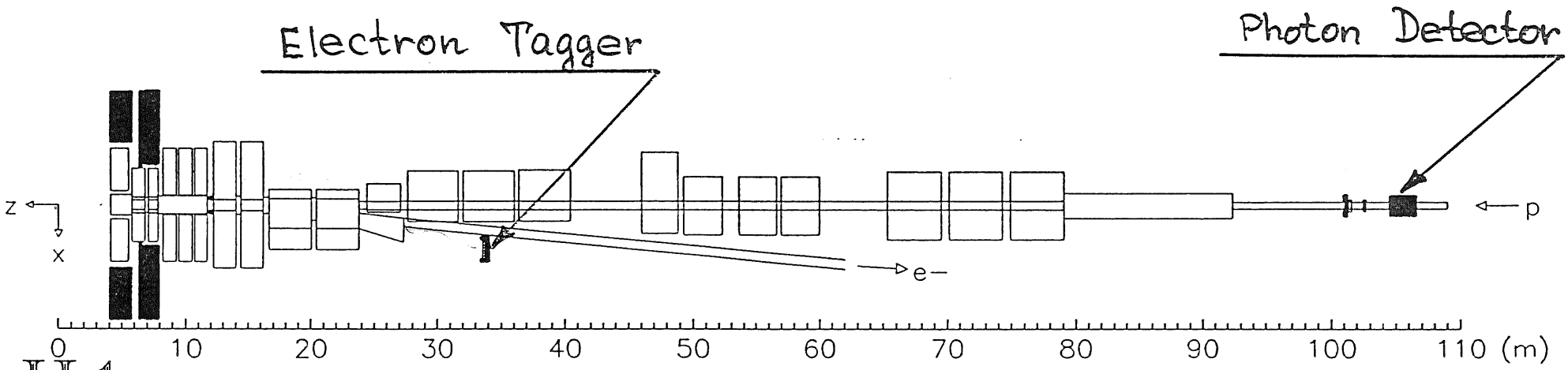
  (coincidence)

- July HERA run:

  $eA \rightarrow eA\gamma$ $\Rightarrow$ 10÷20 Hz at

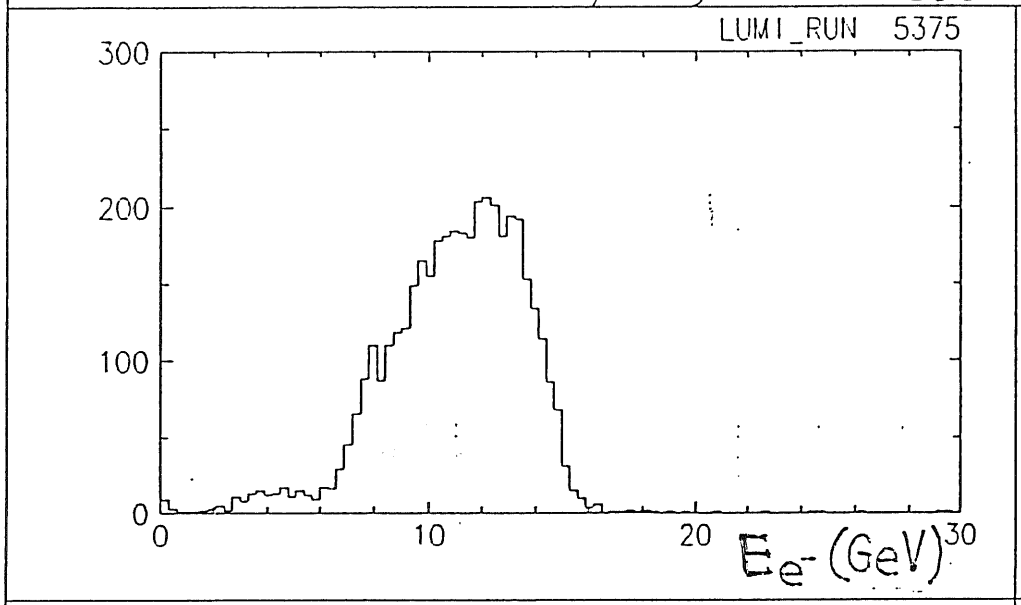
  coincidence (~1% of I_e)

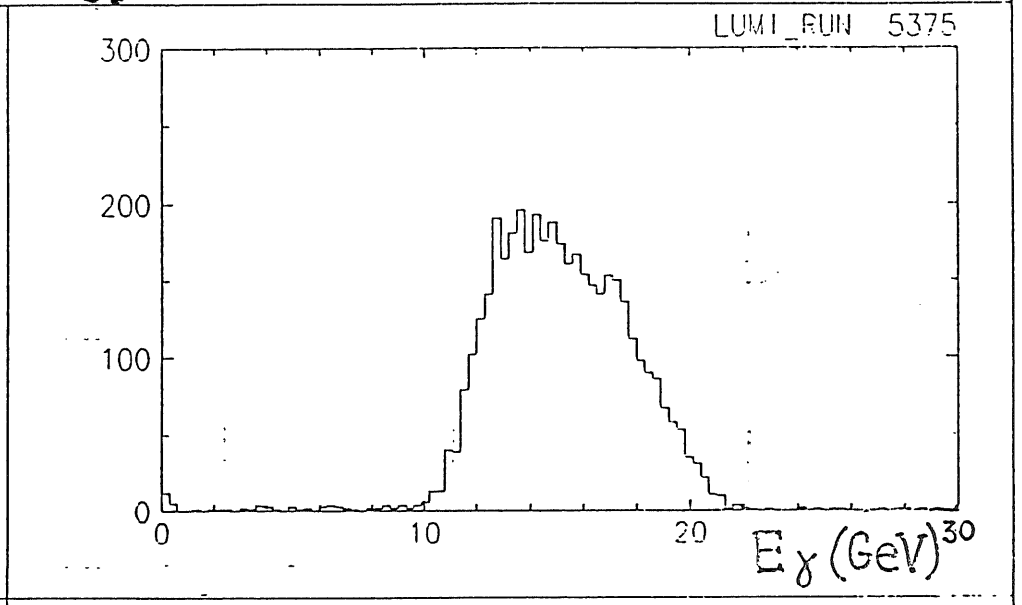


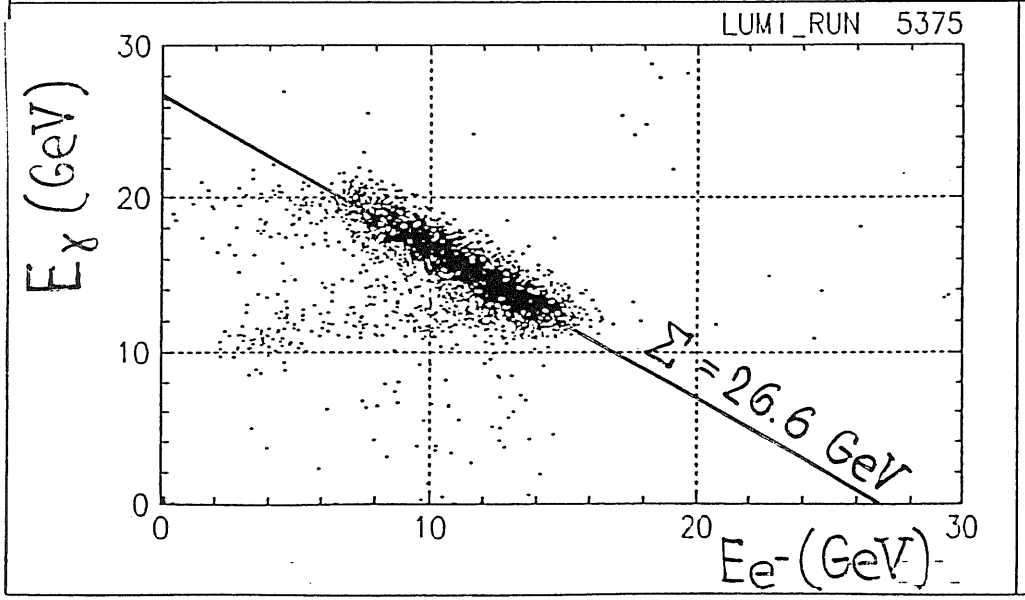


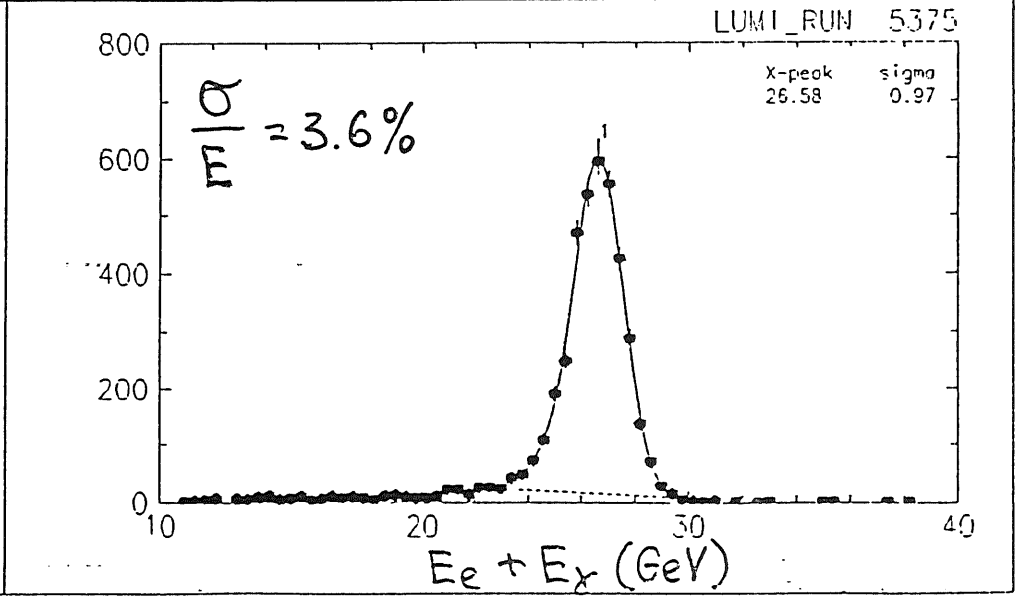
Luminosity system. Top view

Look - HERA e^- run June/July 91 **LUMI trigger: ET ⊕ PD ⊕ $\overline{VC}$** *H1 LUMI*









