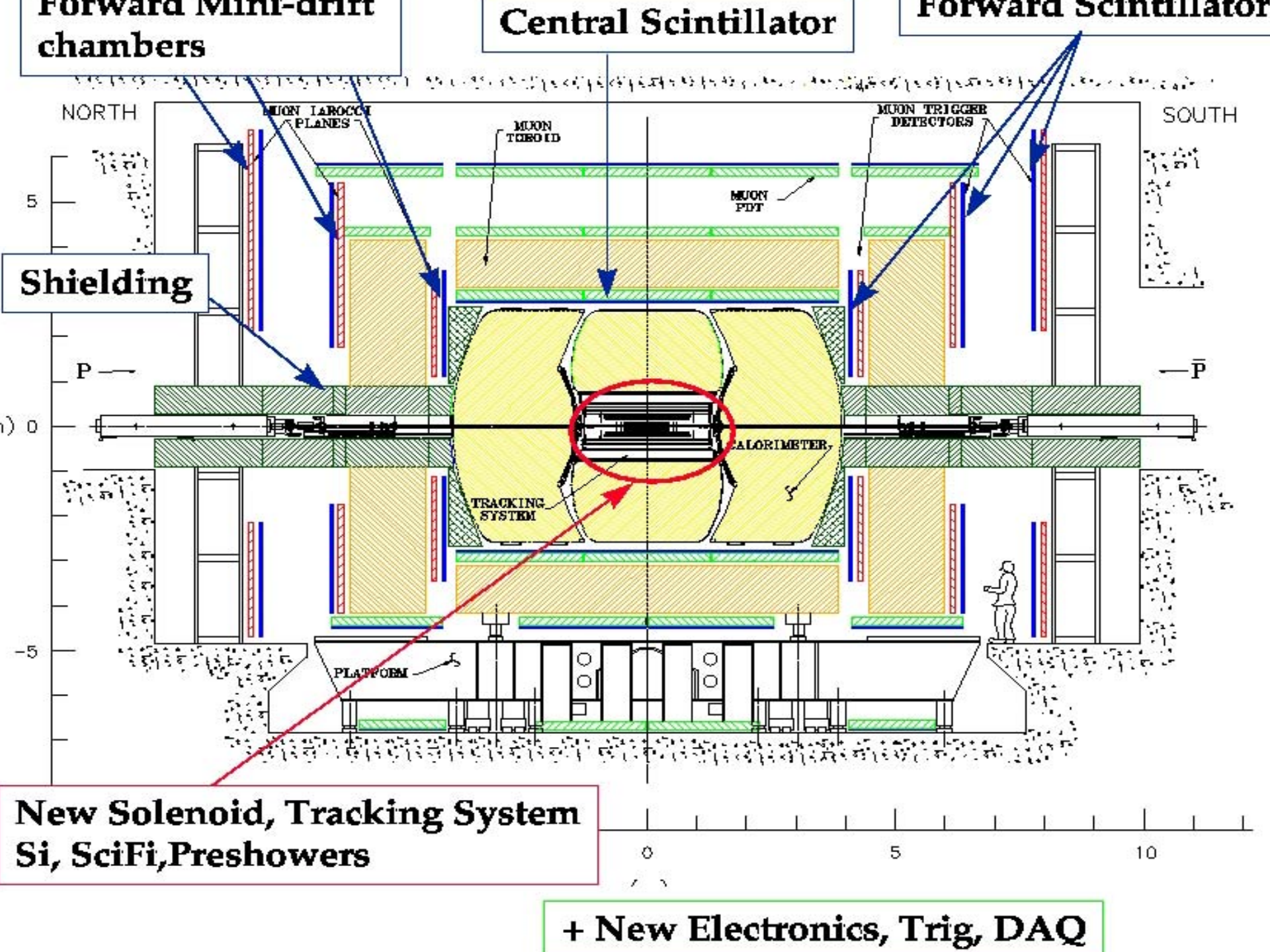
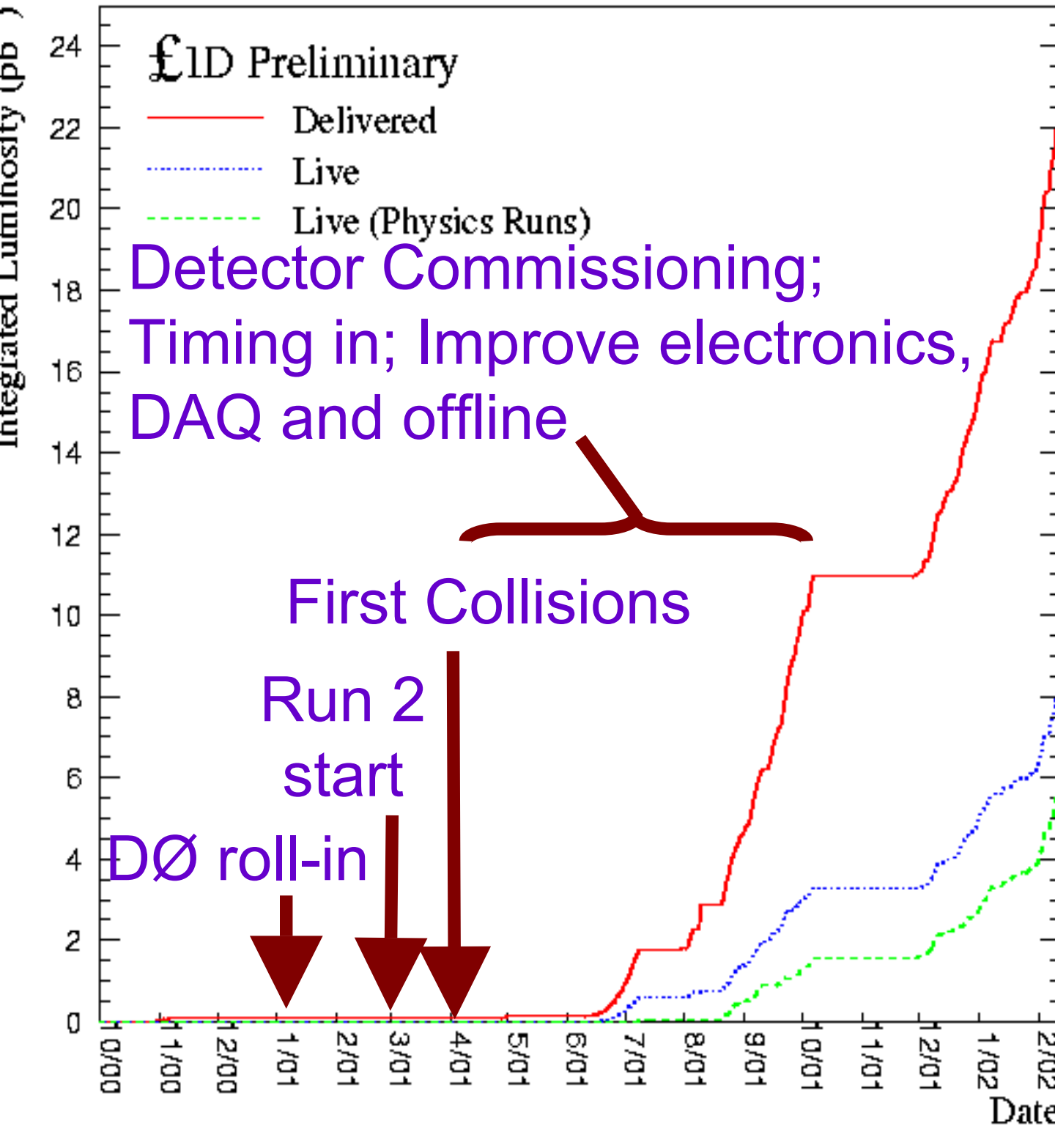
The DØ Detector in Run 2


Forward Mini-drift chambers
Central Scintillator
Forward Scintillator
Shielding
NORTH
SOUTH
MUON IAROCCI PLANES
MUON TOROID
MUON TRIGGER DETECTORS
MUON PDT
P
$\bar{P}$
CALORIMETER
TRACKING SYSTEM
PLATFORM
New Solenoid, Tracking System
Si, SciFi,Preshowers
+ New Electronics, Trig, DAQ

Luminosity in Run 2A



The DØ Collaboration

The DØ Collaboration

U. of Arizona
U. of California, Berkeley
U. of California, Irvine
U. of California, Riverside
Cal State U., Fresno
Lawrence Berkeley Nat. Lab.
Florida State U.
Fermilab
U. of Illinois, Chicago
Northern Illinois U.
Northwestern U.
Indiana U.
U. of Notre Dame
Iowa State U.
U. of Kansas
Kansas State U.
Louisiana Tech U.
U. of Maryland
Boston U.
Northeastern U.
U. of Michigan
Michigan State U.
U. of Nebraska
Columbia U.
U. of Rochester
SUNY, Stony Brook
Brookhaven Nat. Lab.
Langston U.
U. of Oklahoma
Brown U.
U. of Texas, Arlington
Texas A&M U.
Rice U.
U. of Virginia
U. of Washington

U. de Buenos Aires

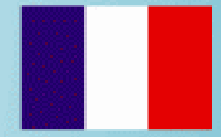
LAFEX, CBPF, Rio de Janeiro
State U. do Rio de Janeiro
State U. Paulista, São Paulo

IHEP, Beijing

U. de los Andes, Bogotá

Charles U., Prague
Czech Tech. U., Prague
Academy of Sciences, Prague

U. San Francisco de Quito



ISN, IN2P3, Grenoble
CPPM, IN2P3, Marseille
LAL, IN2P3, Orsay
LPNHE, IN2P3, Paris
DAPNIA/SPP, CEA, Saclay
IReS, Strasbourg
IPN, IN2P3, Villeurbanne

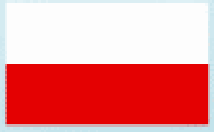
U. of Aachen
Bonn U.
IOP, U Mainz
Ludwig-Maximilians U, Munich
U. of Wuppertal

Panjab U., Chandigarh
Delhi U., Delhi
Tata Institute, Mumbai

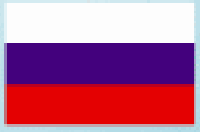
KDL, Korea U., Seoul

CINVESTAV, Mexico City

FOM-NIKHEF, Amsterdam
U. of Amsterdam/NIKHEF
U. of Nijmegen/NIKHEF



INP, Kraków



JINR, Dubna
ITEP, Moscow
Moscow State U.
IHEP, Protvino
PNPI, St Petersburg

Lund U.
RIT, Stockholm
Stockholm U
Uppsala U.

