



IDEA: Vertical Slice Test

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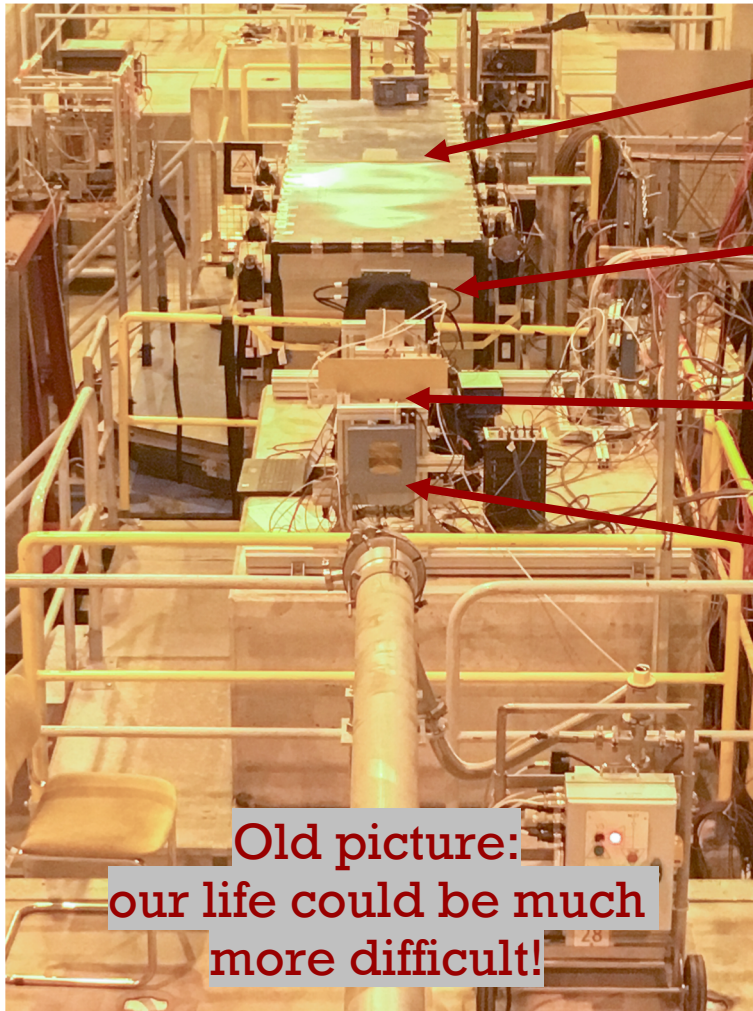
■ Measurements:

- Particle Identification with:
 - Drift Chamber Prototype (p, π , k) using dE/dx VS cluster counting
 - Preshower + Dual Readout Calorimeters (e, π , μ)
 - μ RWell (e, μ)
- Preshower optimization studies
- Tracking qualification
- Small calorimeter module with SiPM readout qualification
- RD52 calorimeter with longitudinally displaced fibers qualification

■ Beam Requirements:

- 6, 10, 20, 40, 60 GeV hadrons (both positive and negative)
- 10, 20, 40, 60 GeV electron
- 20, 100 GeV muons
- Beam pipe close to the experimental area (no parasitic upstream of our setup)

Control room: HNA – 468 (0887-1- Q70)



RD52 calorimeter (already installed in the area)

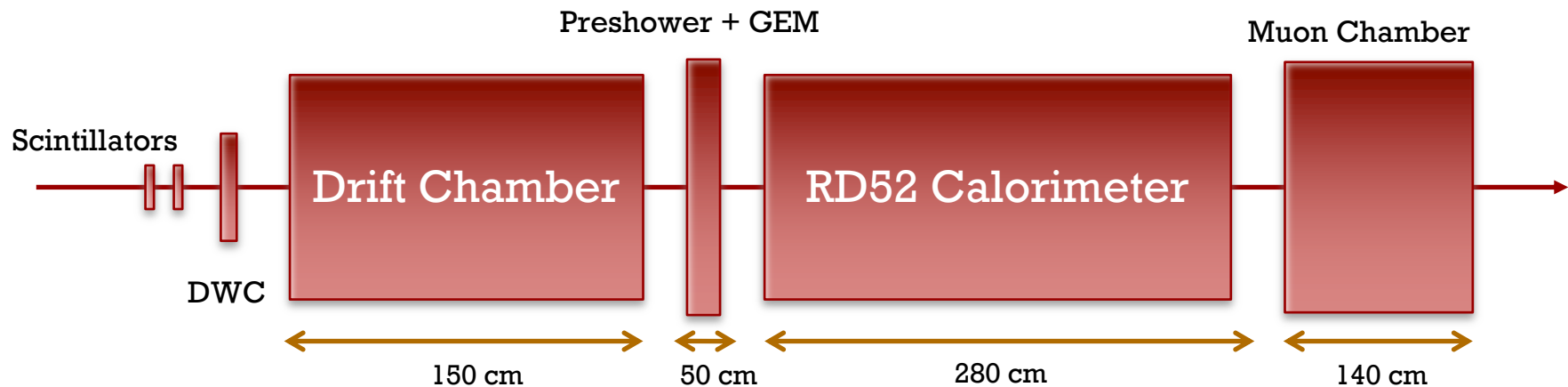
Some space in front of the calorimeter for the preshower