Look - HERA e⁻ run June/July 91 γ-arm signal H1 LUMI

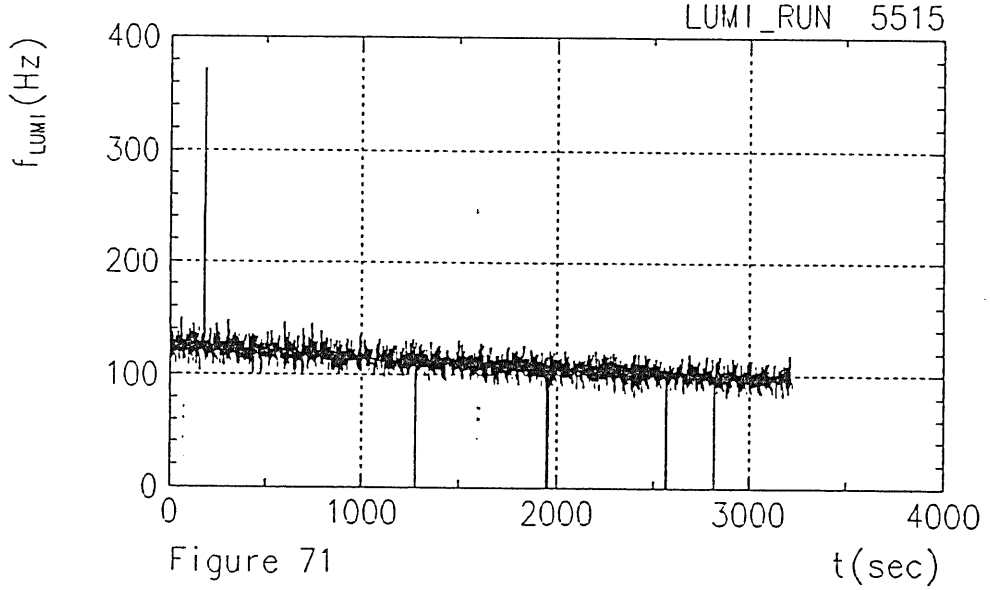


Figure 71

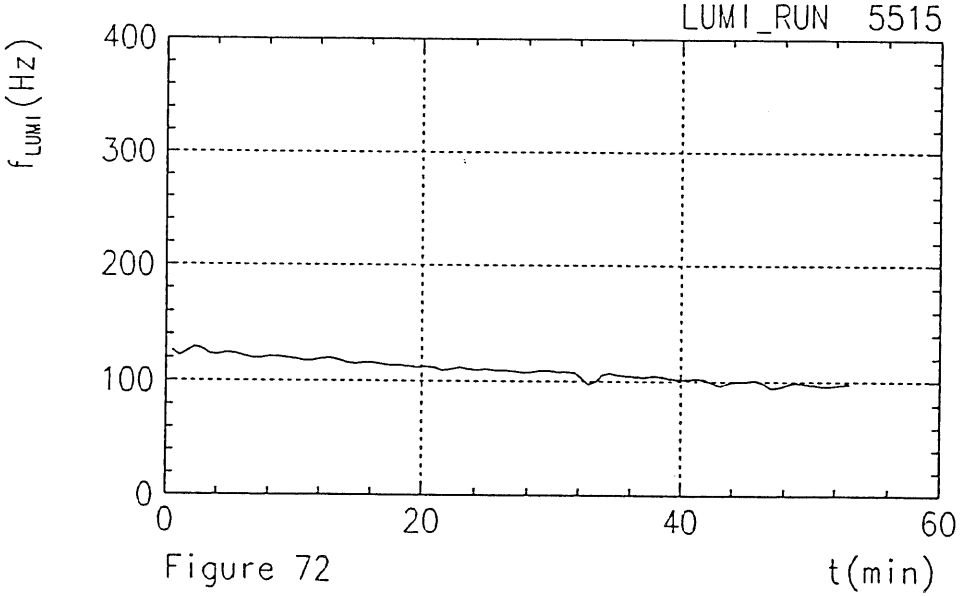


Figure 72

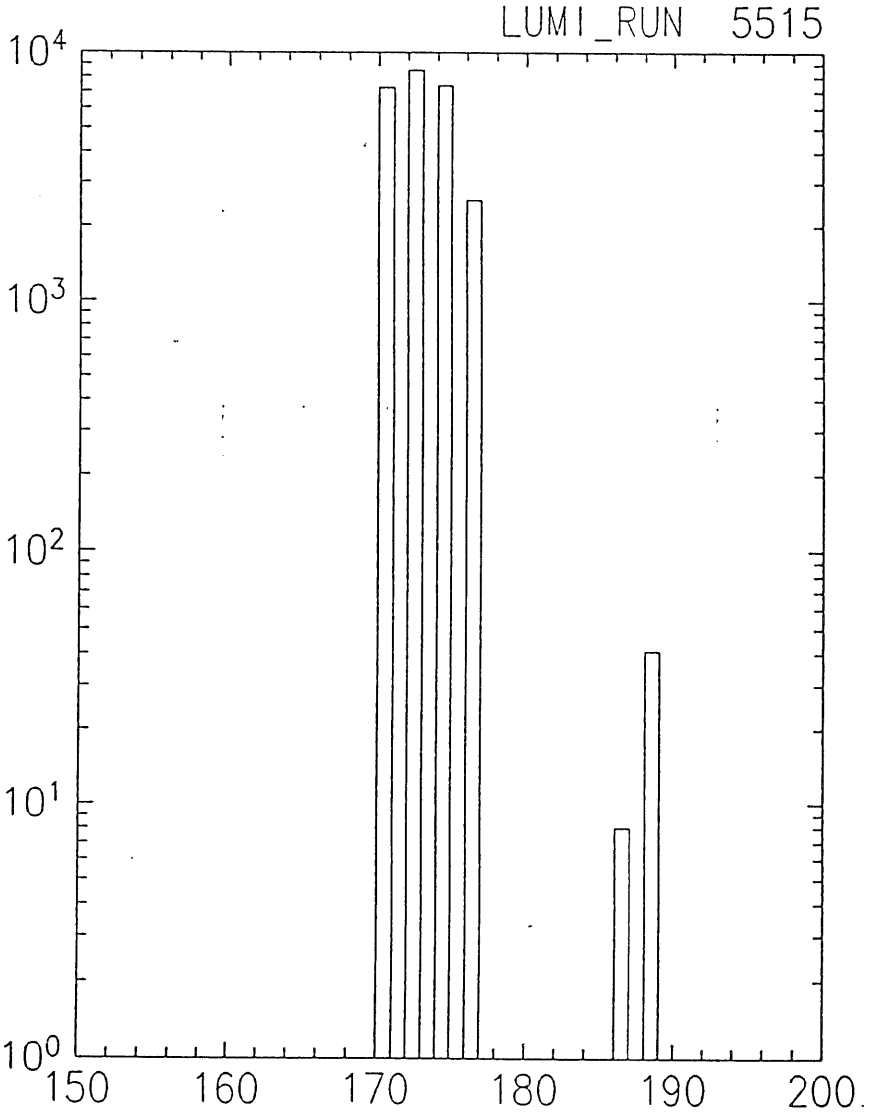


Figure 70

Look - HERA e⁻ run June/July 91 e⁻ BEAM PROFILE H1 LUMI

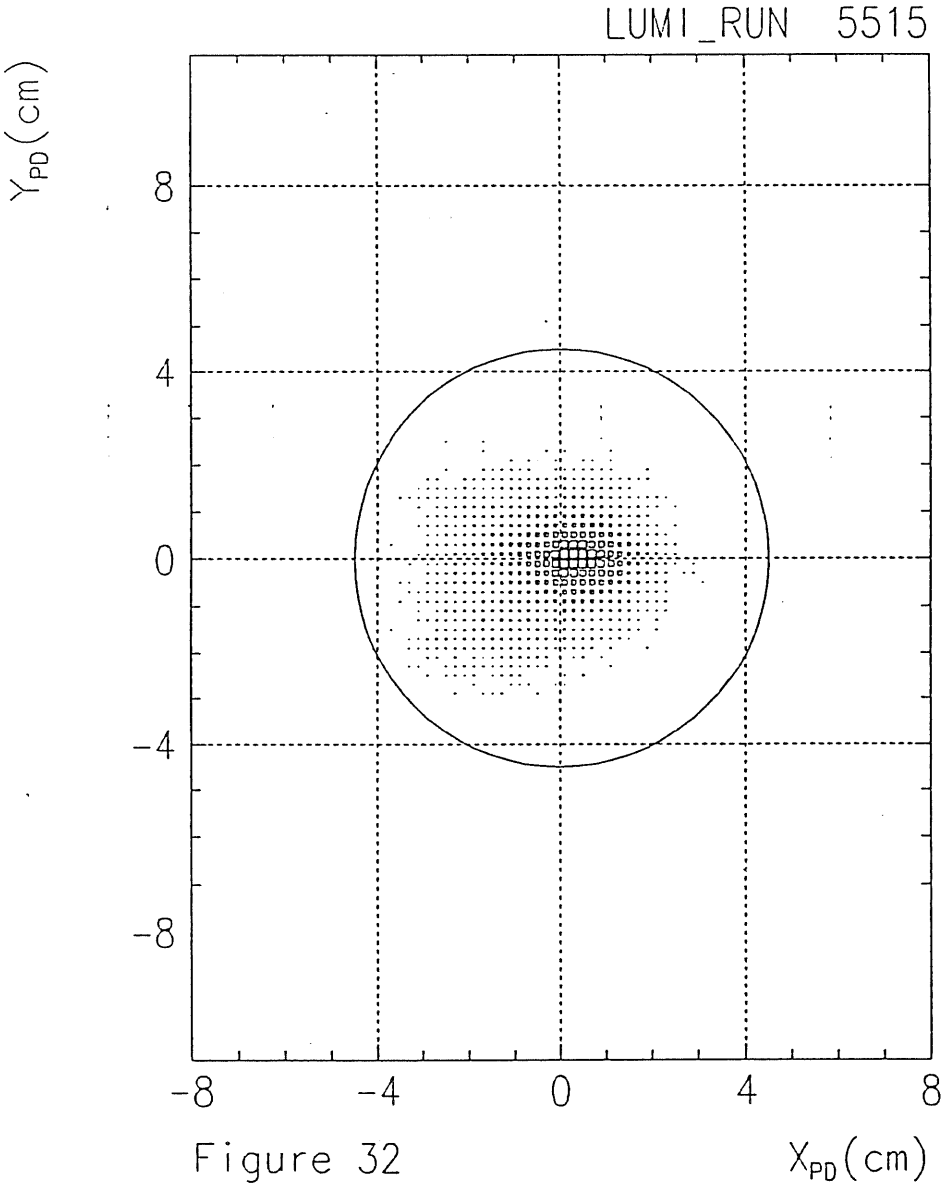


Figure 32

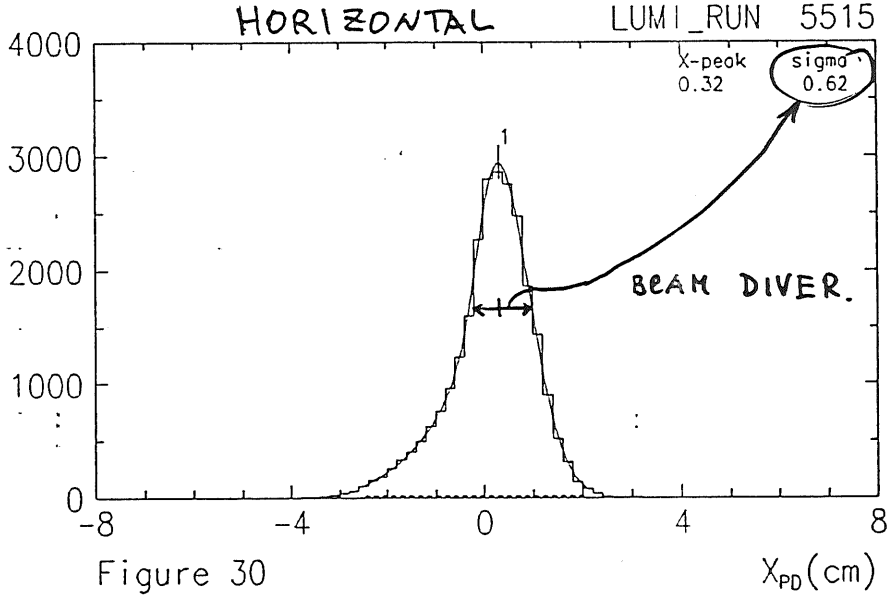


Figure 30

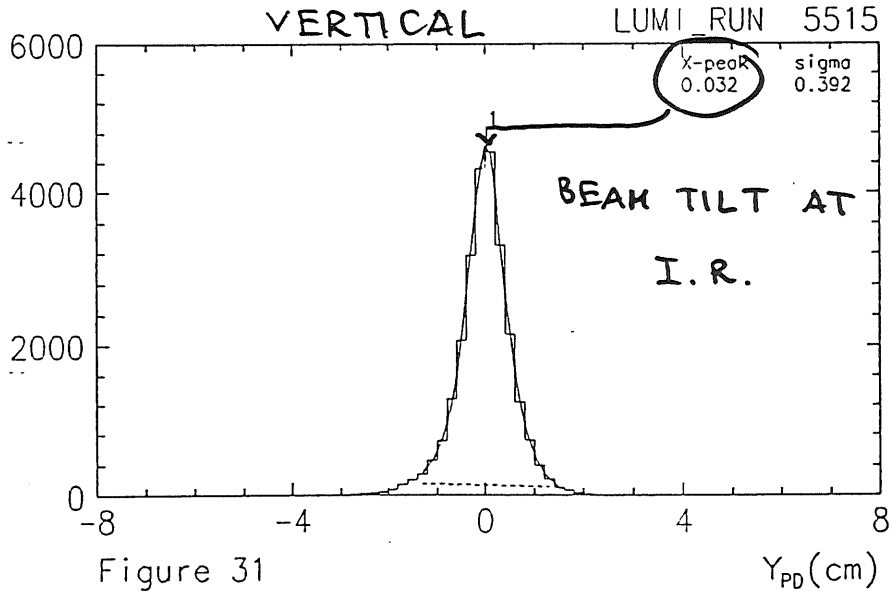


Figure 31

Look – HERA e^- run. Beam profile (emittance, tilt) H1 LUMI

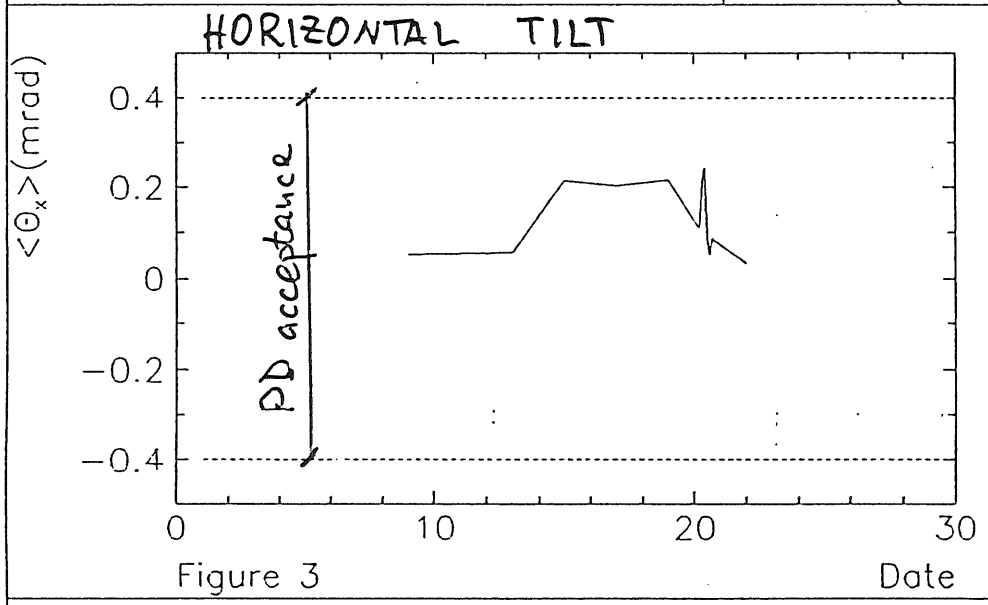


Figure 3

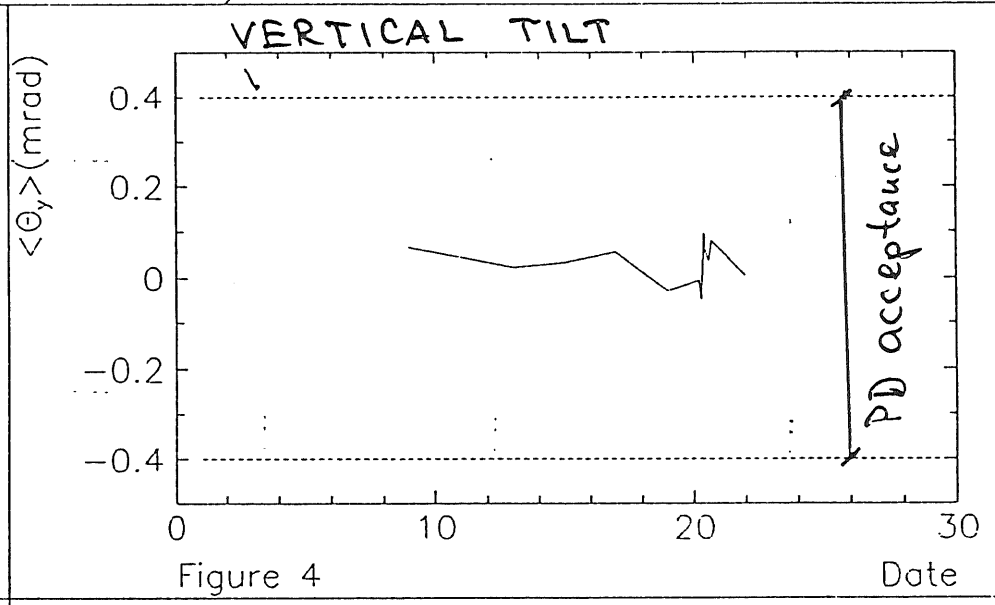


Figure 4

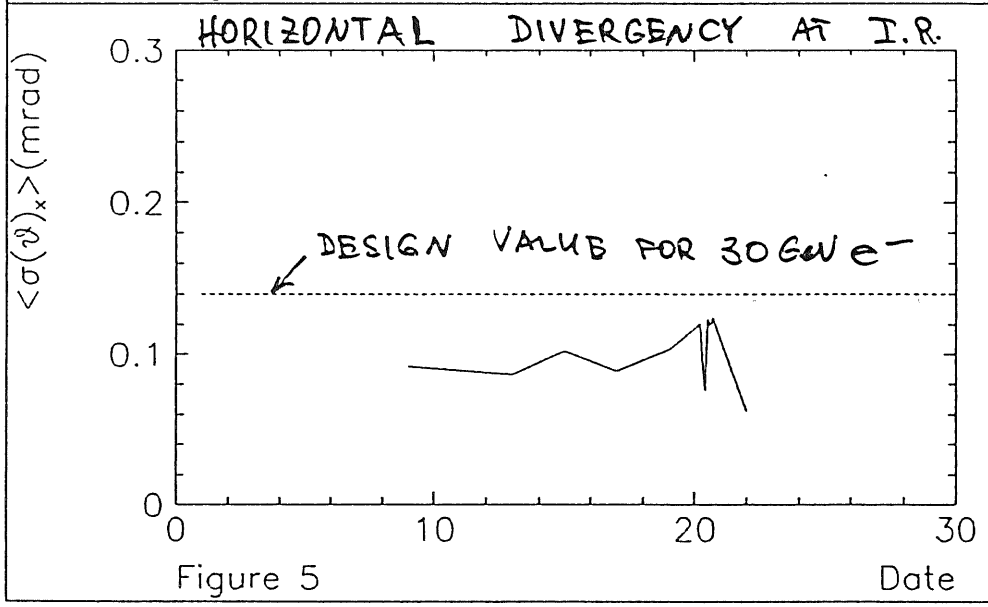


Figure 5

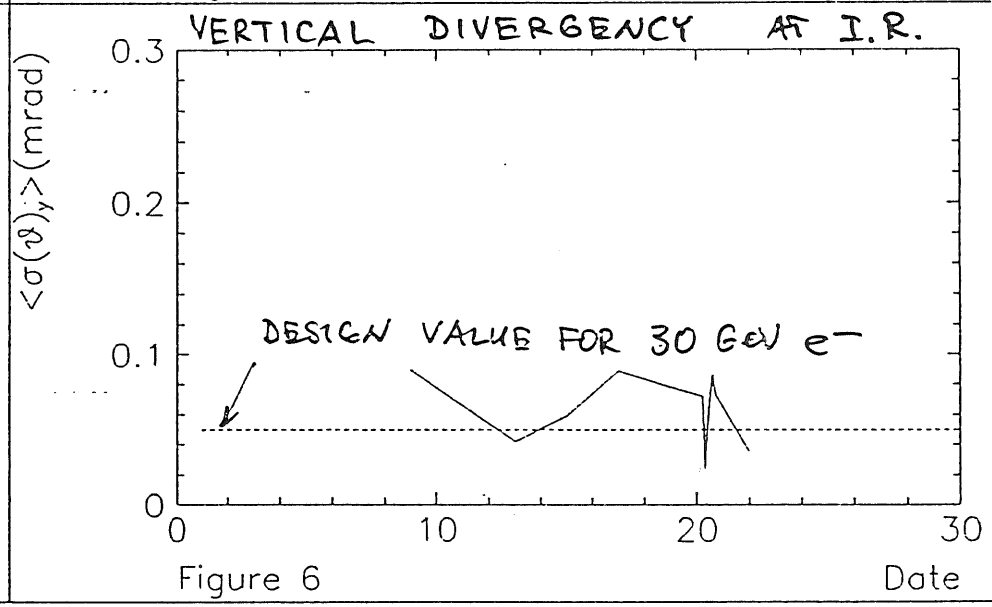
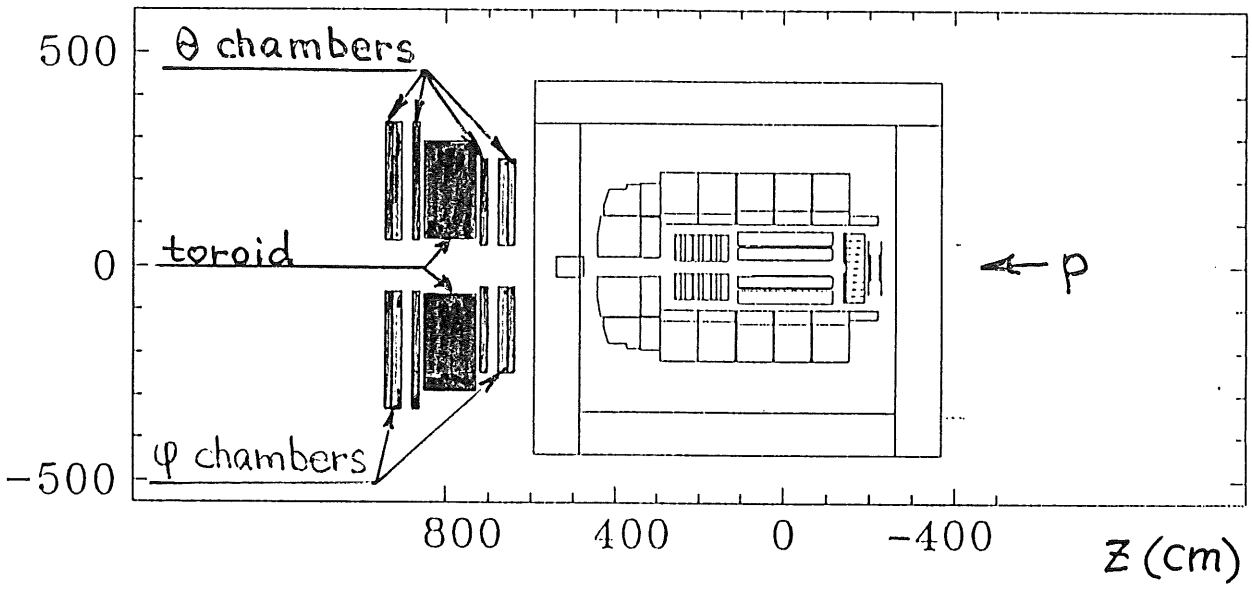