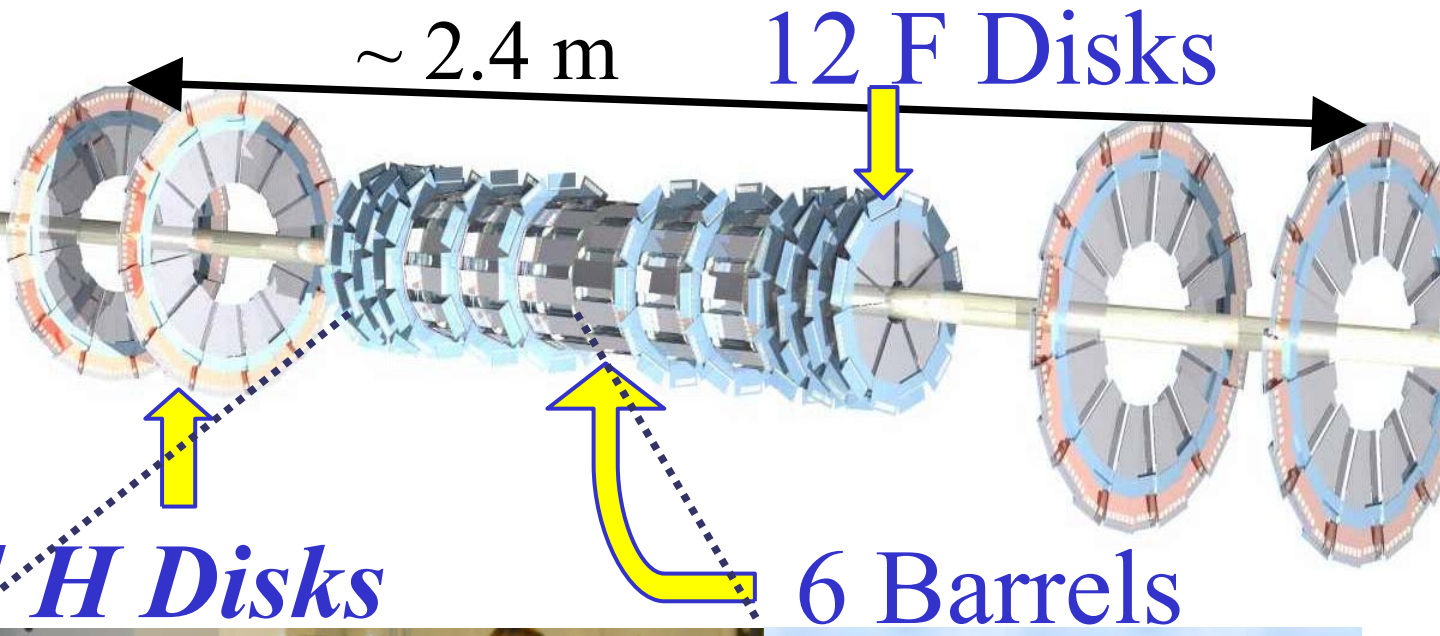
Lancaster U.
Imperial College, London
U. of Manchester

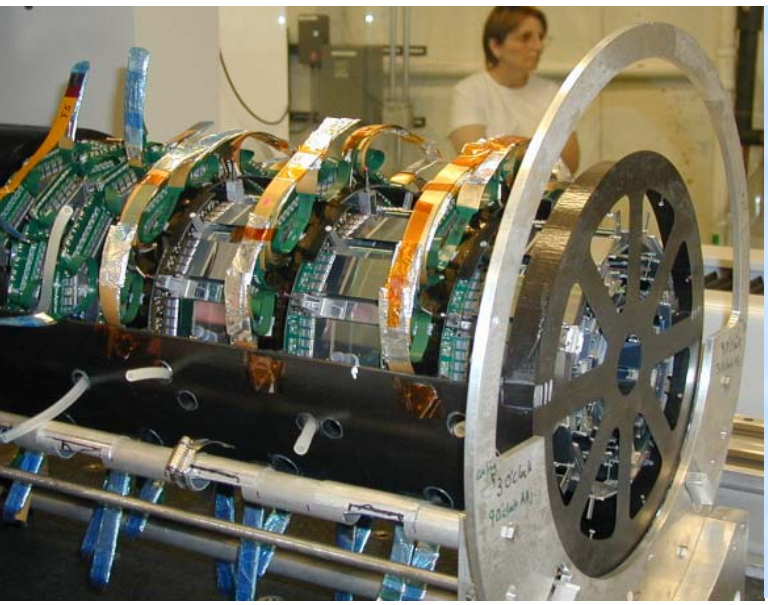
HCIP, Hochiminh City

Ann Heinson, UC Riverside

Silicon Microstrip Tracker

Design of the Silicon Tracker:

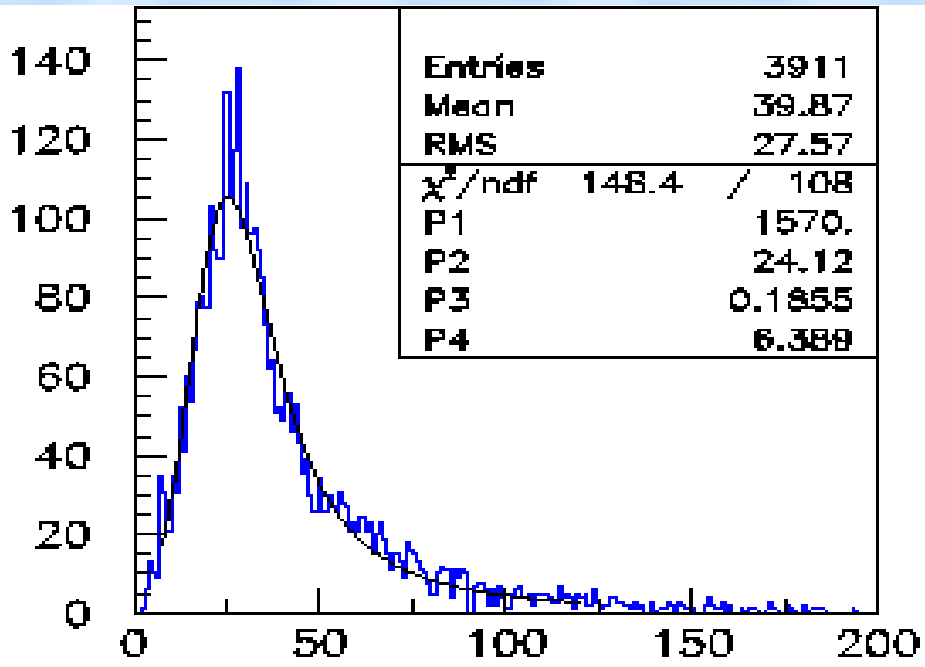




The real thing: assembled SMT half cylinder

Silicon strip detectors
double -and single-sided
total: 793k readout channels

Cluster charge distribution:



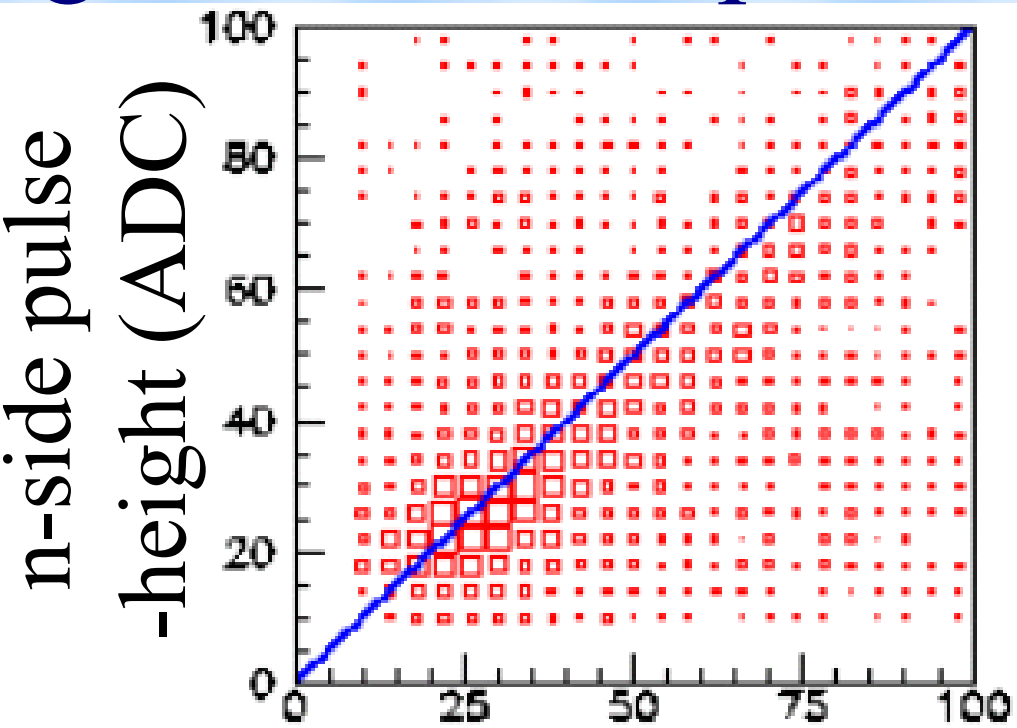
p-side pulse-height (ADC)