Figure 6

Forward Muon Spectrometer



- Possibilities

$3^\circ < \theta < 17^\circ$

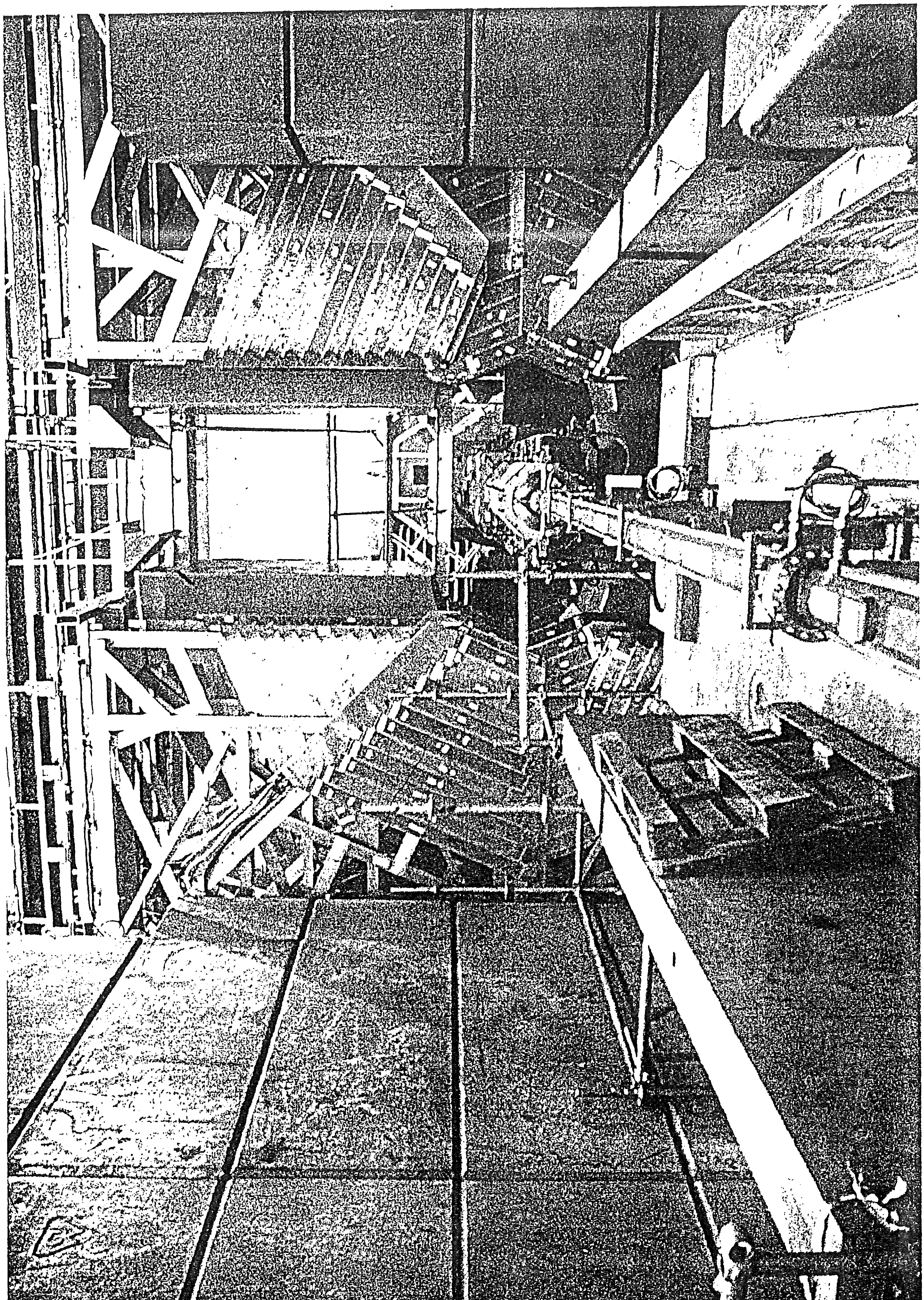
$5 < P_\mu < 200$ GeV/c

- Status

θ chambers – installed with full electronics and readout; tested on e^- beam;
– will take muon (p-halo) data on proton beam in October

φ chambers – ready; will be installed in a shutdown
(however, no readout during first phase: missing 600 FADC's)

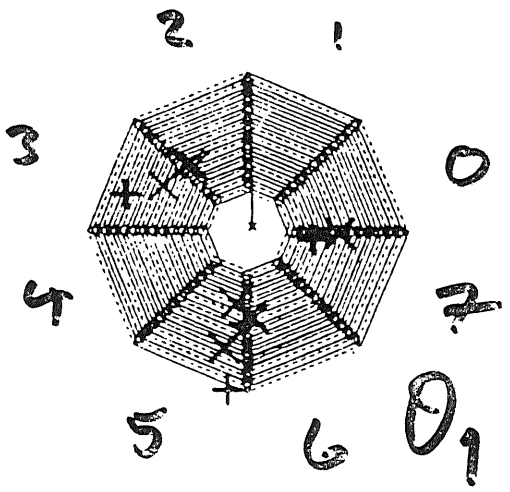
toroidal magnet – installed, tested at B~2 T

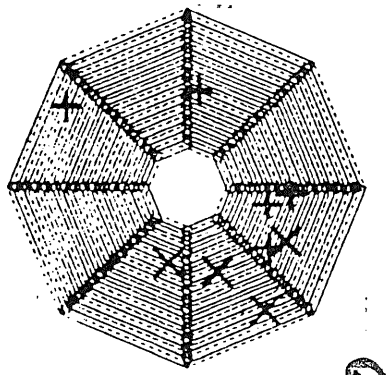


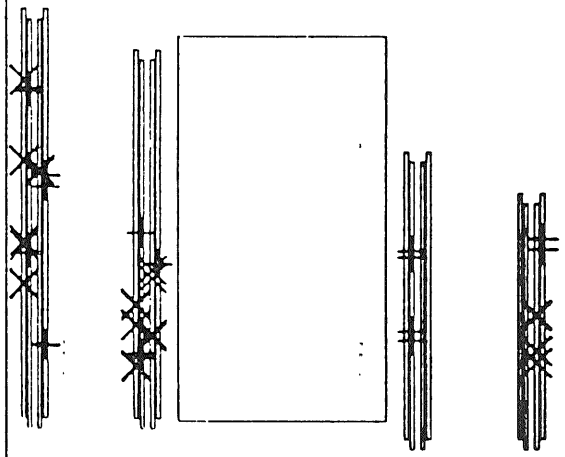
Test operation with e^- beam (x-ray hits only!)

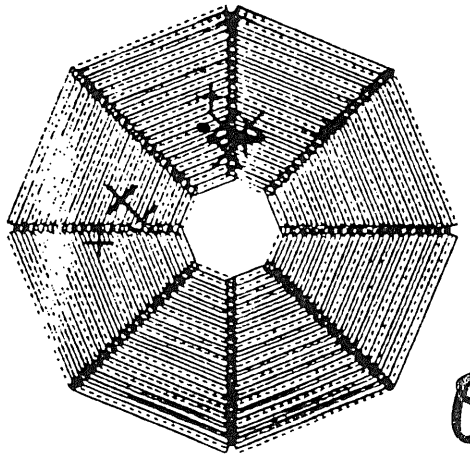
Look – H1 FORWARD MUON SYSTEM

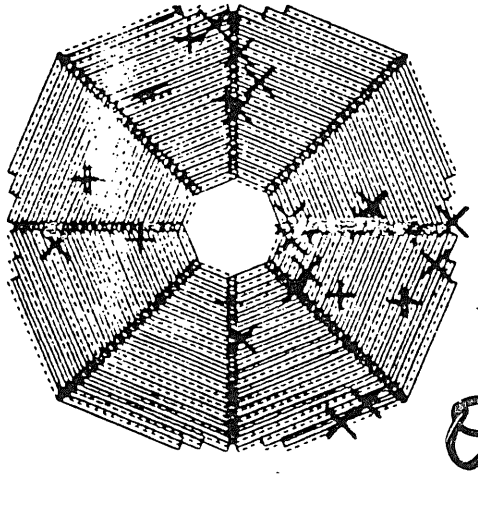
Date 31/07/1991

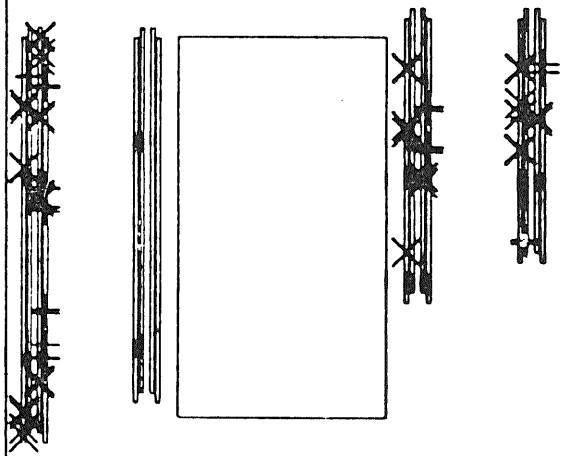




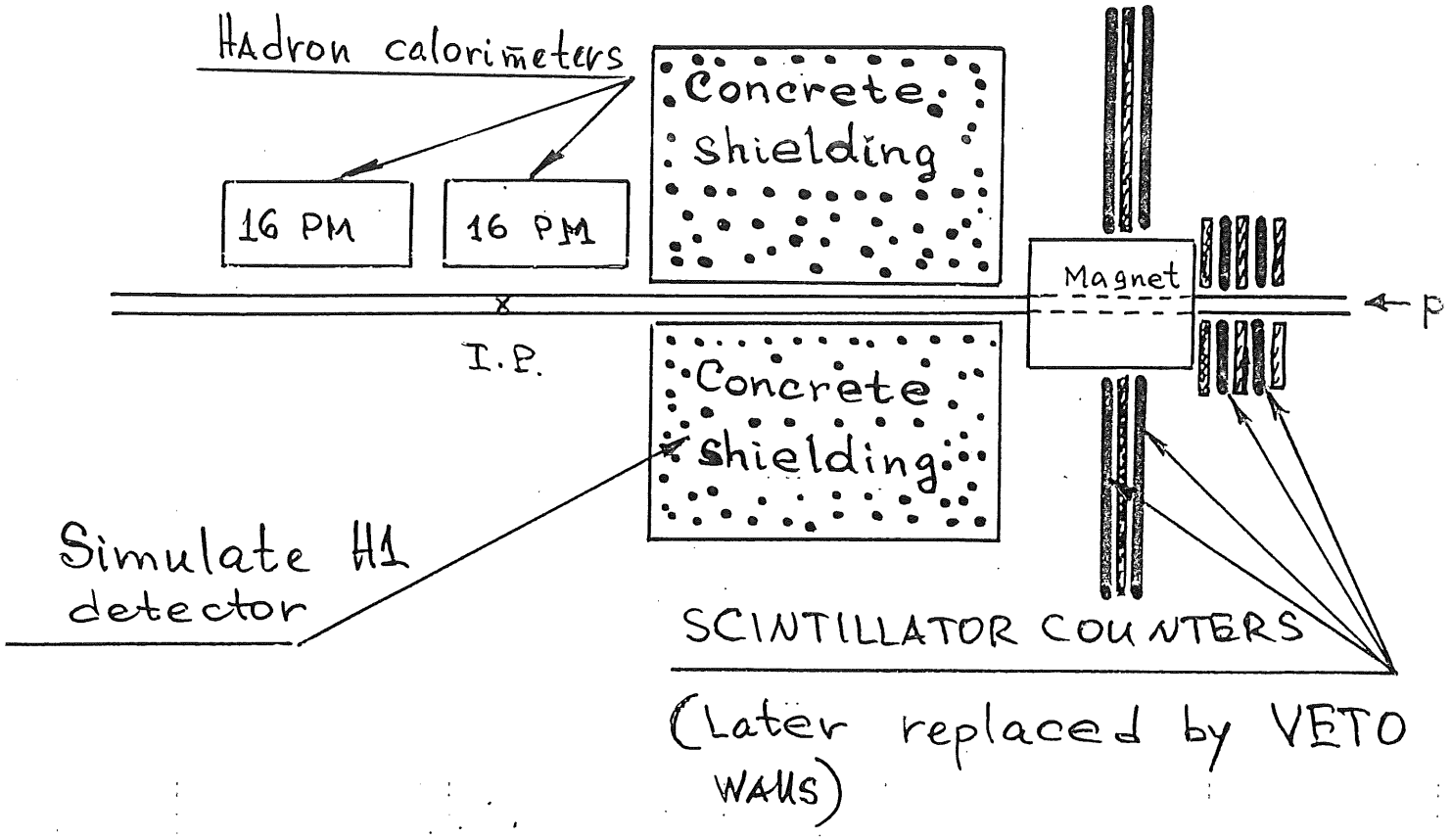








Background study with p beam

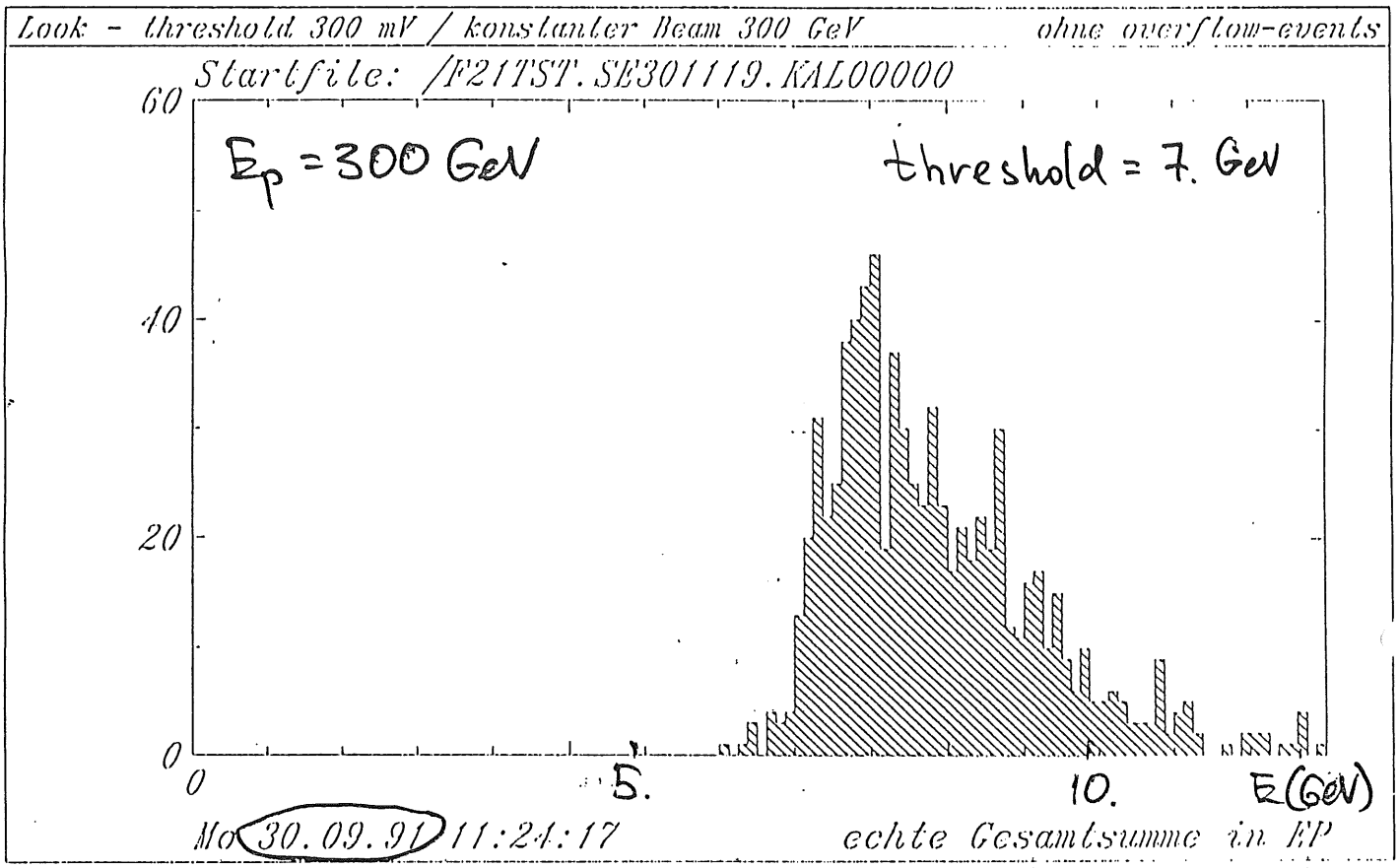


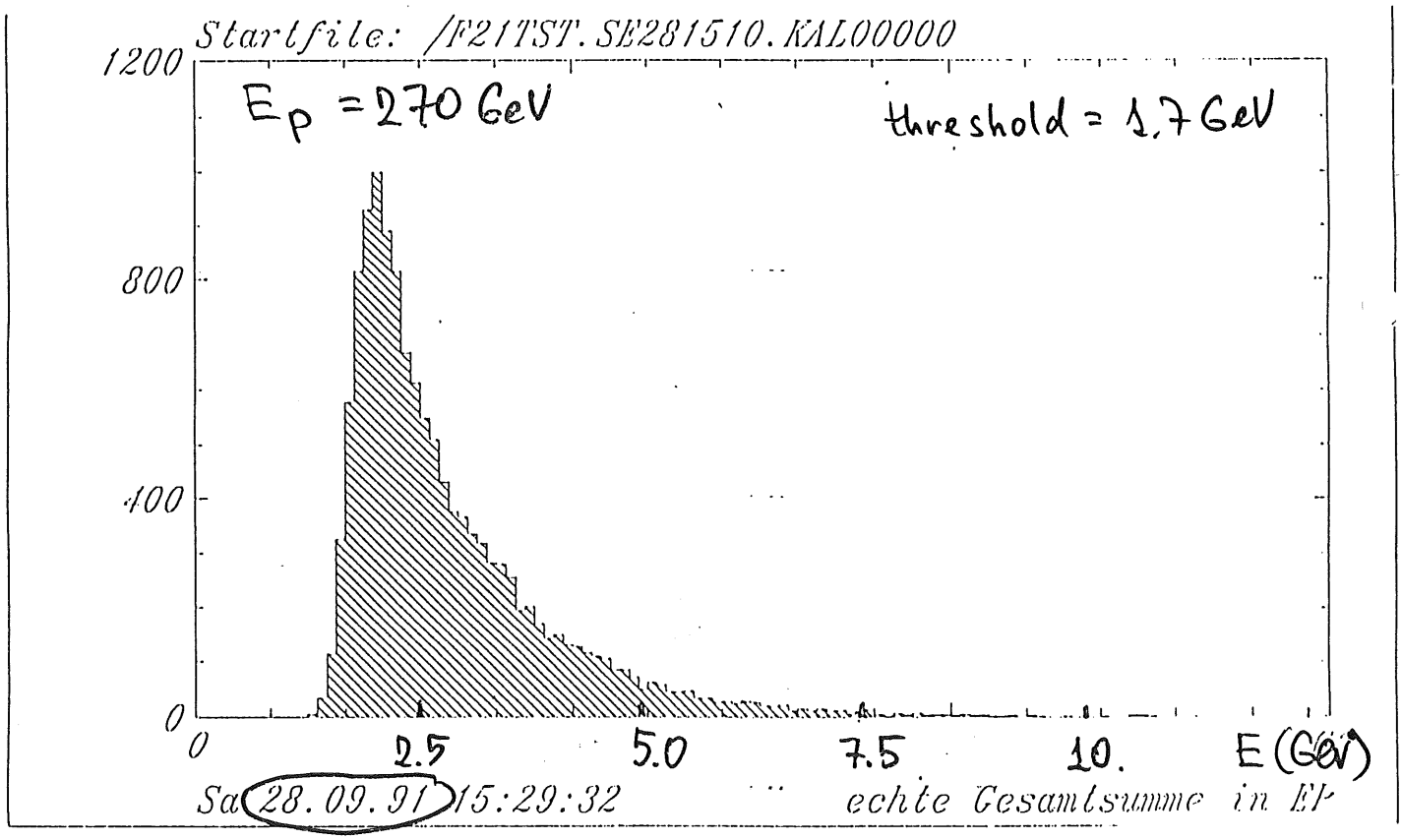
- Ready, tested, checked on cosmic muons.
  Waiting for high energy proton beam with collision optics

  Background studies with 'final' shielding

- Some data have been taken with a stable 300 GeV p-beam and being analysed now
  a) Rate at scintillators (→ 50 kHz at nominal I_p)
  b) Energy spectrum in hadron calorimeters

Hadron Background from HERA p-Beam in H1 I.P.





• Streamer tube system

- Based on LURANYL extrusion
- Uses non-inflammable gas (CO_2, Ar, Isobutan)

} High Safety standard

- New material → delay in production and instrumentation

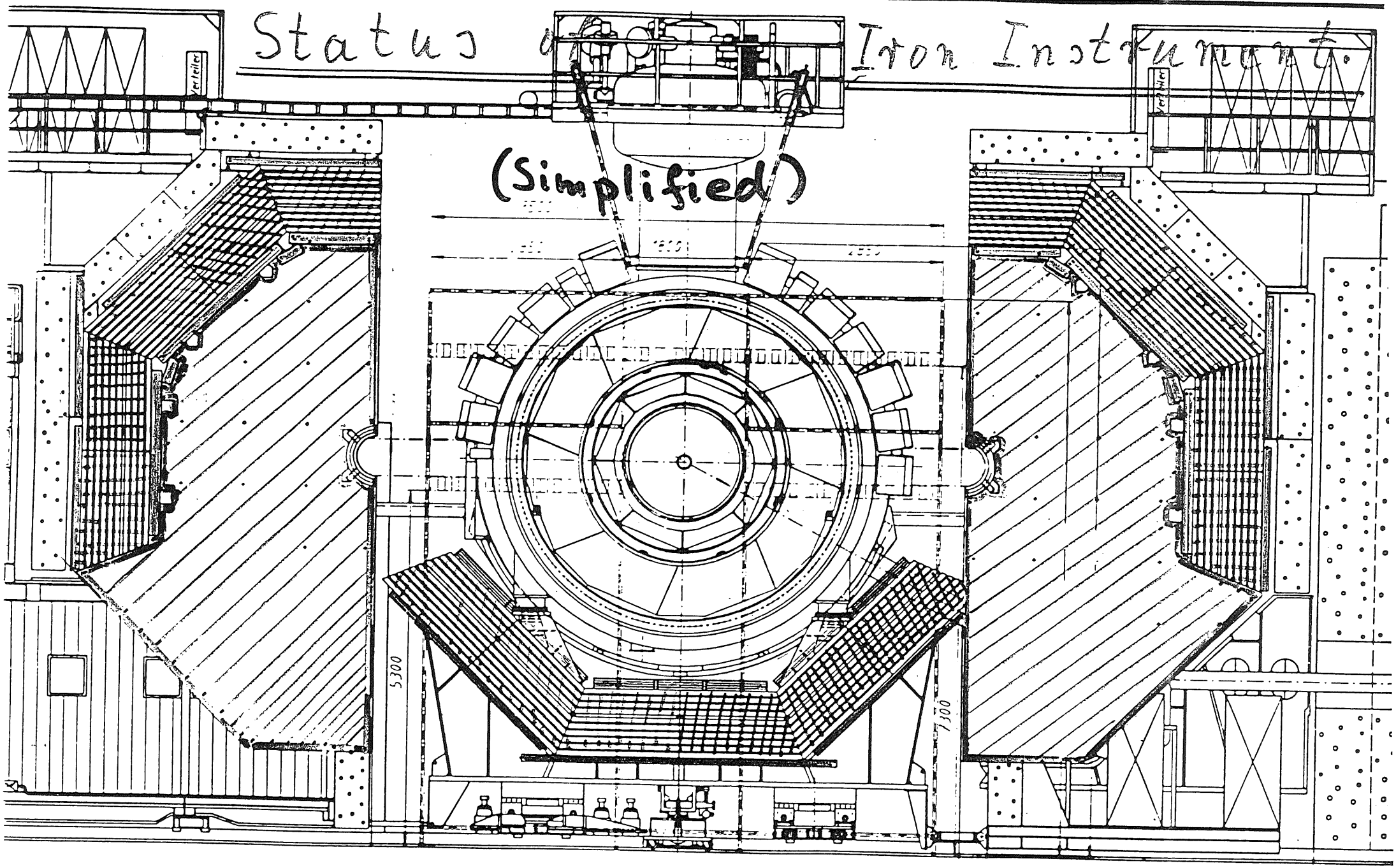
- Only partly installed, will not be fully ready in March '92

- However, the rest can be installed in beam position

- Profiles are reliable (< 1% failure)

Status of Iron Instrument

(Simplified)



▨ = installed

▨ = to be installed in 91

▨ = to be installed 92 in beam position

SLOW CONTROL

A BASIC MINIMAL SAFETY SYSTEM FOR H1

- TASKS

  FAST ALARMS + DIAGNOSTICS FOR FAILURES
  FAST ACTIONS IN CASE OF ALARMS
  } CENTRAL H/W ALARM SYSTEM BBL3

  SETTING OF DETECTOR STATUS
  MONITORING OF DETECTOR STATUS
  LOGGING OF MEASUREMENTS ('SLOW EVENTS')
  } COMPUTER CONTROL AT SUBDETECTOR LEVEL

  CENTRAL STATUS INFORMATION (+CONTROL)

- STATUS

  SIGNIFICANT PROGRESS SINCE APRIL RUN

  - H/W ALARM SYSTEM IS OPERATIONAL, WILL BE TESTED IN OCTOBER/NOVEMBER RUN
  - 50% out of 132 foreseen H/W SIGNALS FROM SUBDETECTORS ARE PRESENTLY CONNECTED
  - COMPUTER CONTROL AT SUBDETECTOR LEVEL: BASIC VERSIONS OPERATIONAL FOR ALL SUBDET. IN OCTOBER: HV, GAS FLOWS, CRATES ... WILL BE UNDER COMPUTER CONTROL

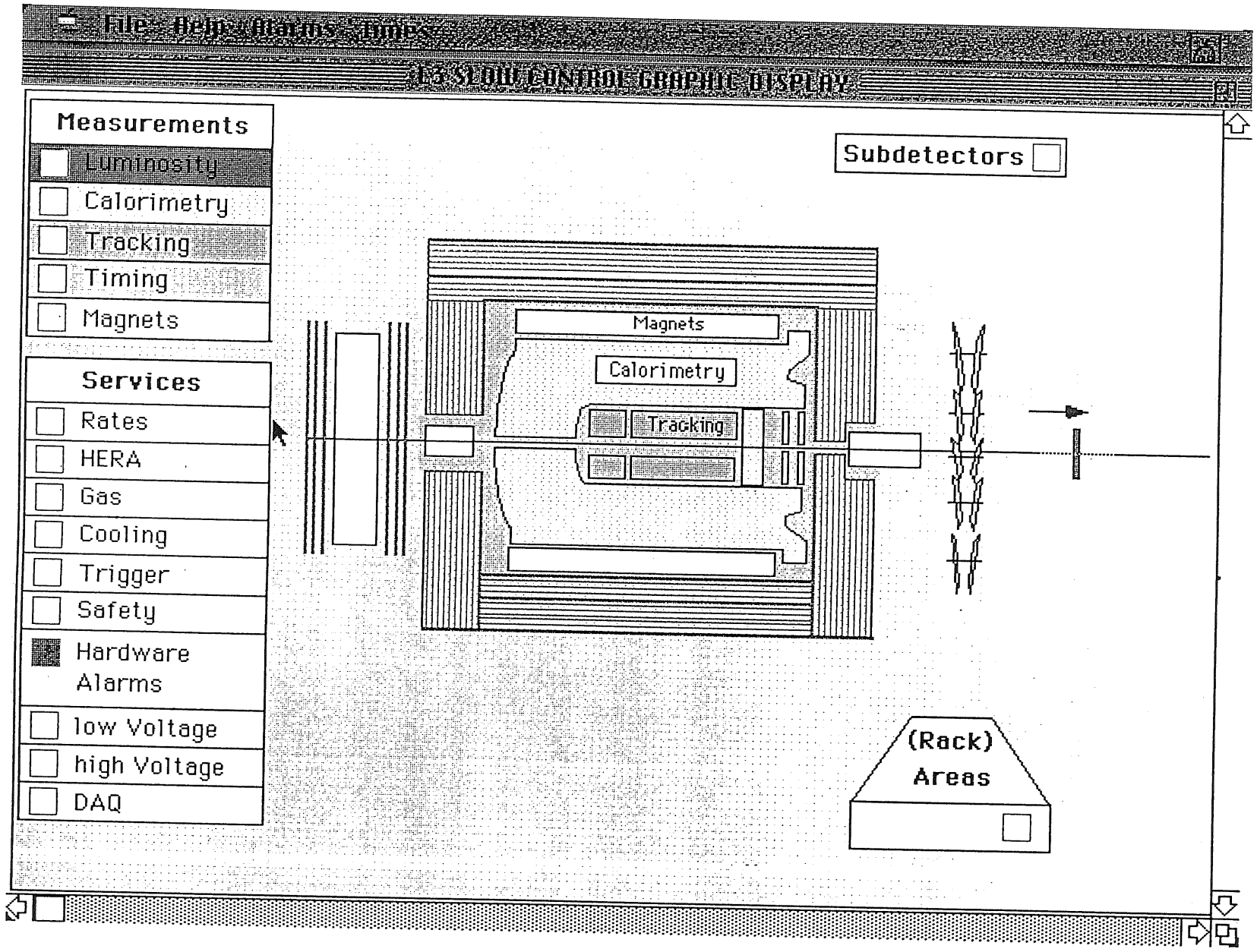
- CENTRAL SLOW CONTROL

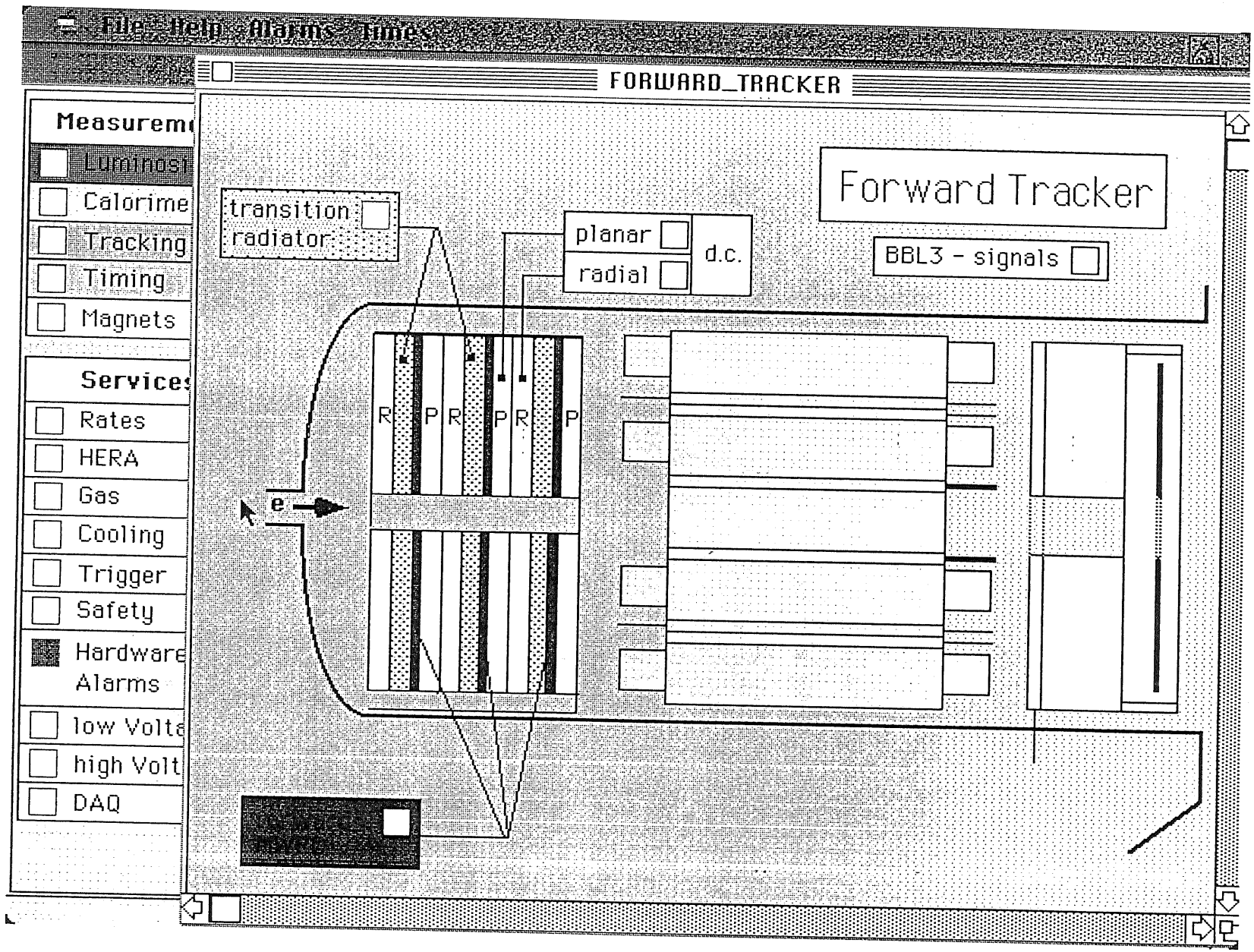
  CENTRALIZED COLLECTION OF INFORMATION VIA LAN
  CENTRAL CONTROL (LATER ON)
  COMMUNICATION WITH SUBDETECTORS HAS STARTED
  BASIC STATES DISPAY AND DATA LOGGING EXISTS.