1 mip
= 4 fC
= 25 ADC

counts

S/N > 10

Charge correlation p/n-side:



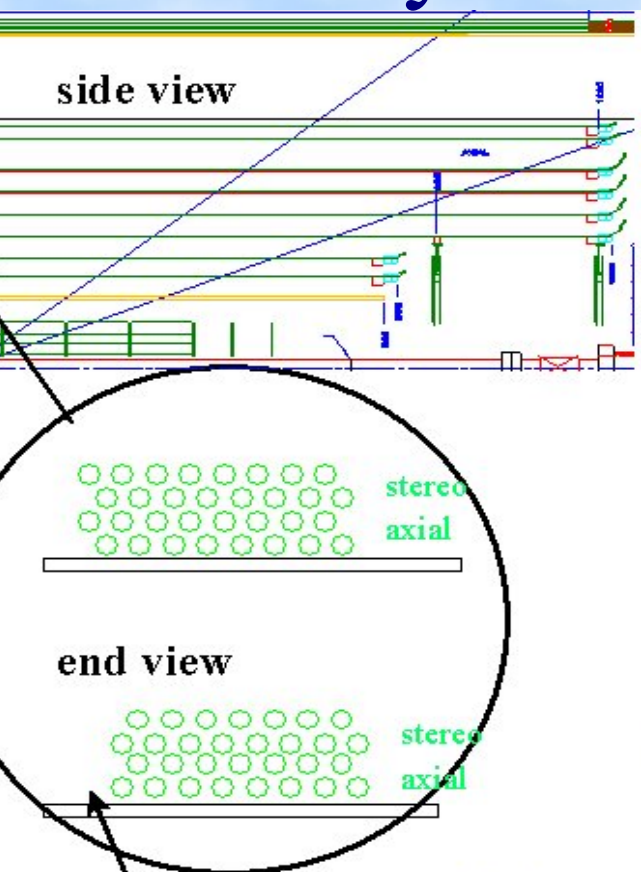
p-side pulse-height (ADC)

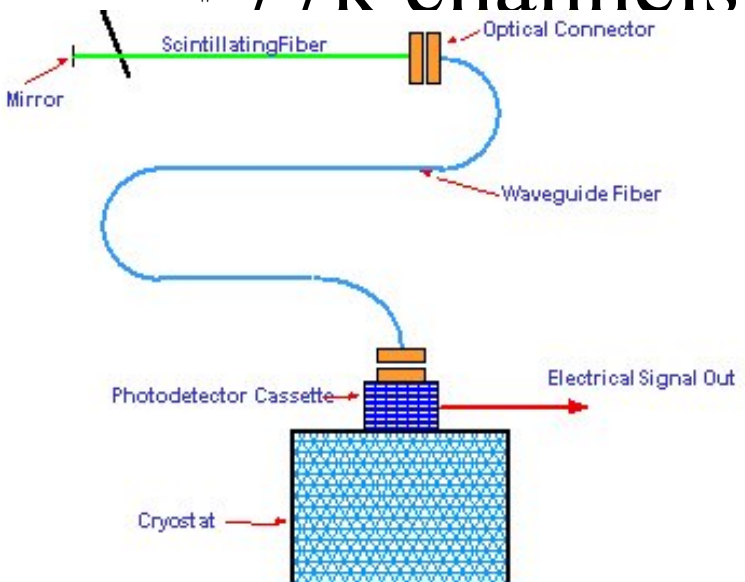
Central Fiber Tracker

The completed CFT

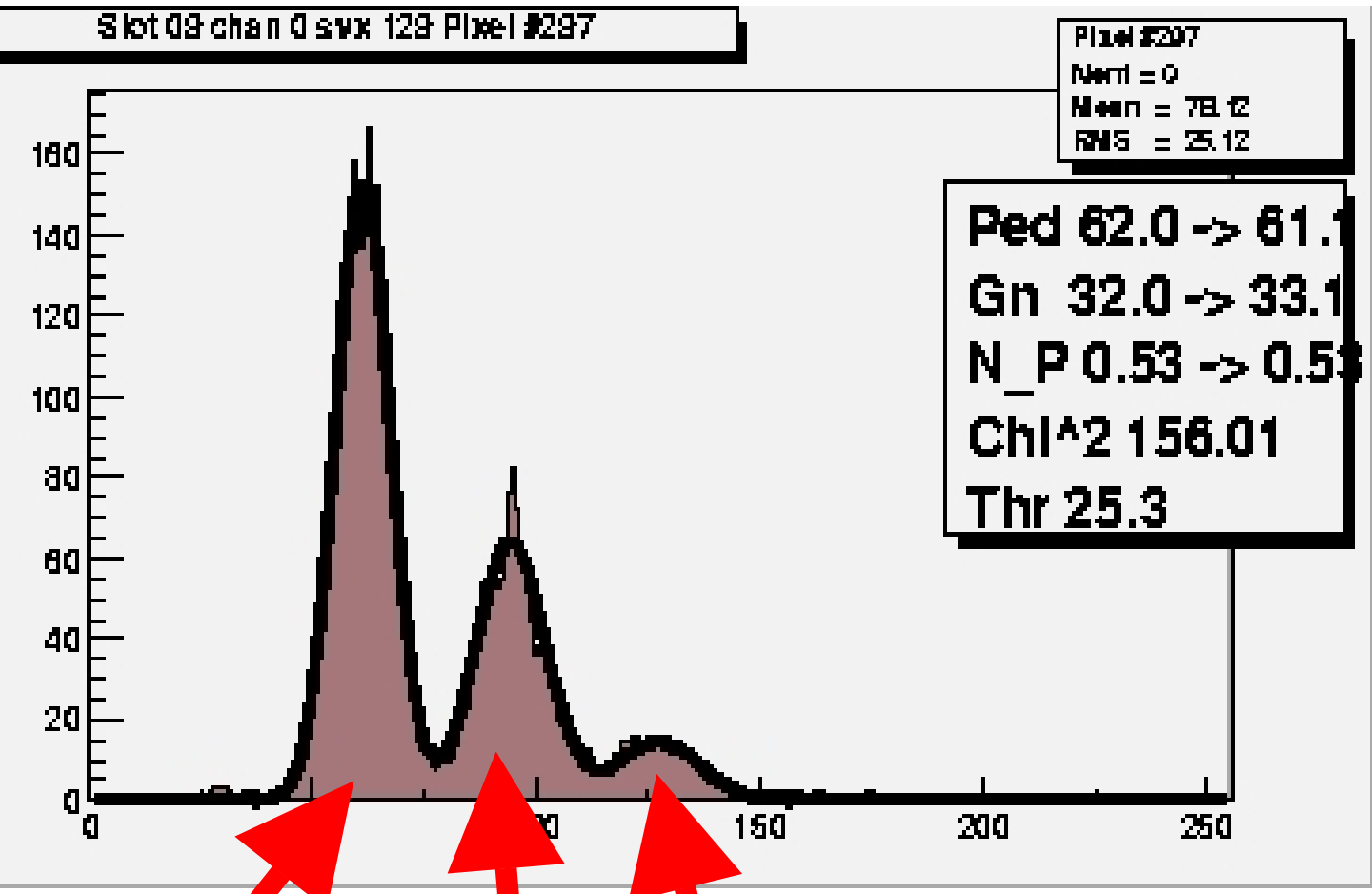
- scintillating fibers
- 8 axial and 8 stereo (3°) doublets
- VLPC's as photo-detectors
- SVX II
- 77k channels

Readout system





Pulse height spectrum of LED pulser:



ADC

0 pe (pedestal)

1 pe

2 pe

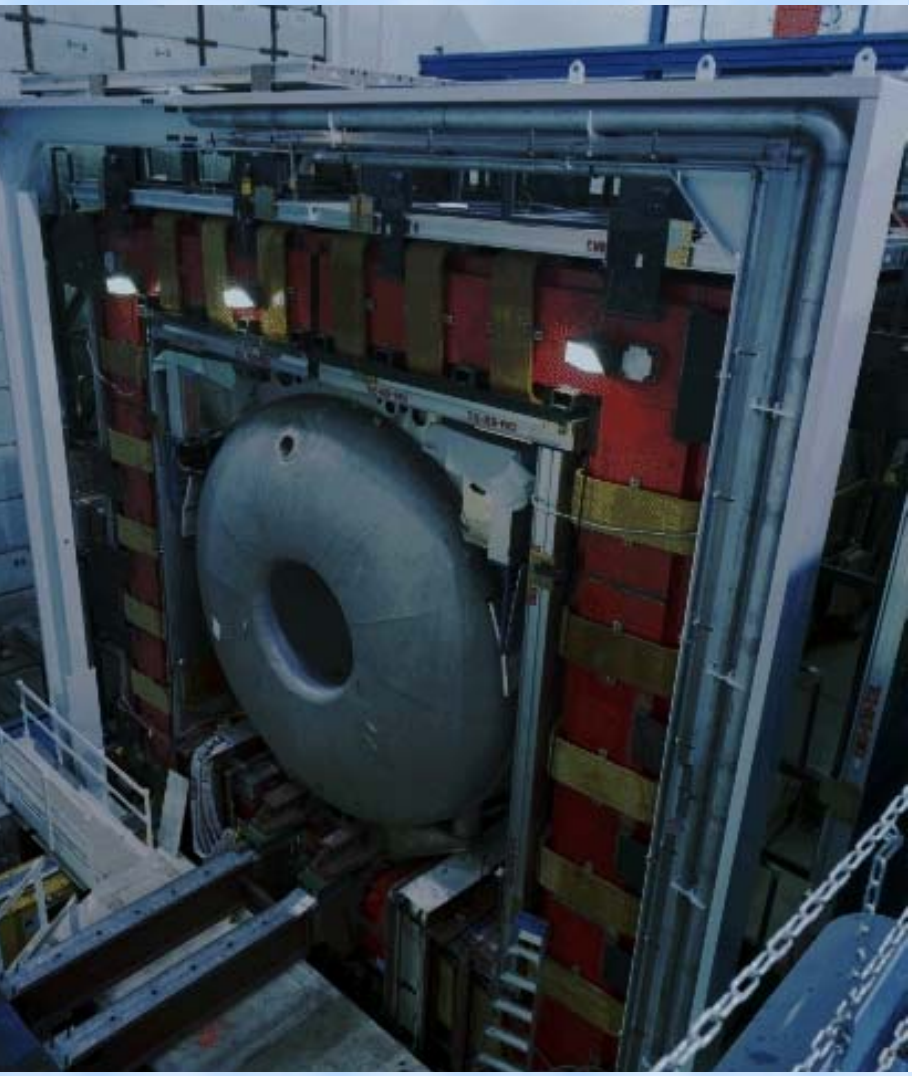
A VLPC in natural size

1 mip ~ 8 pe

Excellent S/N!

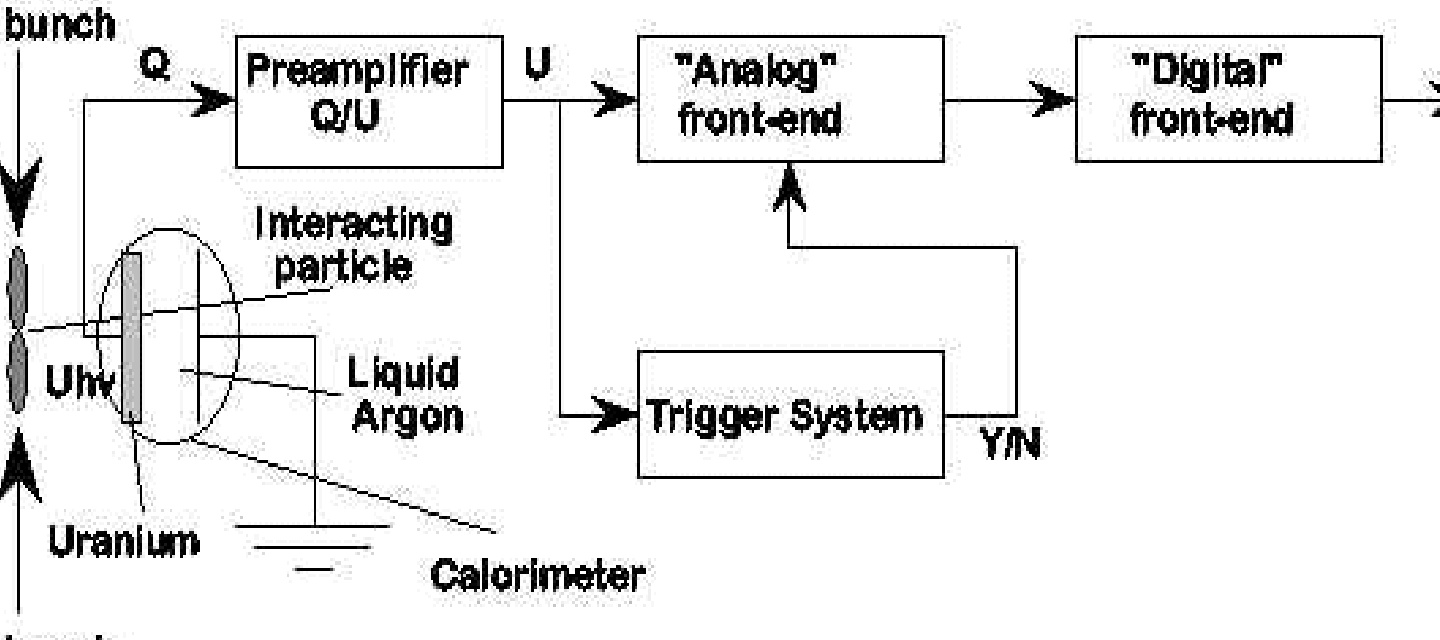
Calorimeter

The DØ Calorimeter

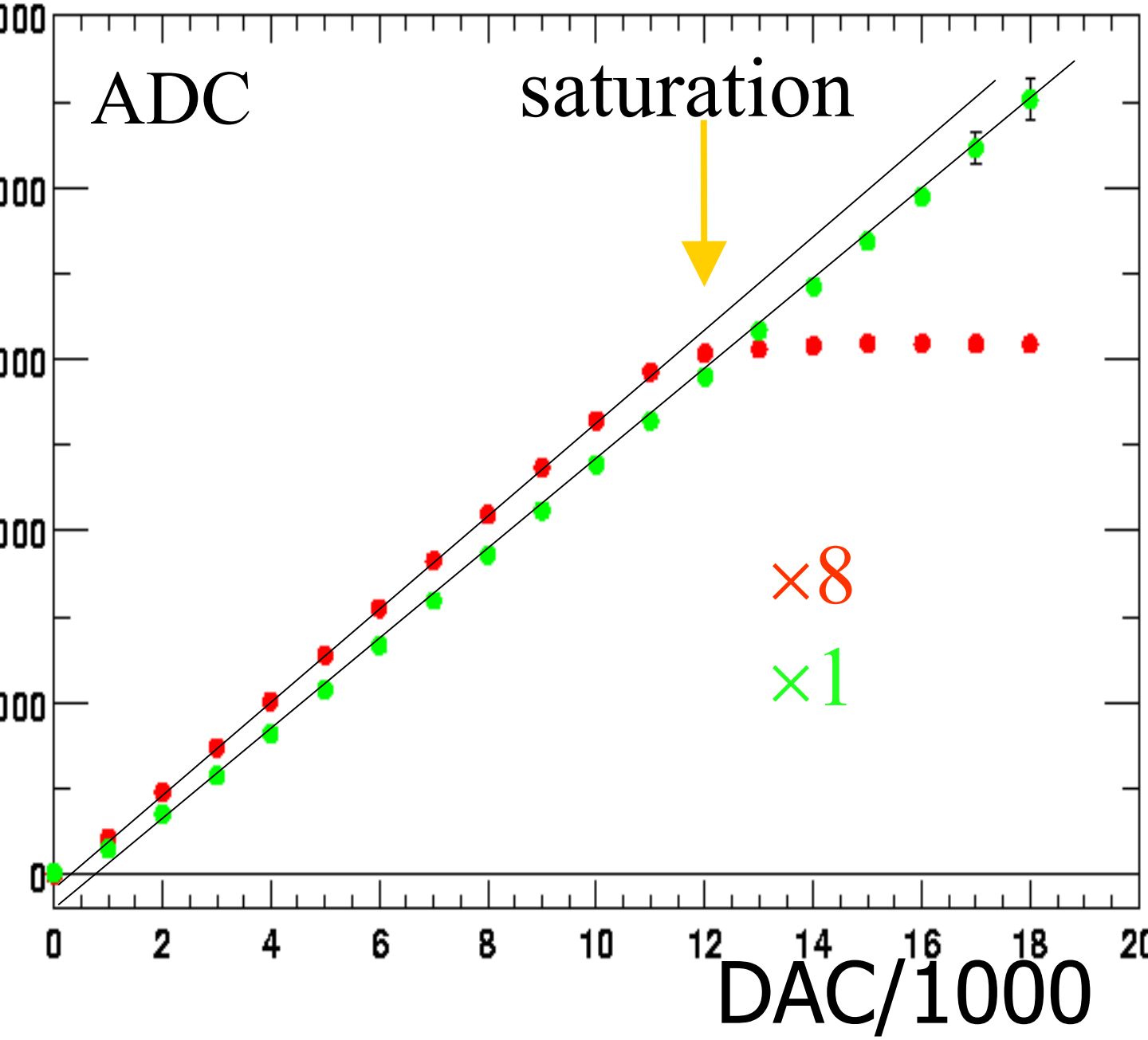


- LAr/U
- uniform
- hermetic
- good energy resolution
- e/h ~ 1

Overview of the readout system:



Pulser calibration of the Calorimeter

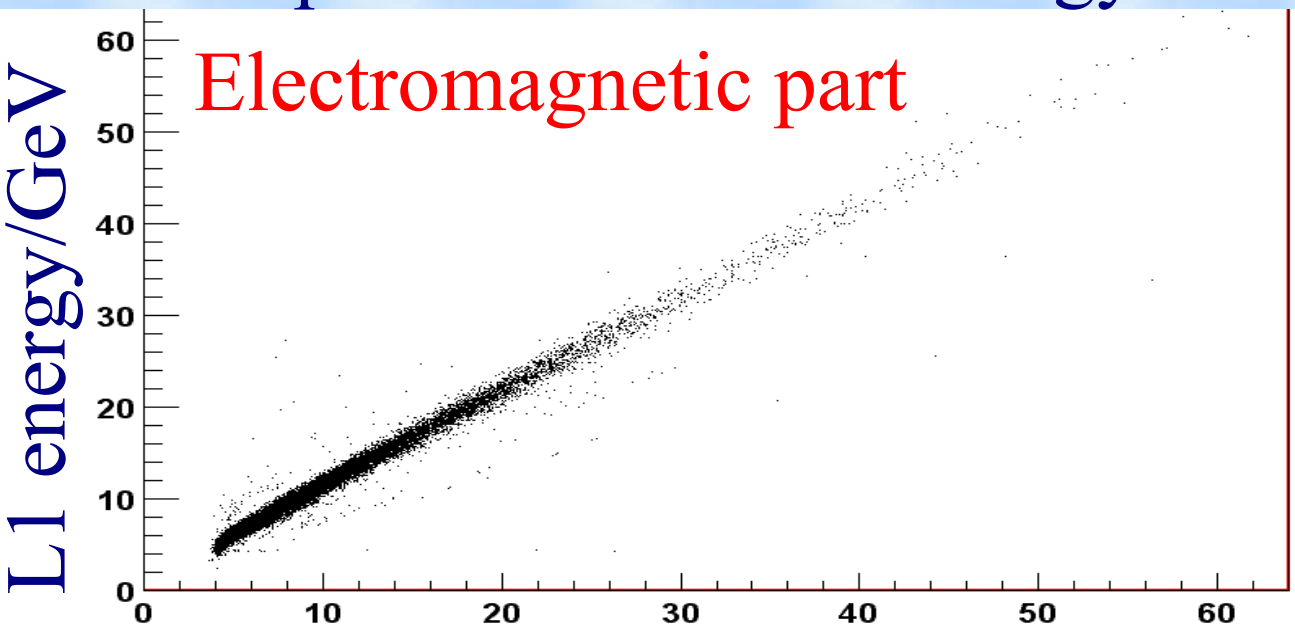


Non linearity <0.3% for DAC>1000

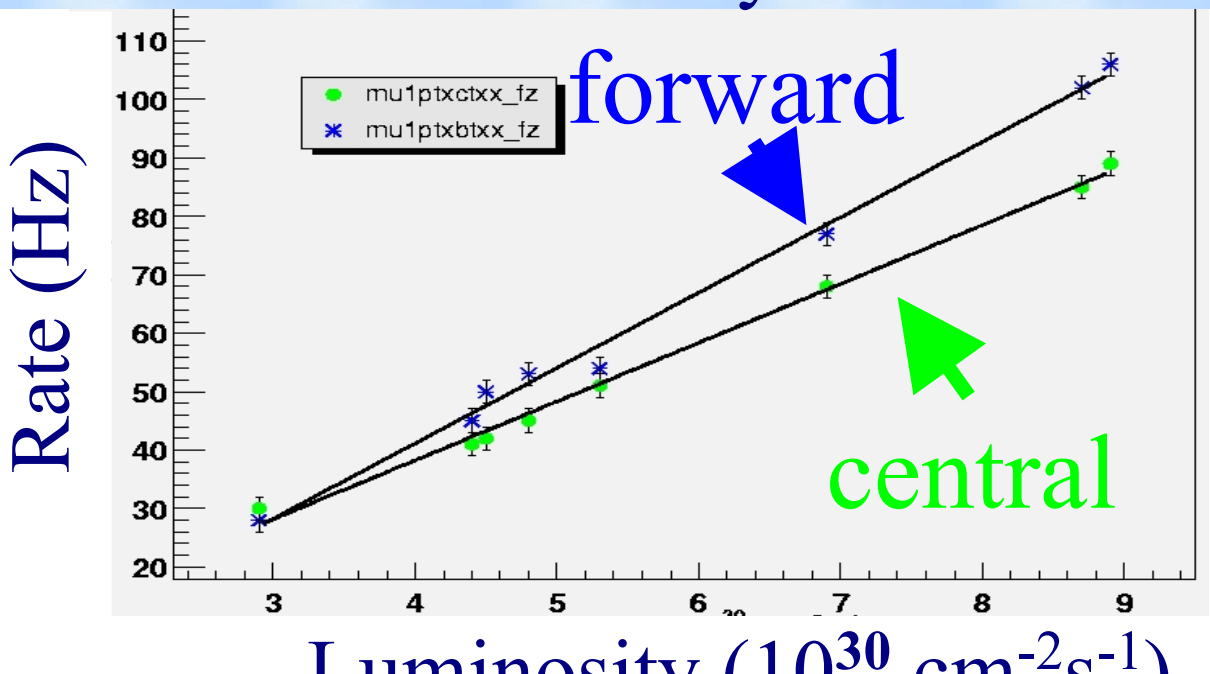
parametrized for lower DAC values

Level 1 Trigger

alorimeter: Correlation between evel 1 and precision readout energy

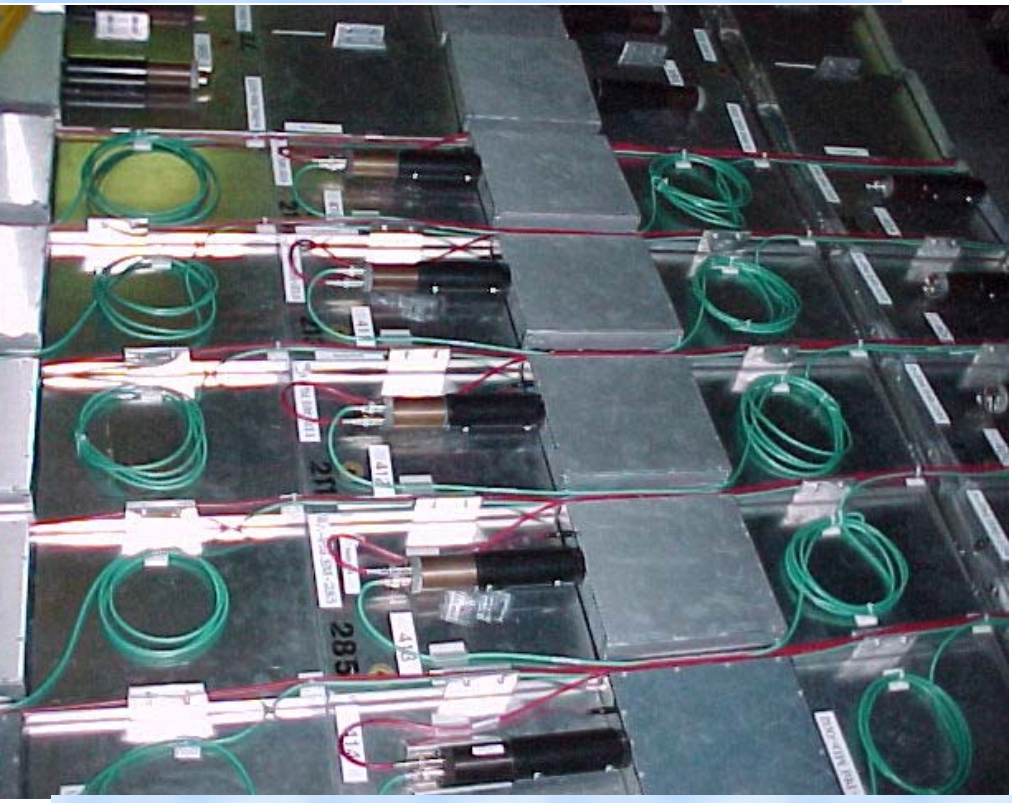


Trigger-rates for single muons versus Luminosity

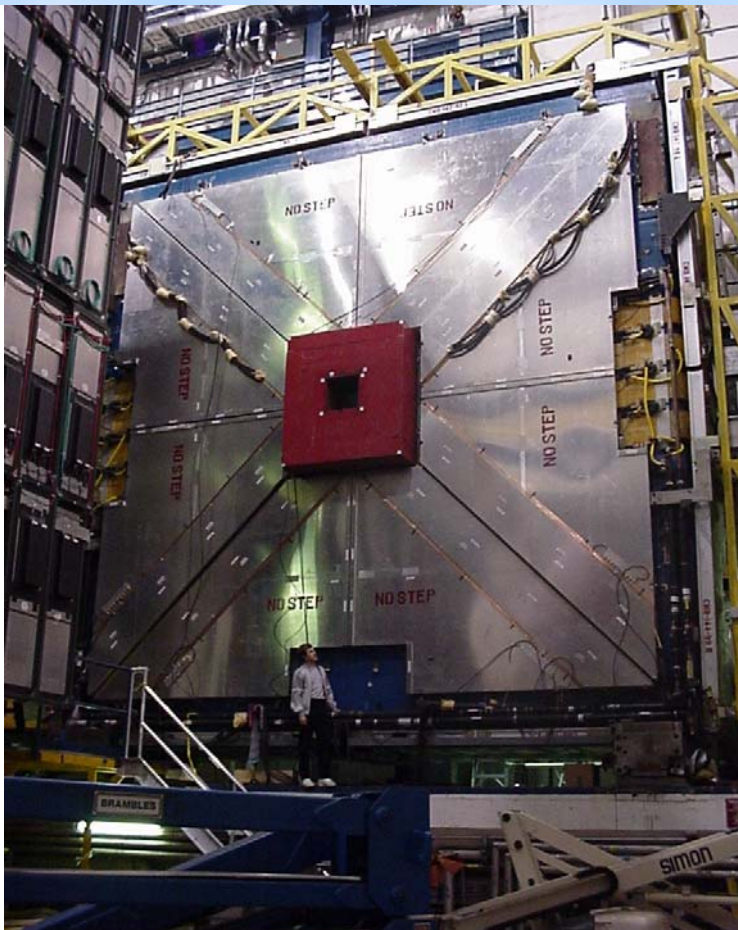