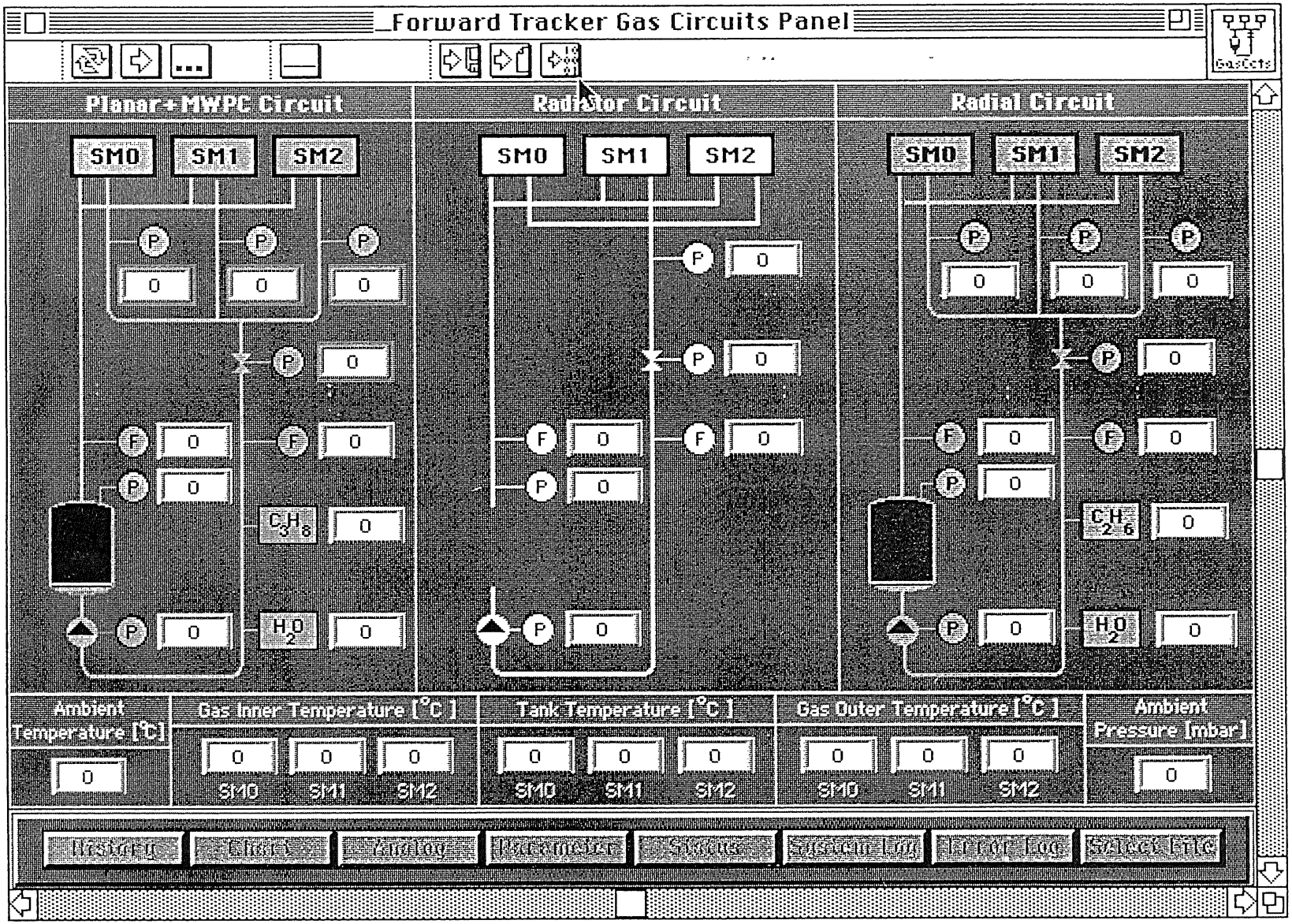
WHAT CAN ONE DO...

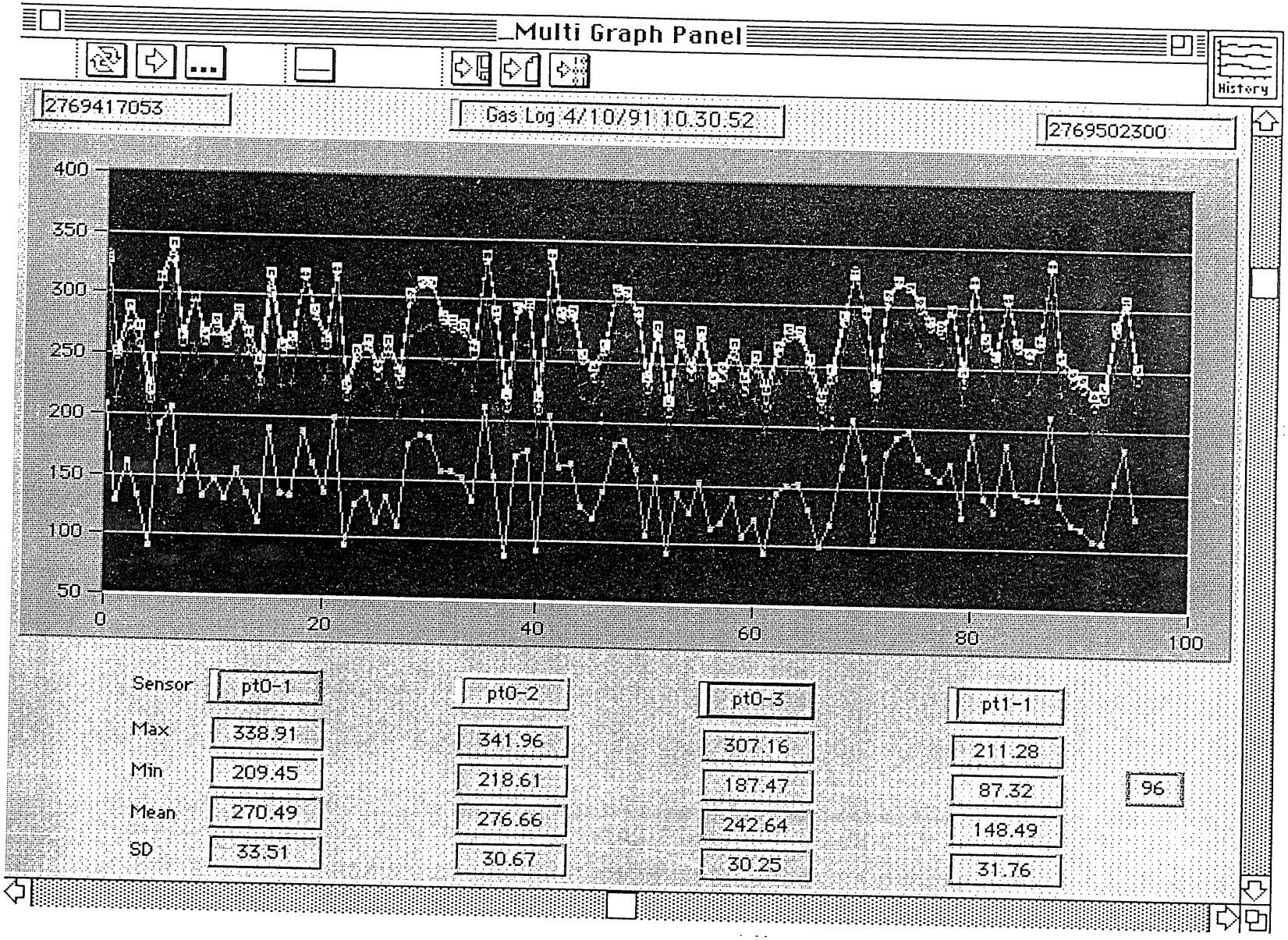
... CENTRALLY ⇒ ARGUS DISPLAY

... LOCALLY ⇒ SUBDETECTOR CONTROL

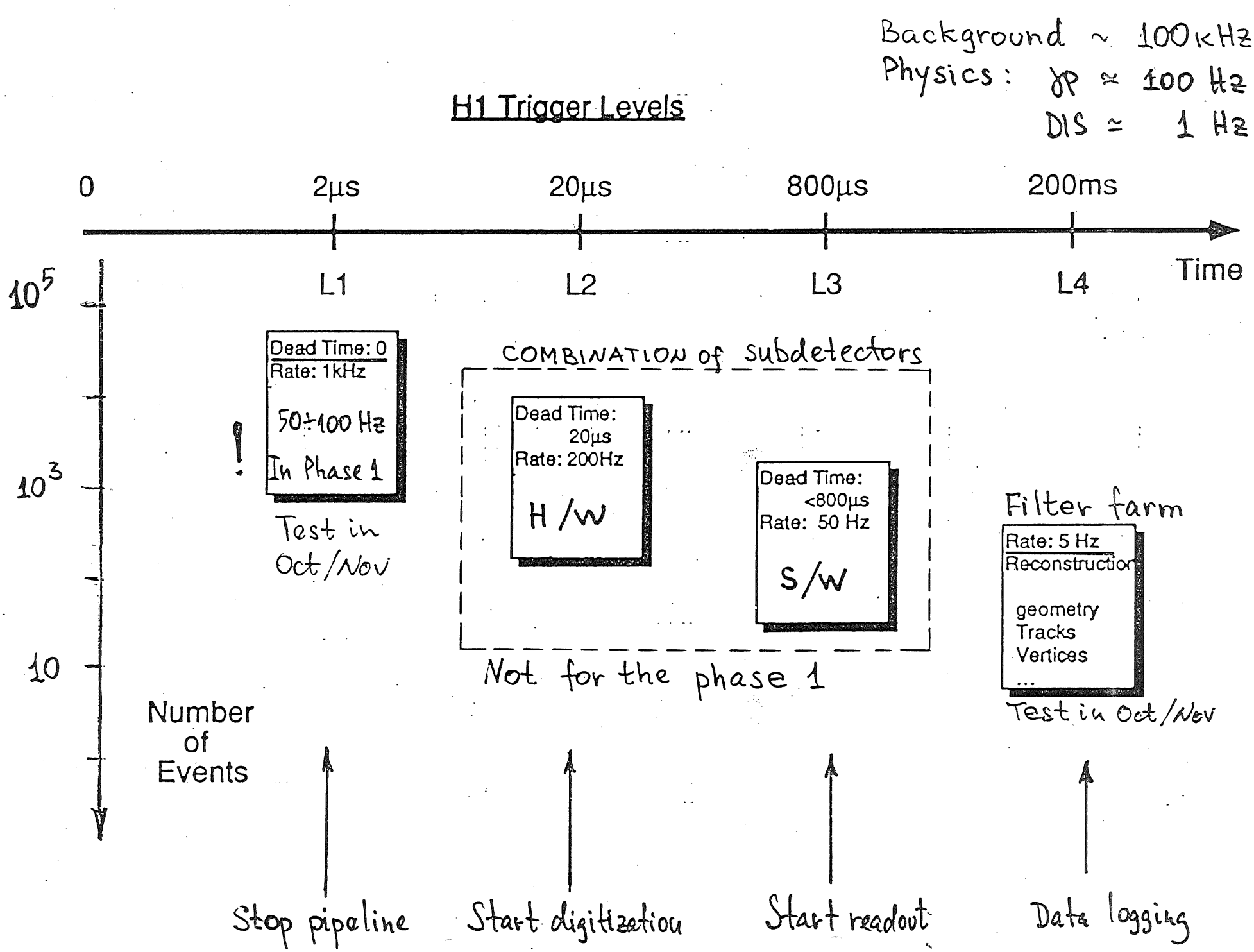

File Help Hardcopy Time
L3 SLOW CONTROL GRAPHIC DISPLAY
Measurements
Luminosity
Calorimetry
Tracking
Timing
Magnets
Services
Rates
HERA
Gas
Cooling
Trigger
Safety
Hardware Alarms
low Voltage
high Voltage
DAQ
Subdetectors
Magnets
Calorimetry
Tracking
(Rack) Areas


File Help Alarms Times
FORWARD_TRACKER
Measureme
Luminosi
Calorime
Tracking
Timing
Magnets
Service
Rates
HERA
Gas
Cooling
Trigger
Safety
Hardware
Alarms
low Volta
high Volt
DAQ
transition
radiator
planar
radial
d.c.
Forward Tracker
BBL3 - signals
R P R P R P
e


Forward Tracker Gas Circuits Panel
Planar+MWPC Circuit
Radiator Circuit
Radial Circuit
SM0
SM1
SM2
Ambient Temperature [°C]
Gas Inner Temperature [°C]
Tank Temperature [°C]
Gas Outer Temperature [°C]
Ambient Pressure [mbar]


Multi Graph Panel
History
2769417053
Gas Log 4/10/91 10.30.52
2769502300
400
350
300
250
200
150
100
50
0
20
40
60
80
100
Sensor
pt0-1
pt0-2
pt0-3
pt1-1
Max
338.91
341.96
307.16
211.28
Min
209.45
218.61
187.47
87.32
96
Mean
270.49
276.66
242.64
148.49
SD
33.51
30.67
30.25
31.76

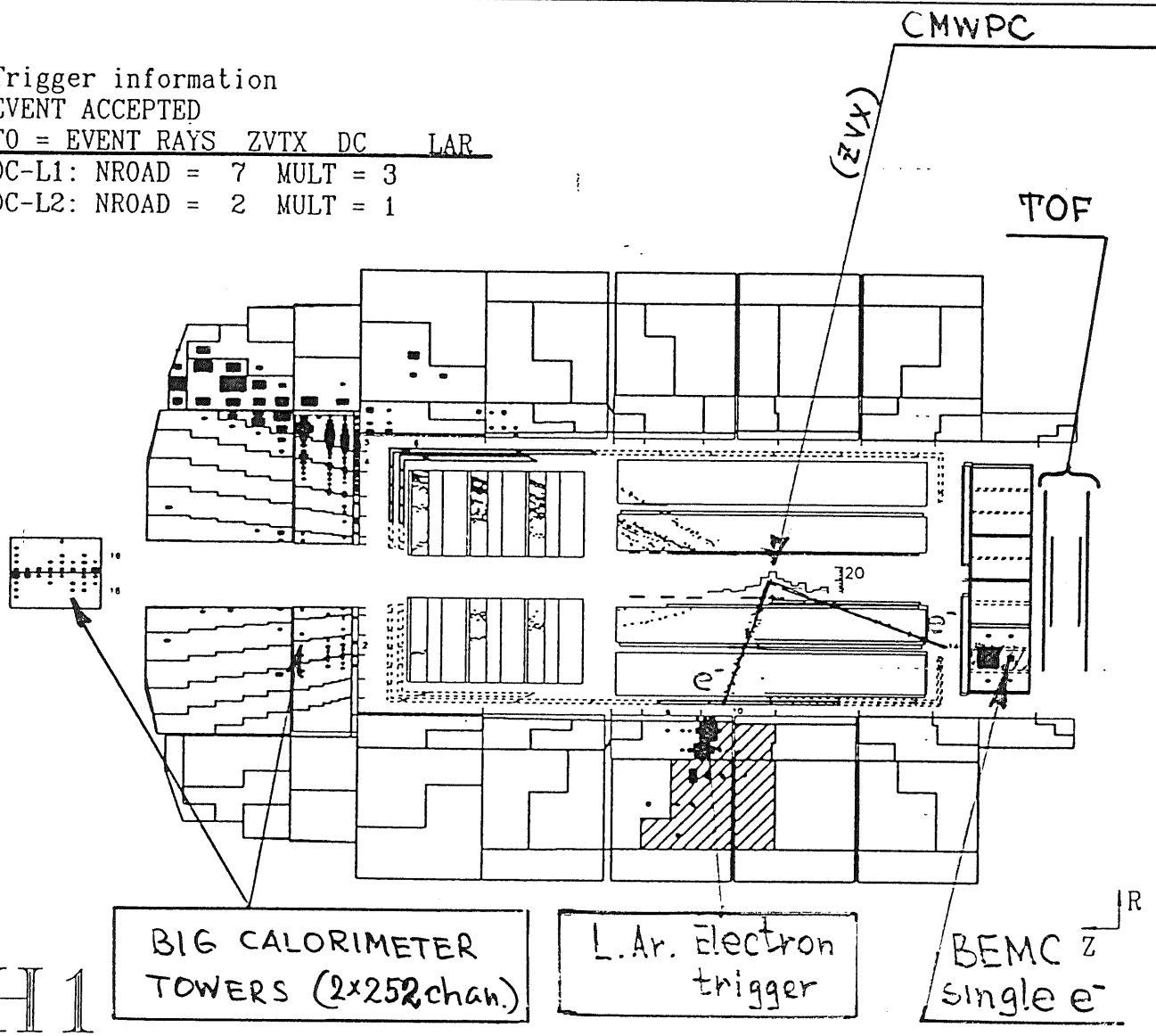
Background ~ 100 kHz
Physics: $\gamma p \simeq 100$ Hz
DIS $\simeq$ 1 Hz



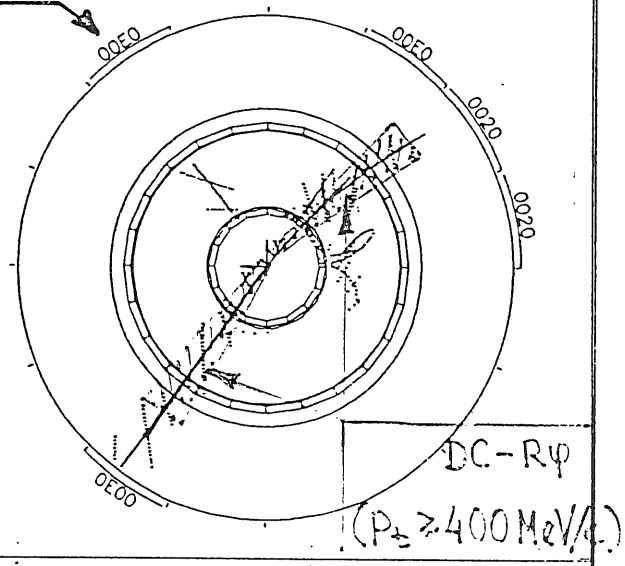
Look - L1 Trigger information

Date 1/10/1991

Trigger information
EVENT ACCEPTED
TO = EVENT RAYS ZVTX DC LAR
DC-L1: NROAD = 7 MULT = 3
DC-L2: NROAD = 2 MULT = 1