Muon System

Central Scintillators



Forward Mini-Drift Chambers



Forward Scintillators

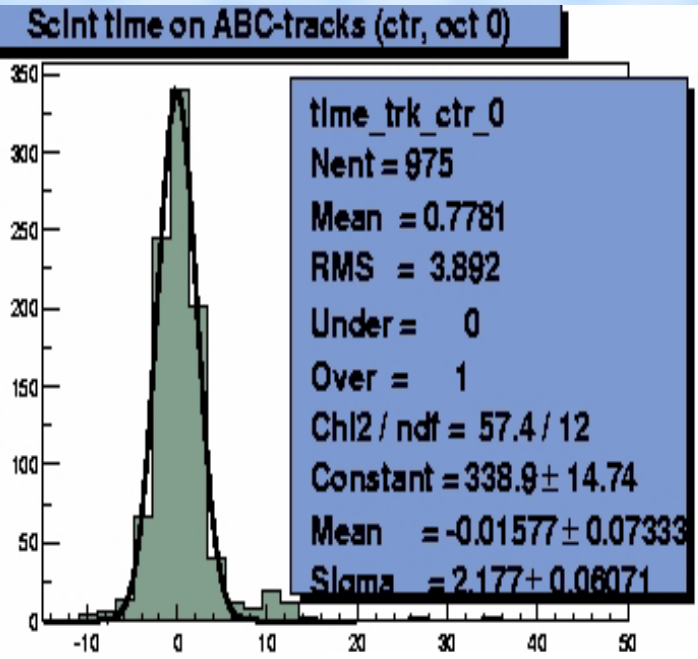
Forward Counters

Forward Mini-Drift Chambers

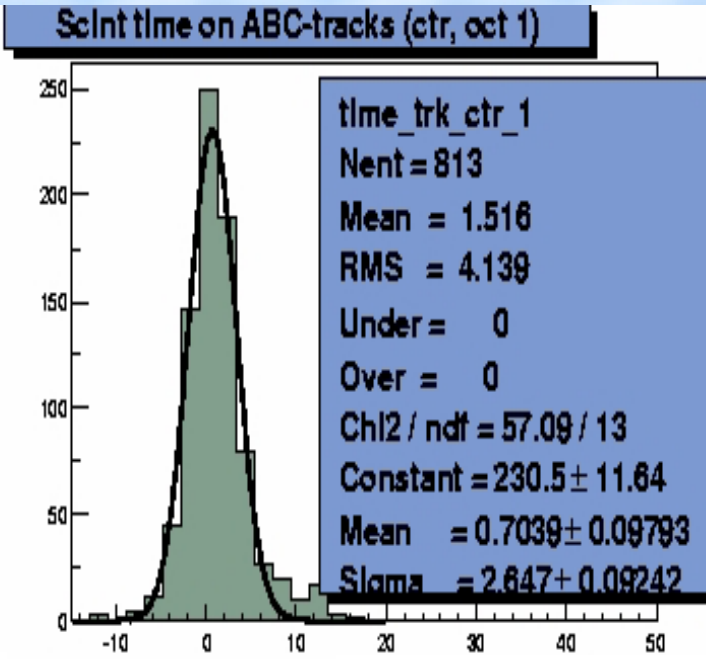
Forward Scintillation

new shielding $\Rightarrow$ lower occupancy

A-layer central scintillator time distributions for ABC tracks

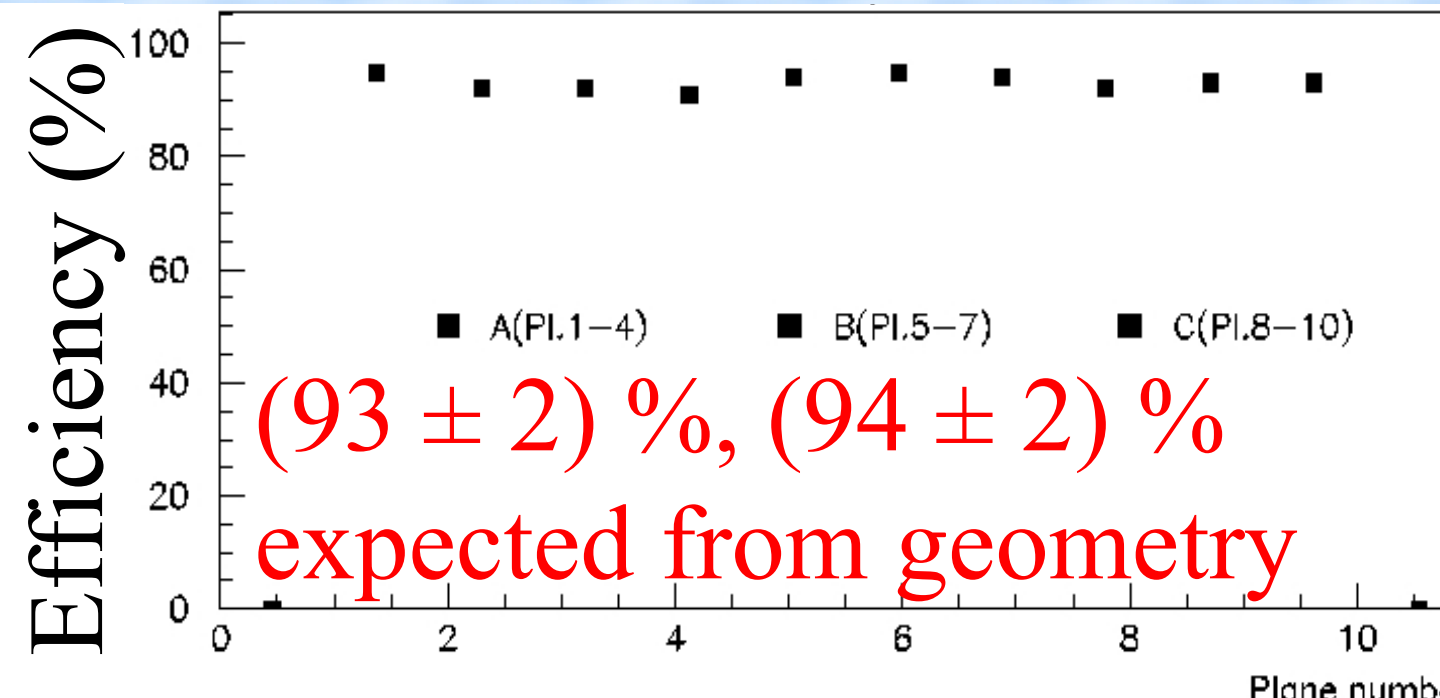


time (ns)