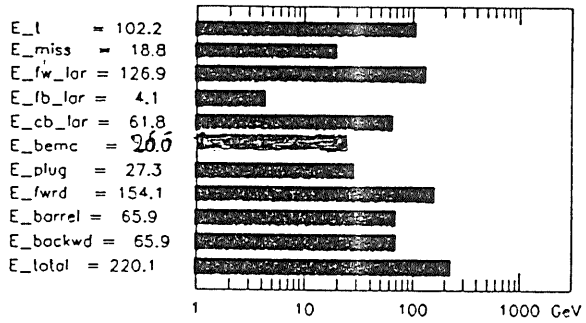


H1



CALORIMETER ENERGY SUMS

TTSE: L1 trigger energy sums



L1 subdetector trigger status (Oct '91)

Subdetector trigger	First operation	March '92
Main calorimeter trigger (L.Ar., BEMC)	October: redout of FADC November: 1. digital sums	*
Single electron trigger in Backward El. mag. calorimeter	October '91	*
z-vertex trigger (Central MWPC's)	October: 2/16 operational	*
Rφ trigger (Central Jet Chamber)	October: 1/15 operational	*
z chamber trigger (2 z drift chambers)	In the development stage	> Spring 1992
Digital muon trigger (Instrumented IRON)	October: partly operational	(*)
Forward muon trigger (Forw. muon spectrometer)	December '91	*
TOF (scintillator walls)	October '91	*
Electron tagger (ET of LUMI system)	July '91	*

Liquid Argon Trigger

Main work is done:

- analog part installed and tested
- timing adjusted (compensated for different capacities): ~4730 tr. channels

In October run:

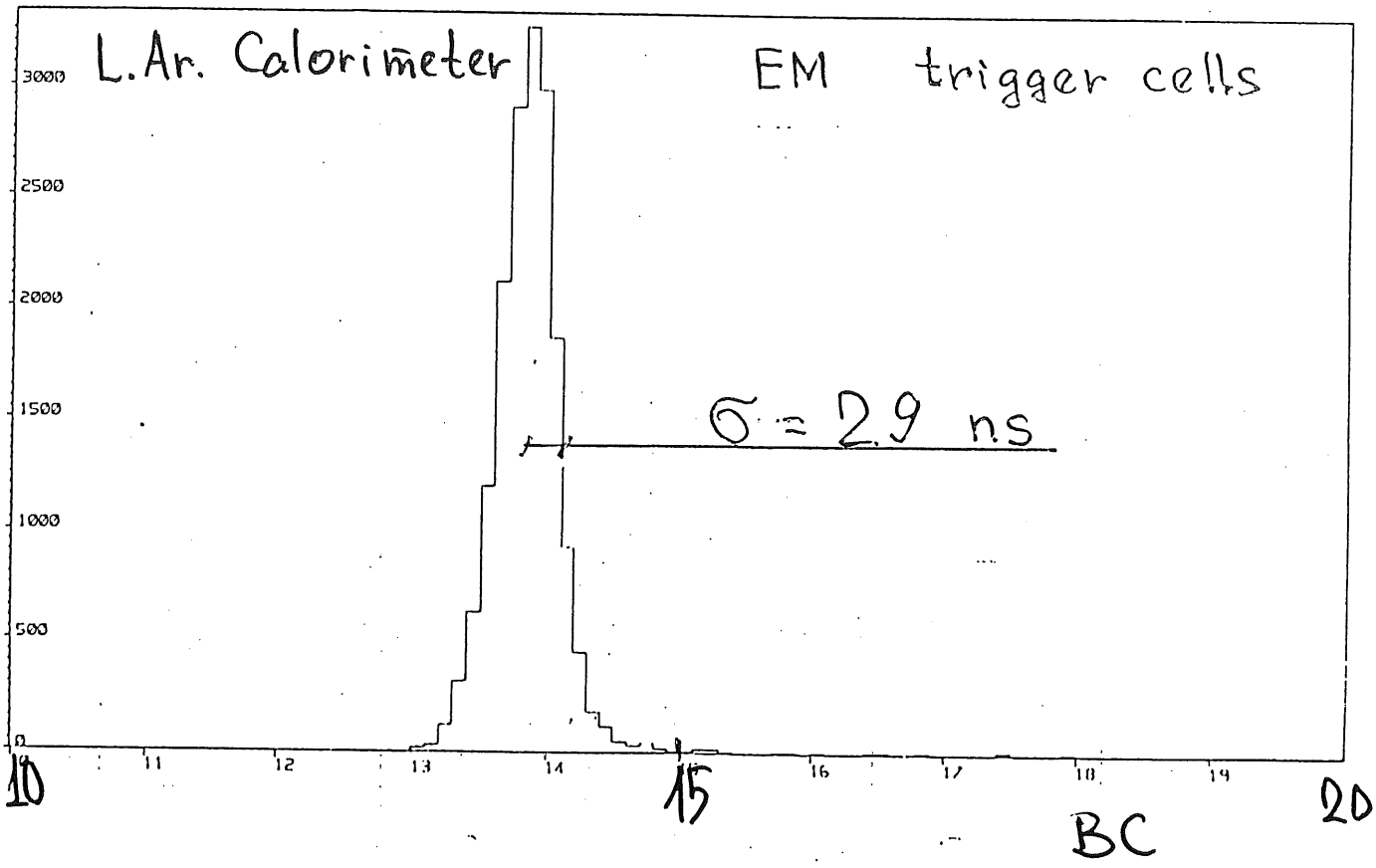
- FADC's will be readout
- measurement of time resolution vs. energy + noise thresholds in real detector

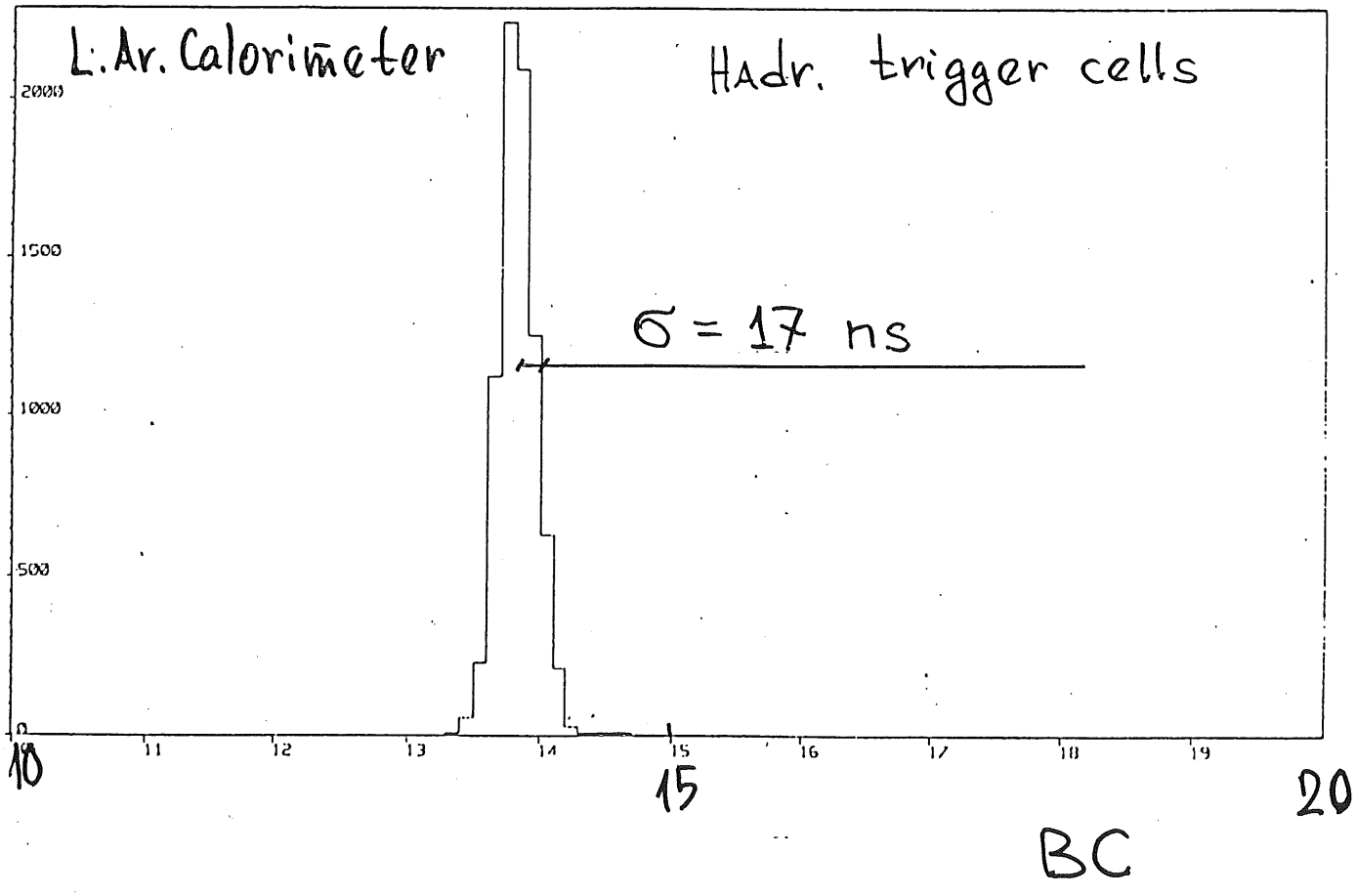
Digital summing

delayed due to the problem of manufacturing of digital summing boxes.

→ in Nov / Dec '91

Tune jitters of trigger signals from cells measured by electronic calibration system

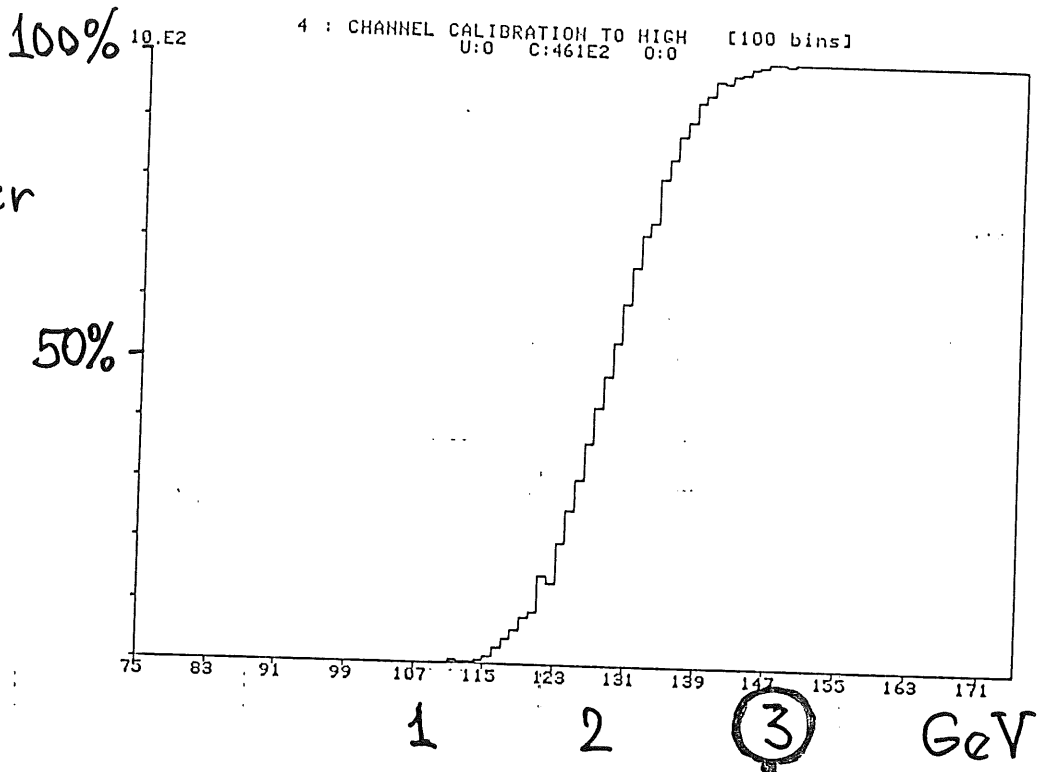


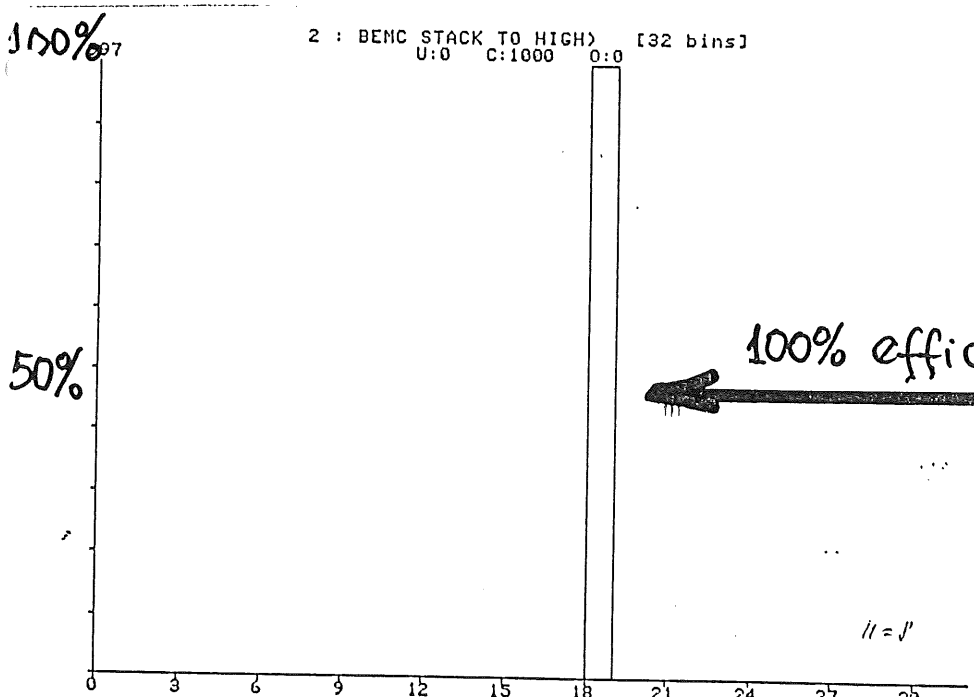


Backward Single Electron Trigger

- Based on measurement of energy of EM cluster.

Single calorimeter stack threshold curve





100% efficiency

−18 0 +12

nominal

HERA bunch crossing

L4 trigger (parallel filter farm)

- Partial event reconstruction for fast filtering: reject background events

Expected input rate: 50÷100 Hz ⇒ output ≤ 5 Hz

Implementation:

15 RISC processors (CES, RAID 8235) in 2 VME crates

⇒ 300 MIPS equivalent to 7.5 IBM 3090 CPU's

{ $t \lesssim 300$ msec/event available }

- Filter algorithms

1) trigger analysis and verification

2) fast vertex reconstruction in z and $(r\varphi)$

- z_{vx} by histogram technique in CJC: 8 msec
- full vertex reconstruction by tracks in CJC: 80 msec
- z_{vx} by z-chambers link 60 msec
- z_{vx} by fast forward track reconstruction: 120 msec

⟹ { $\langle t \rangle \approx 40$ msec
Rejection factor ≳ 7 w.r.t. L1 accepted }

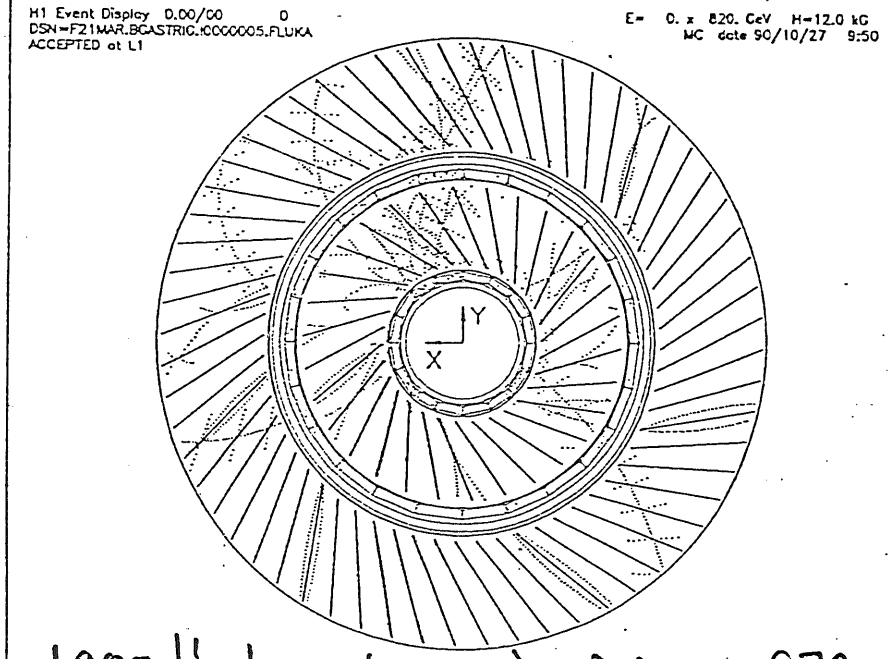
Remaining background:

p-gas collisions within interaction region

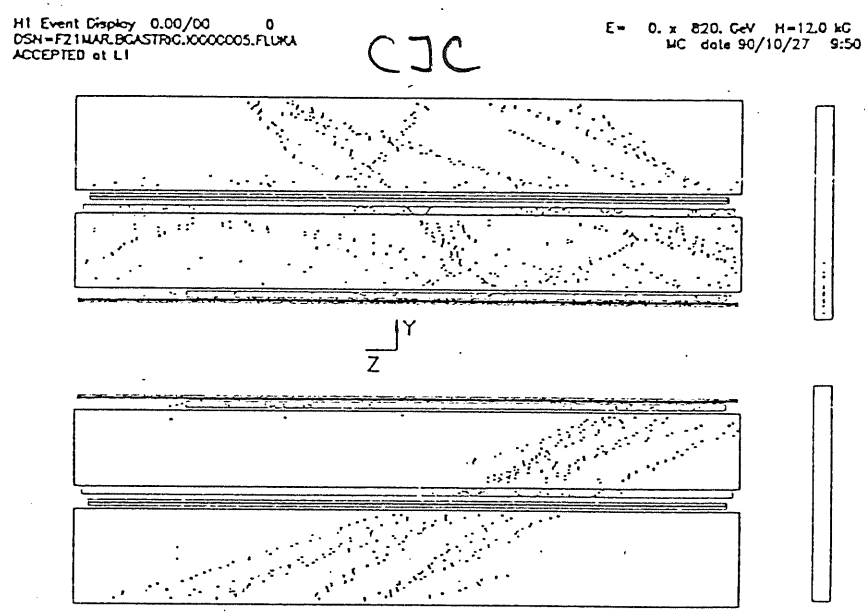
3) further possibilities:

- analyse energy flow
- kinematic selection
- downscaling of 'uninteresting' physics (low p_t jp)

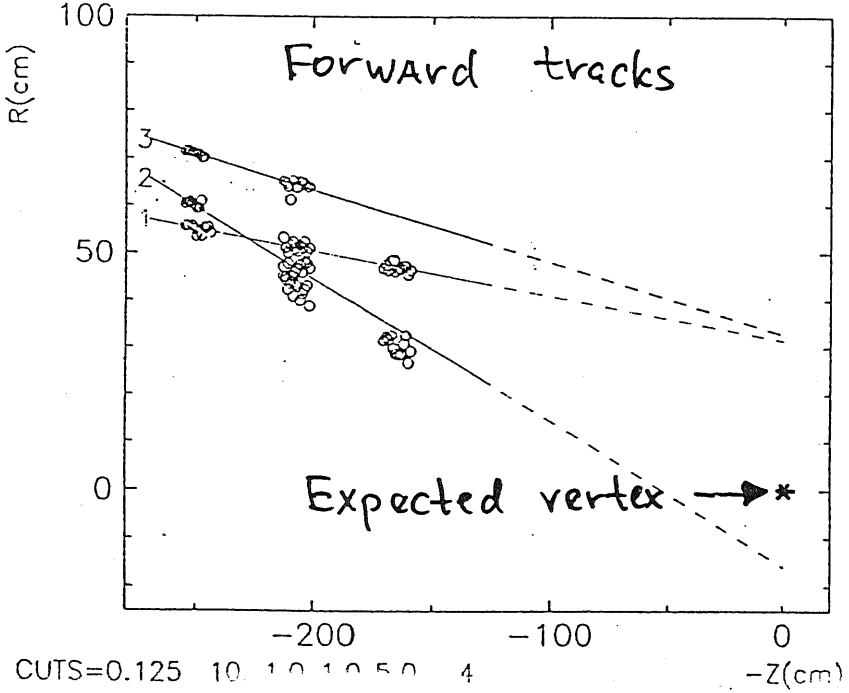
Look – Run number 1 Event nur ber 92 BEAM-GAS EVENT Date 17/01/1991

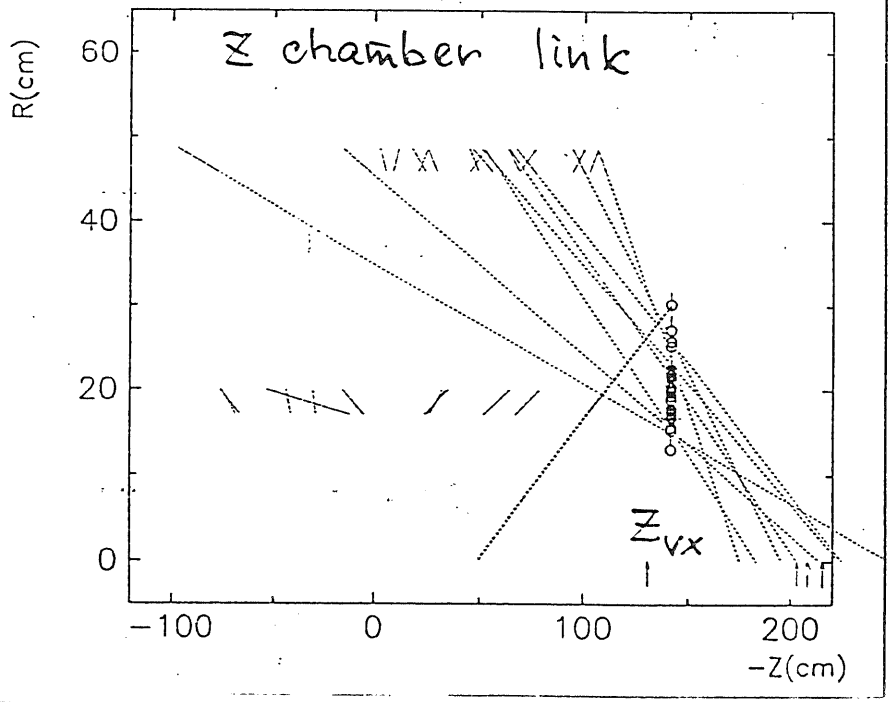


'good' tracks in RΦ. CJC

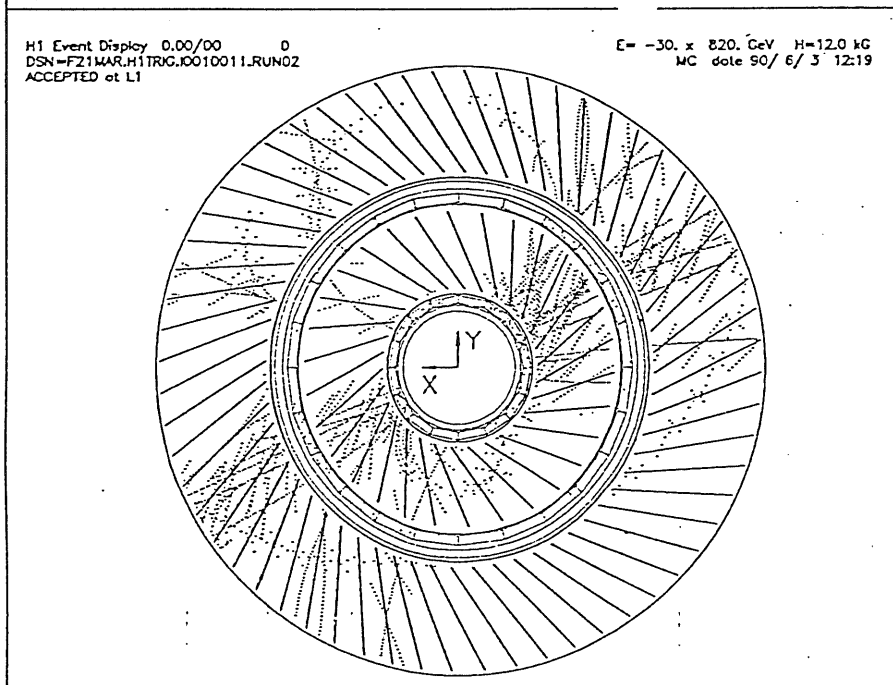


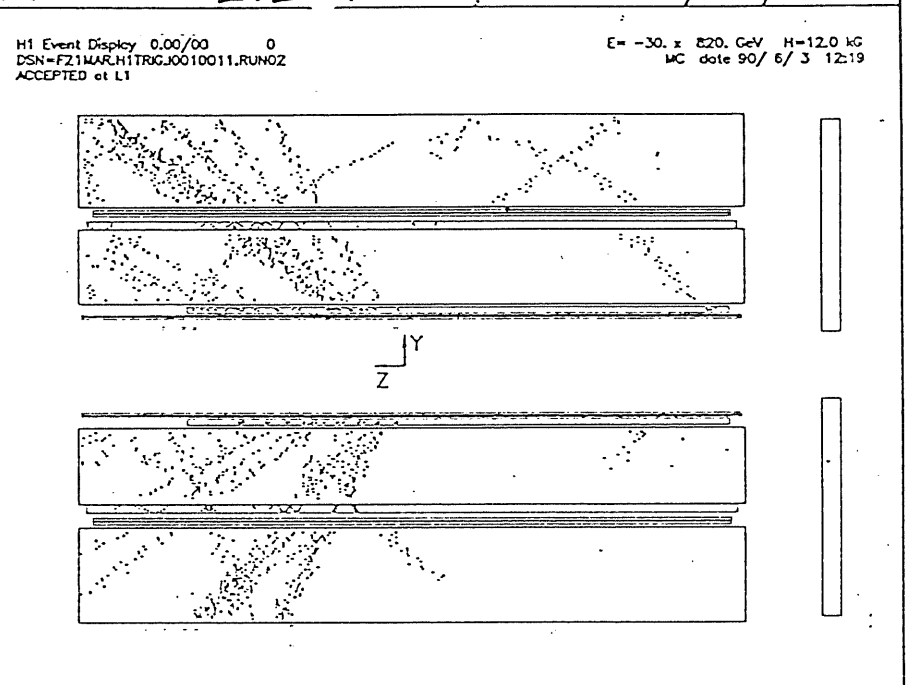
Backward tracks. Can be rejected by hist.

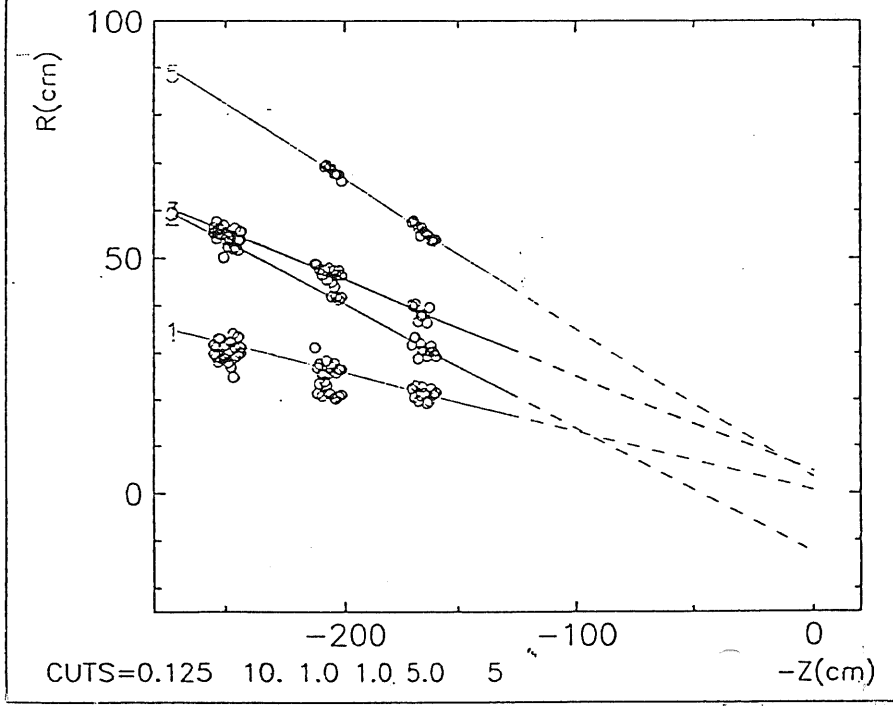


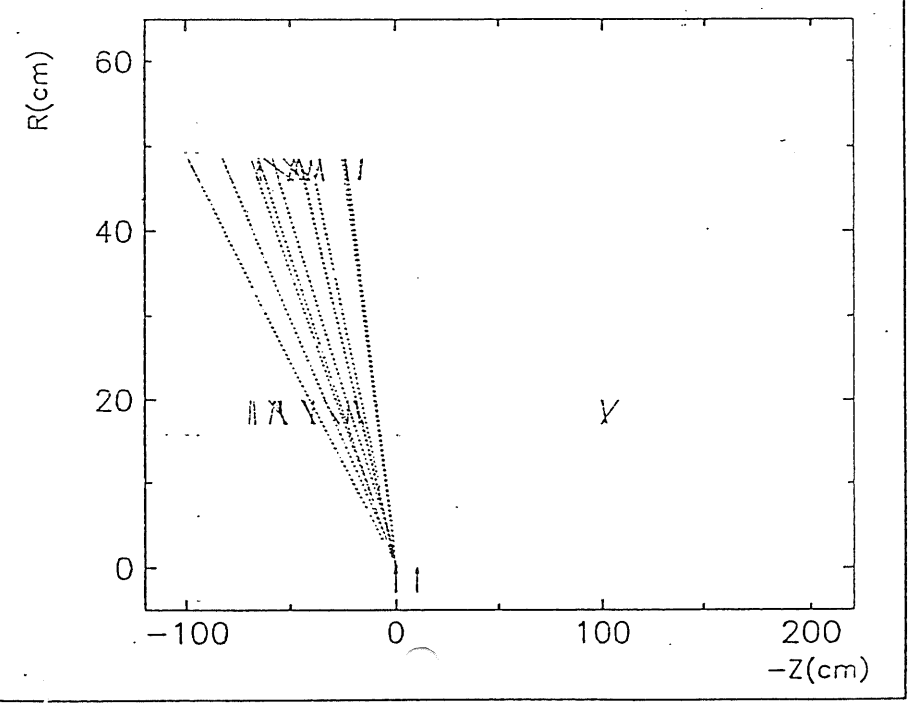


Look – Run number 1 Event number 11 PHYSICS EVENT Date 18/03/1991

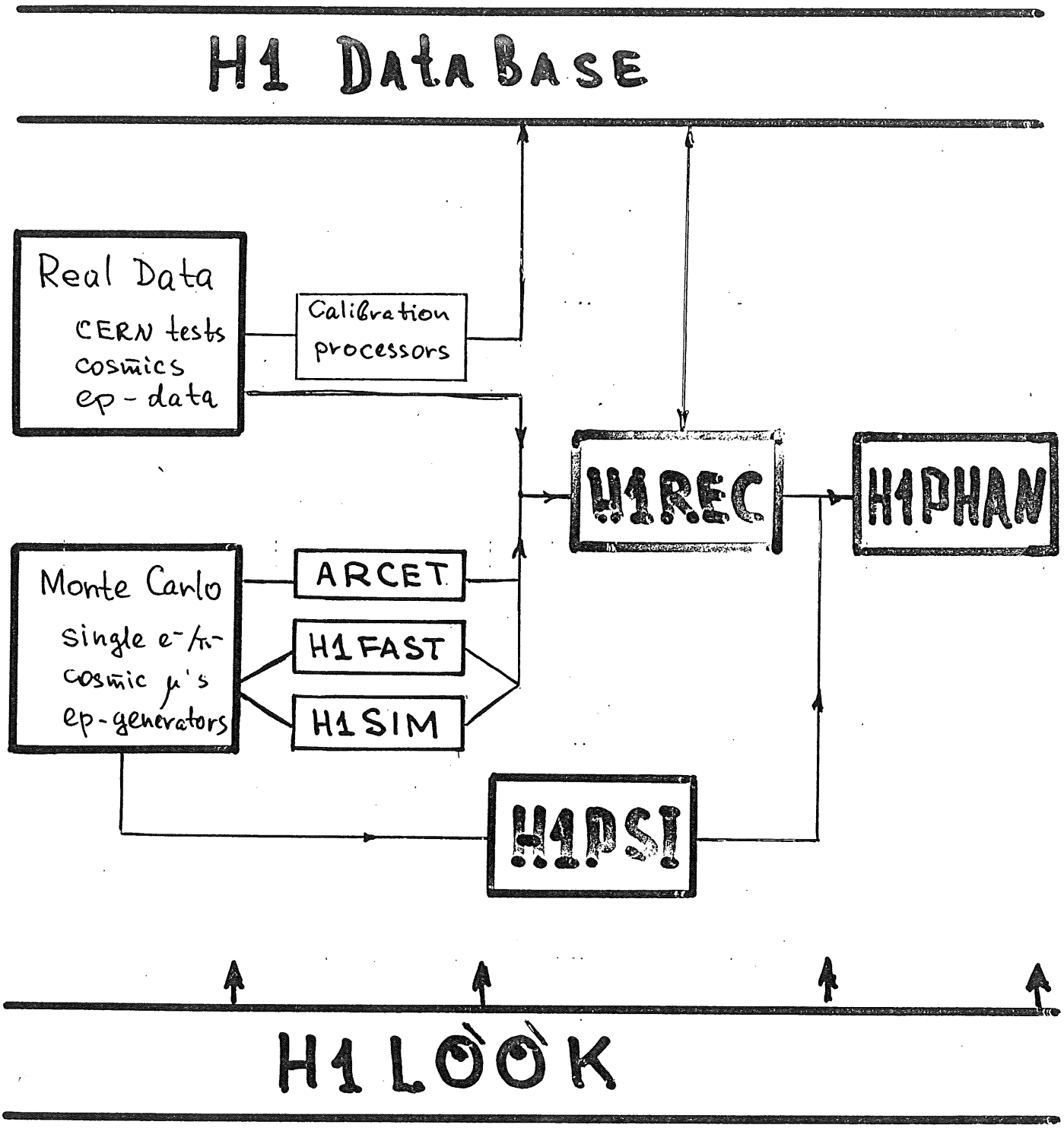








- H1 offline software -



Modularity
Data structure (BOS)
Standard IO (FPACK)
Standard framework for graphics (LOOK)

• BASIC PACKAGES

BOS – Dynamic memory management
Flexible data structure

FPACK – Package for input/output
Machine independent
Remote access via networks
Keyed access (important for DB)
Index feature (event selection)
Data compression (to be added)

LOOK – System for graphics and data analysis
Provide framework for interactive graph. appl.
Includes histogram package
Supports FPACK and BOS formats
Used online and offline
Interactive language interpreter
Fitting

• Standard H1 software

Package		Timing (IBM3090)
H1SIM	best description of H1	300"/DIS event
H1FAST	main MC for mass production	30"/event
ARCET	full simulation of CERN data	
H1REC	general H1 reconstruction	1"/event
H1PSI	superfast parametrized simulation	0.1"/event
H1PHAN	analysis package	
H1LOOK	H1 Event Display	

• H1REC

Reconstruction of ep events in H1 Detector (MC & data)

Fully modular → and easy reprocessable program

Status.