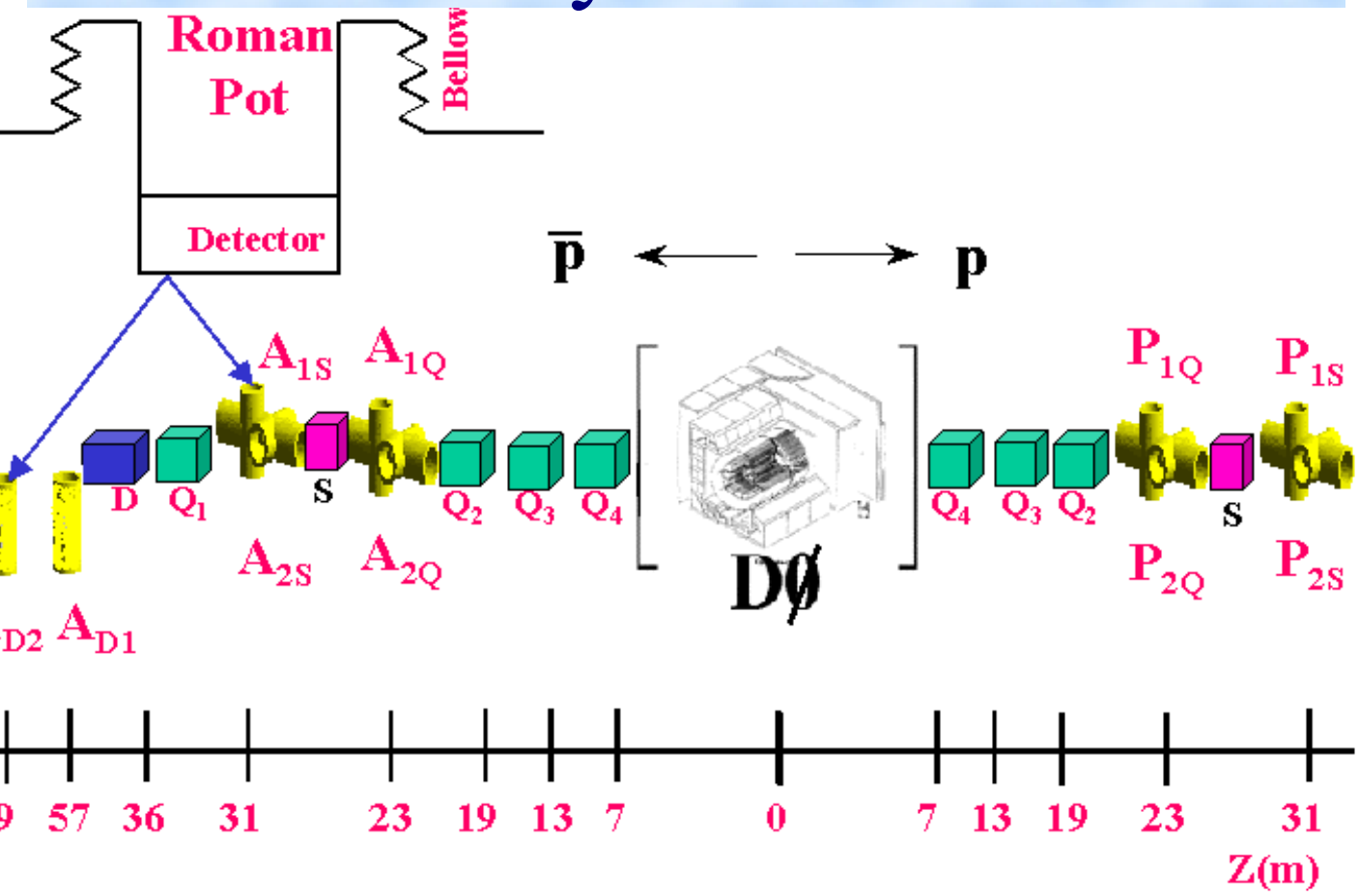
time (ns)

Efficiency of the forward Mini-Drift Chambers:



Forward Proton Detector

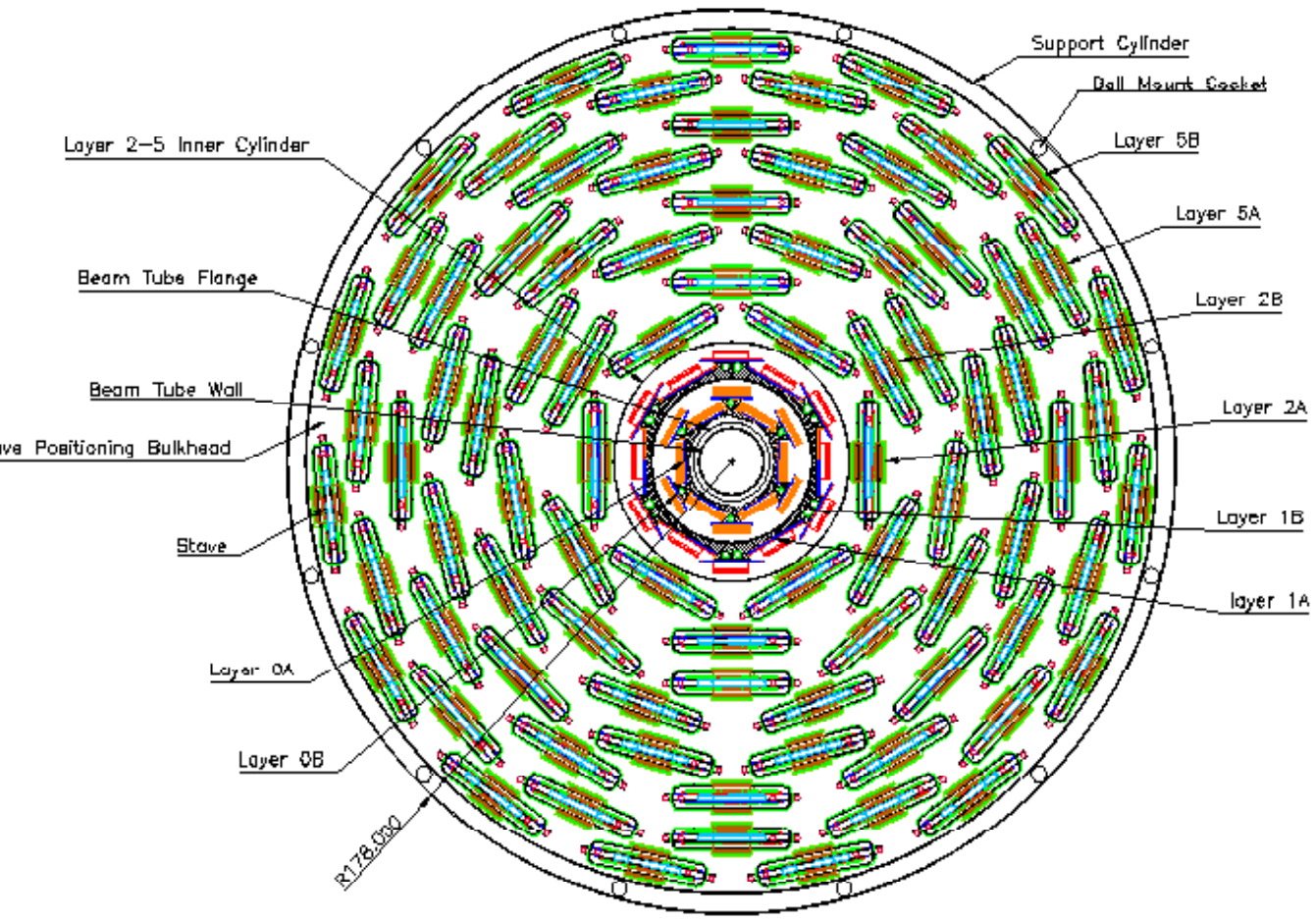
Outline of the DØ roman pot system:



Run 2B Upgrade

Silicon

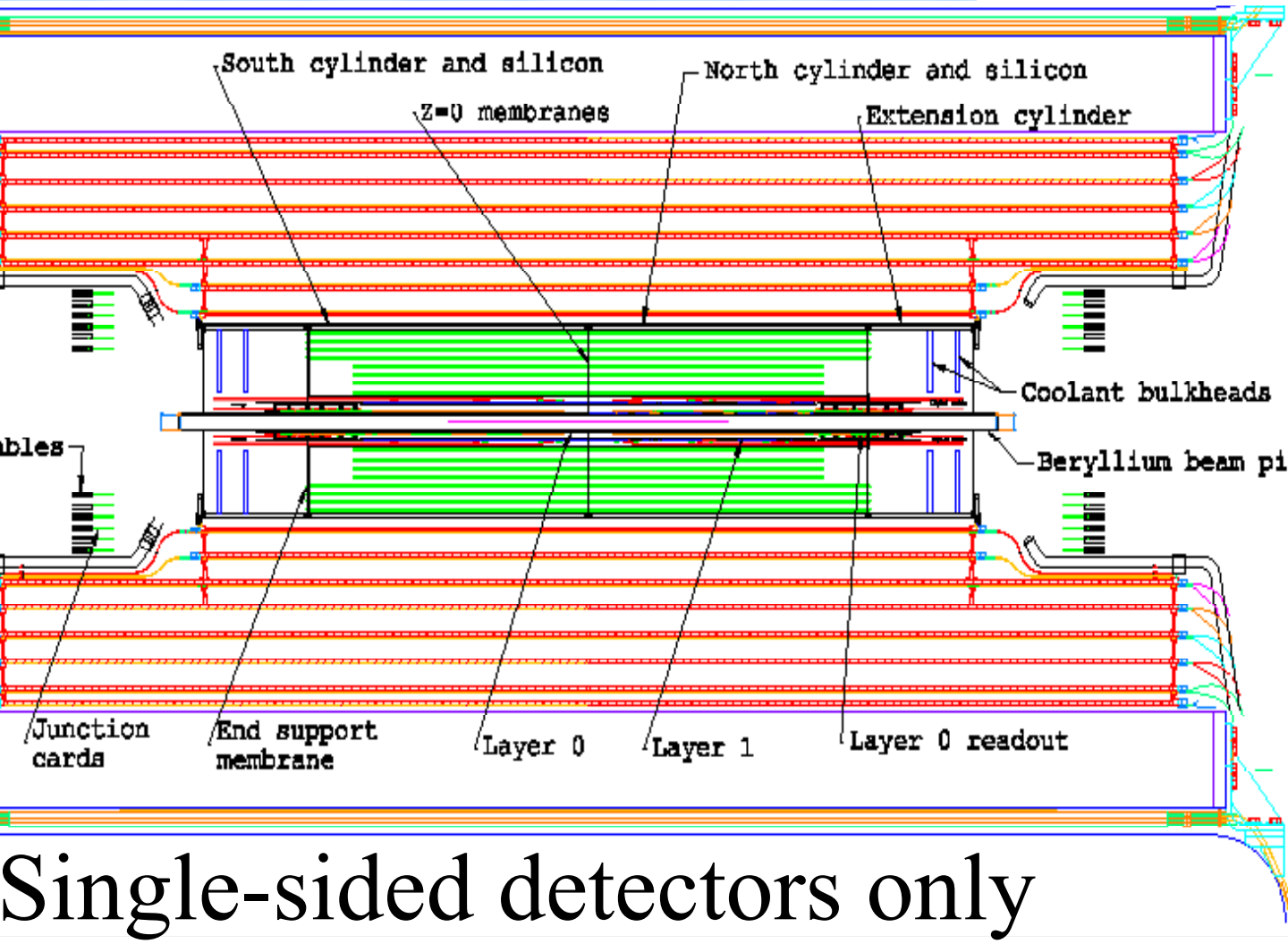
Axial view of the proposed tracker upgrade:



6 layers:

- Layers 0 and 1: axial readout
- Layers 2 to 5: axial and small angle stereo

Plan view of the tracker inside of the CFT:



Single-sided detectors only

Readout: SVX4-chip

Retain current readout-chain

Rad-hard to up to 15 fb^{-1}

Improve silicon-tracking and dca-resolution

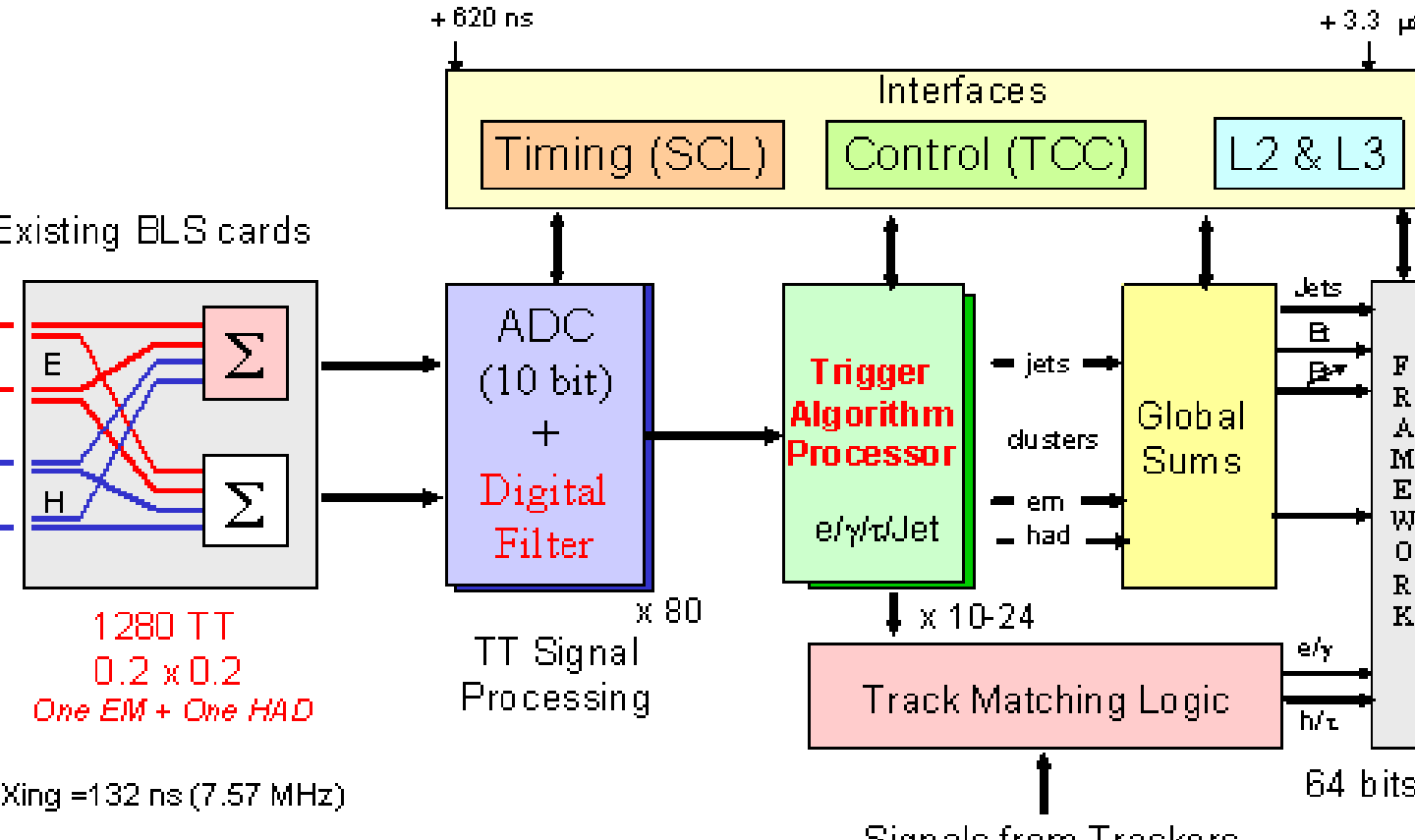
Level 1 Cal

Smaller bunch-crossing time
and higher luminosity

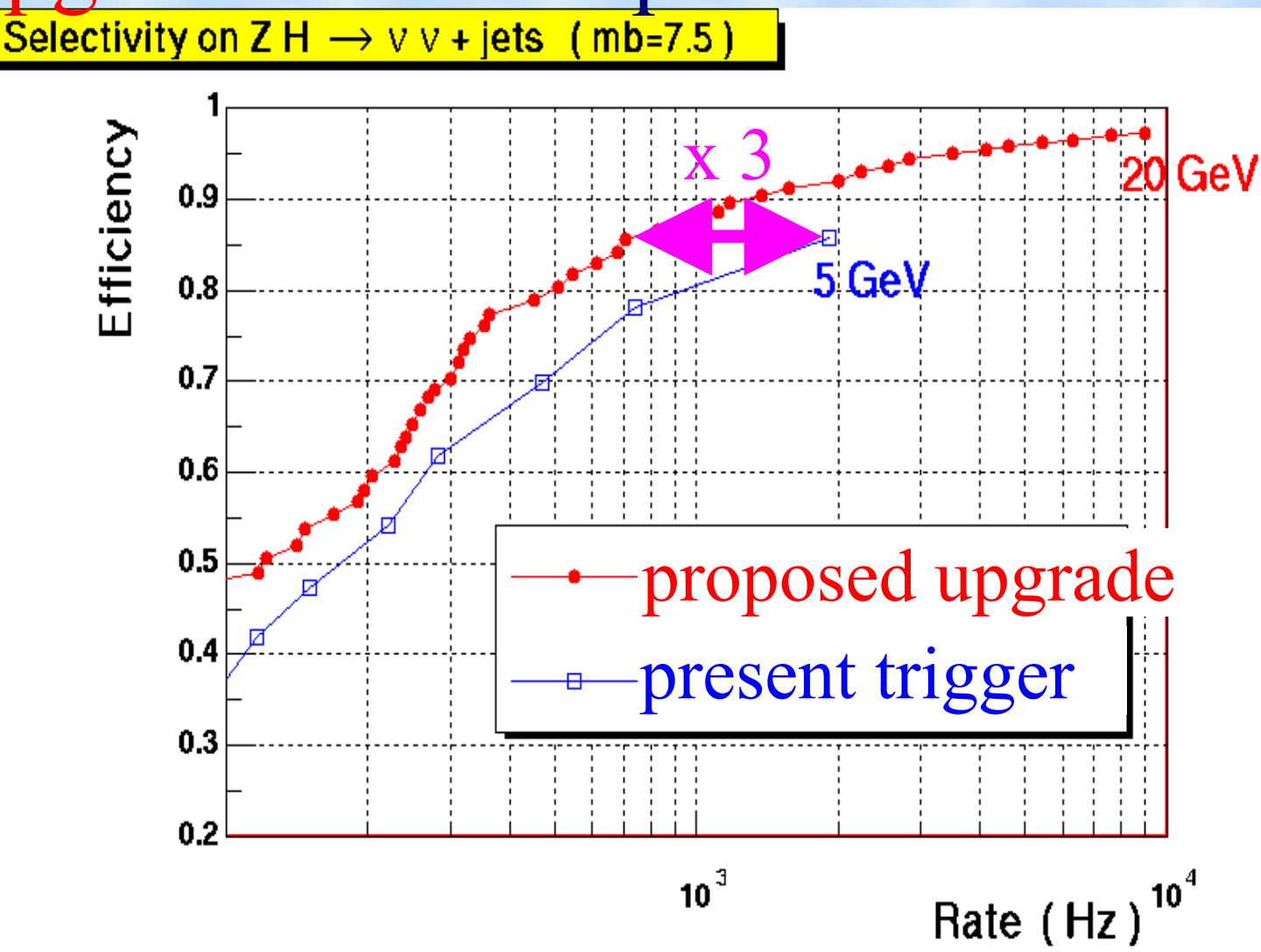
⇒ Digital filtering

⇒ Calorimeter Clustering

Architecture of the proposed Upgrade Trigger



Trigger efficiency on ZH-events using the present and the proposed calorimeter trigger upgrade versus expected rate



x3 lower rate at same efficiency