Complete version of all modules technically works providing unambiguous detector information:

- linked tracks (including muons)
- calibrated calorimeter cell energies and clusters
- lepton ID estimators
- track-cluster link probabilities

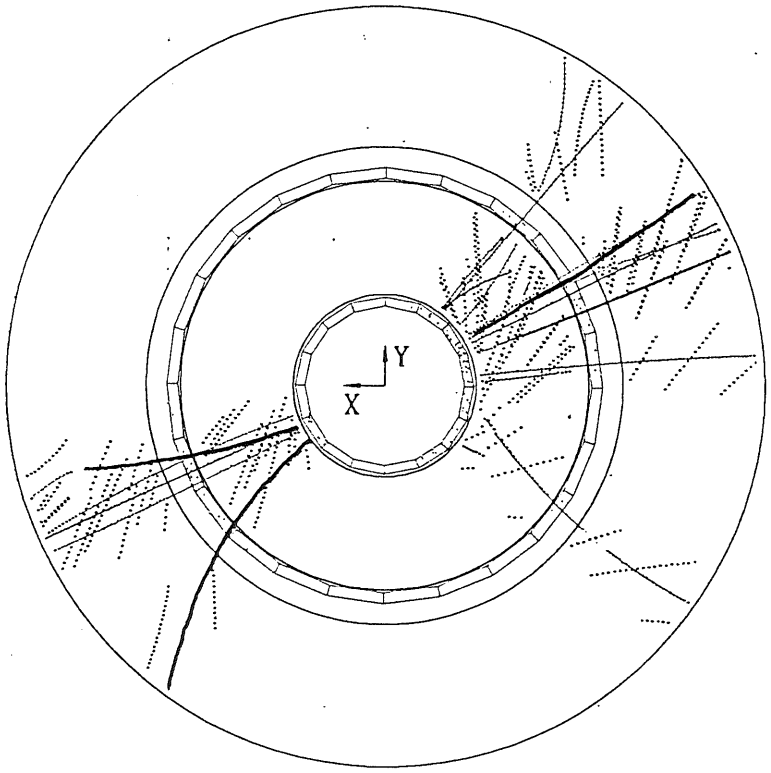
Performance

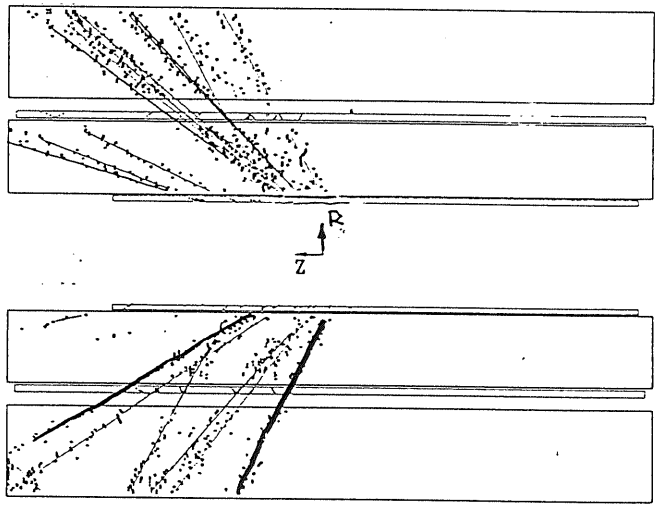
- MC event reconstruction (tested on 10^3 DIS ev.)
  - SIZE: $\lesssim$ 10 MB
  - Speed: 1.1 sec / DIS event on IBM 3090
  - Pattern recognition, link eff., ... - reasonable (Fig →)
- Reconstruction of cosmic events
  - test of data corrections
  - calibration algorithms
  - access to the database including updating (Fig →)
- Installed and tested on Number Cruncher for 'online' reconstruction

Status is reasonable, but still a lot of work to be done to have a stable, well tested and bug-free production version before March '92

Look - Central Tracker Reconstruction

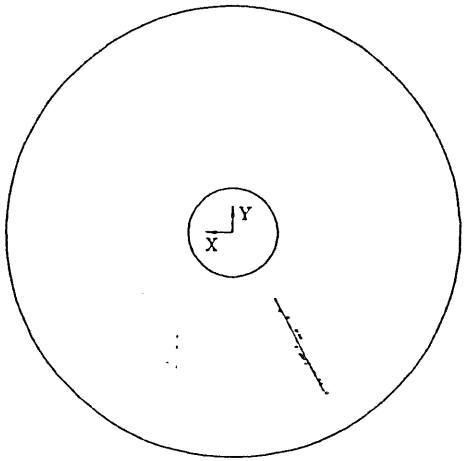
Date 3/10/1991

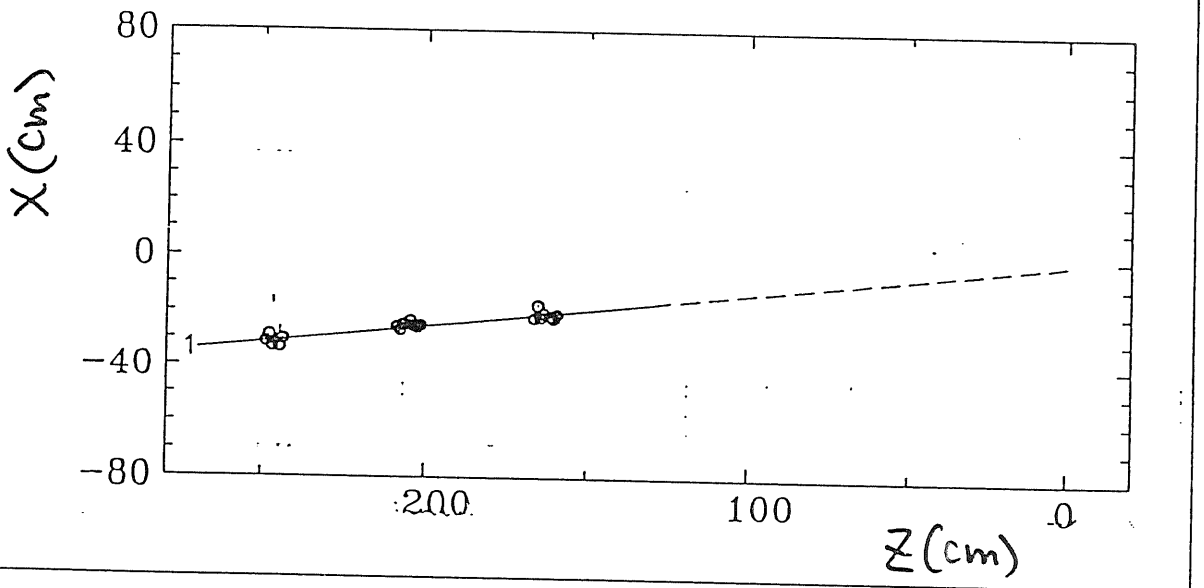


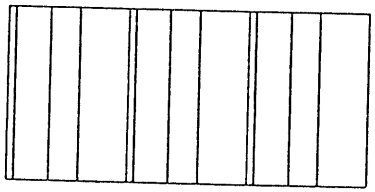


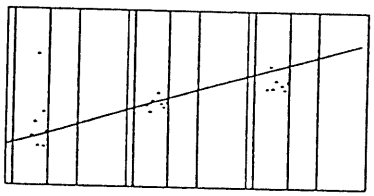
H1

Look – Cosmic muon reconstructed in Forward tracker Date 22/09/1991

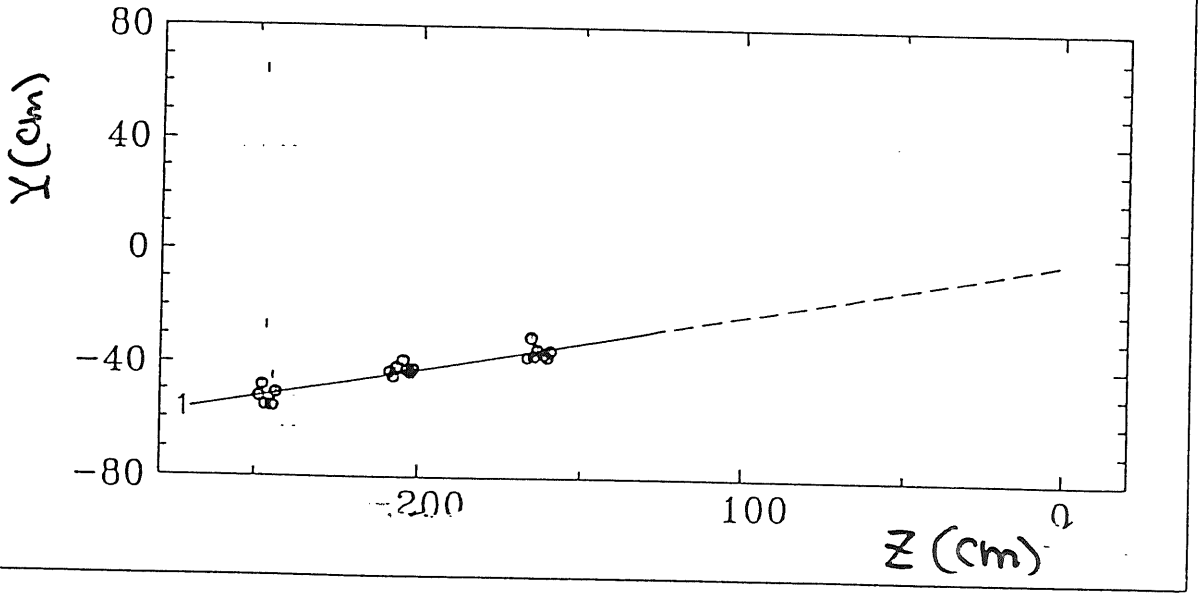








H 1



- Next steps
  - 'online reconstruction' of cosmic μ's in October
  - to get first calibration set for ep-data
  - mass reconstruction of MC events for physics analysis and background studies (Dec '91)

• Online reconstruction

Processing of logged data parallel to the data taking

- ▸ fast filter to reject background (if not on L4)
- ▸ full reconstruction
- ▸ event classification

Output

POT (production output tapes): full output of all interesting events

DST: selected 'most important' events (limited by disk space $\leq$ 20 GB in 92)

Index: files for fast direct access to the events using classification

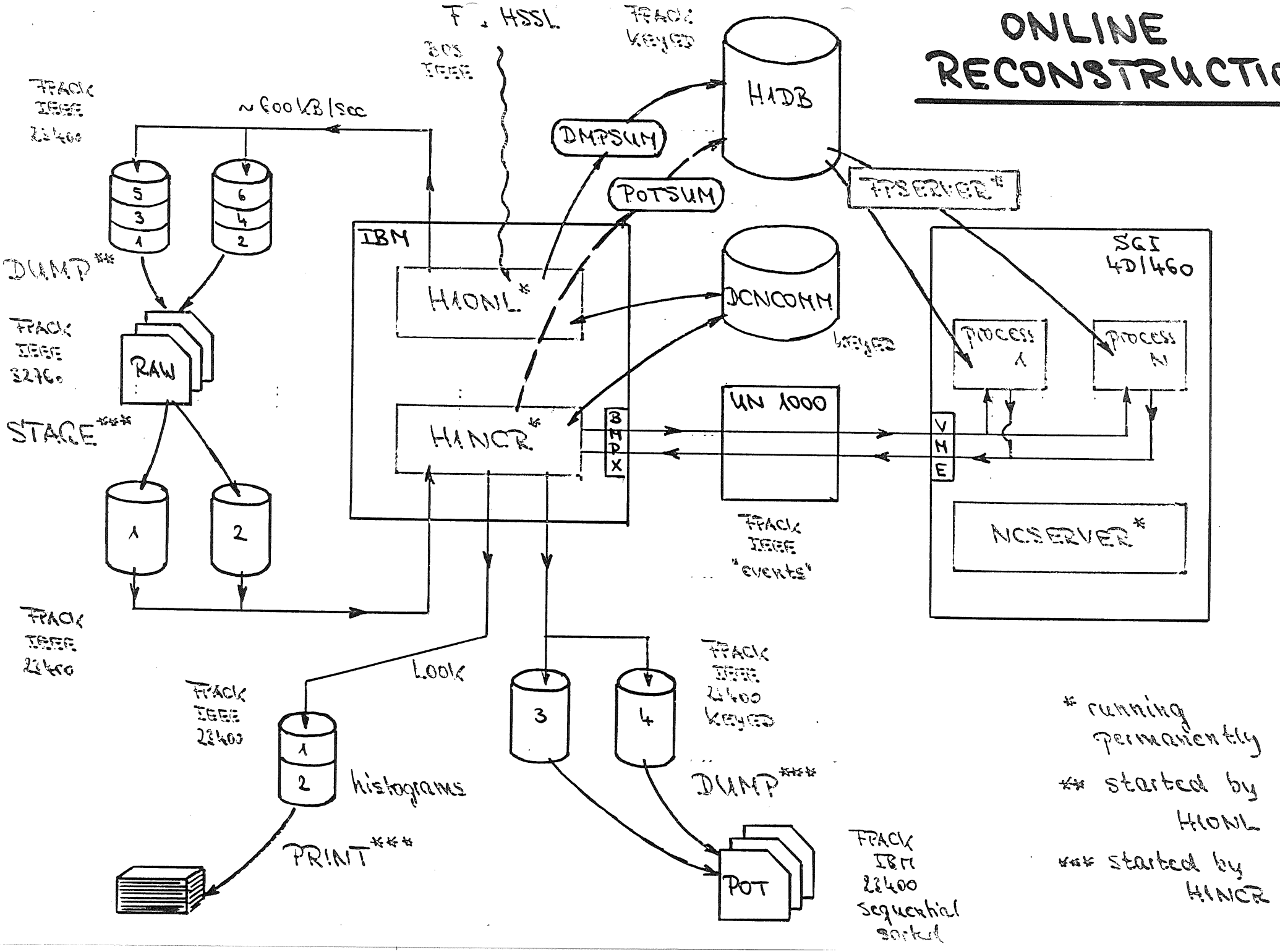
Technical realisation

→ see fig.

Status

Hardware and basic software available, set up and tested
First complete test - during October run

ONLINE RECONSTRUCTION



- **H1PHAN** Physics analysis package

[Modelled on examples of ARGUS/ALEPH]

POT's → DST's

- fast event access and selections (Index files)
- interpretetion of reconstruction output
- reprocessing features:
  - association tracks to vertices
  - particle identification
  - association of tracks and clusters
- 4-vector bank creation for particles and vertices
- easy access to the physical variables
- utility library for analysis
  - kinematics
  - jet algorithms
  - fitting routines
  - .....

} Open for user's contribution!

n-tuples, histograms → Your favourite interactive analysis (LOOK, PAW, ...) → Publication

μ-DST's → Your favourite interactive analysis (LOOK, PAW, ...)

Status
- Basic version exists and tested
- Used for physics analysis within H1
- Manual available

SUMMARY

- H1 IS WELL PREPARED TO MOVE INTO THE BEAM AS SOON AS MACHINE STATUS ALLOWS IT

- REMAINING AREAS OF UNCERTAINTIES:

  TRIGGER – THE MAIN PROBLEM FOR HERA, NEEDS REAL PROTON BEAM DATA TO SEE WHERE WE STAND

  RECONSTRUCTION – NEEDS STILL SERIOUS WORK, BUT REASONABLY GOOD AND WELL TESTED VERSION WILL EXIST IN SPRING '92

WE ARE WAITING AND HOPING FOR HERA TO ACHIEVE **ep** COLLISIONS THIS YEAR, AND ep PHYSICS EARLY 1992