Place for the drift chamber ($\approx 2m$)

Trigger + Delay Wire Chamber (DWC) already installed

Space for electronics, services laptop for slow control and DaQ will be verified during the survey (27-June)

Setup schema



- Trigger with 2 scintillators in coincidence + 1 veto (if needed)
- 2 DWC (Delayed Wire Chamber)
- CEDAR (Differential Cherenkov detector)
- Drift Chamber Prototype
- Preshower with GEM
- Few different Dual Readout prototypes
 - RD52 calorimeter with PMT readout
 - RD52 calorimeter with longitudinally displaced fibers
 - Small calorimeter module with SiPM readout
- Muon chamber with μ RWell

- **Detector (ok)**
 - 2 Scintillators + PMTs installed in the area (ok)
 - Veto: 1 scintillator with an hole 1cm diameter + PMT installed in the area (ok)
- **Electronics (ok)**
 - Trigger prepared with NIM modules in counting room.
 - Expected delay for the trigger is 200 ns (logic + cables)
- **Services (ok)**
 - Cable available

DWC: Delayed Wire Chamber

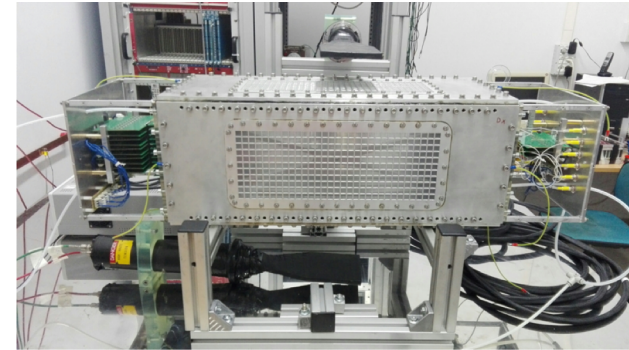
- Detector
 - Installed in the area (to be checked if still working)
- Electronics (ok)
- Services (ok)
- DaQ
 - In counting room integrated with the Calorimeter DaQ

- **Detector**
 - Detector from SPS
- **Electronics (ok)**
- **Services (ok)**
- **DaQ / Trigger (?)**
 - Probably we can consider no to use them in the trigger
 - Readout already integrated with the Calorimeter DaQ

Drift Chamber (I)

- **Detector**

- 12 layers X 12 cells = 144 channels
- 1x1 cm² drift cells instrumented with MEG2 front-end
 - DRS4 8 channels
 - LeCroy 12-bit ADC 16 channels (under discussion)
 - 96 channels readout with Discriminator + TDC
 - 24 channel: not equipped



- **Gianfranco is investigating the possibility to avoid the use of the LeCroy: low event rate (10 Hz)**

- **Two options under investigation (to be clarified soon):**

- 16 Channels readout by DRS4 (windows OS): is it integrated? What is the event rate?
- 16 channels readout with the MEG dedicated board: is it available? Is it integrated?

Drift Chamber (II)

- **Power supply**
 - Mainframe 1527 (Counting room): OK
 - Power supply board (2 slots) from Lecce: OK
 - Crate VME (Exp Area): To be rent and to be installed
 - Crate CAMAC (Exp. Area): will be transported from Lecce OK
 - Crate NIM (Exp Area): ??
- **Services**
 - Long cable from power supply in counting room to the detector: OK
 - GAS:
 - 1 or 2 refill: He (to be rent)
 - 1 or 2 refill Isobutano (to be rent) ???
 - Some discussion is on-going with the expert (Ginafranco - silvia)
 - Rilsan tubes ???
- **DaQ**
 - Desktop (Exp. Area): transported from Lecce
- **Trigger**
 - Latency (ok)
 - Busy propagation (ok)
 - Trigger counting (to be verified)
 - Trigger rate: still under discussion

- The program is still under discussion and it will be strongly affected by the chamber event rate
- This is the request:
 - Goal: Pion / kaon separation at different energies
 - External detector for particle ID (CEDAR)
 - Beam Energies: 6, 10, 20, 40, 50, 60, 100
 - 10k events per particle type and energy
- Measurement with 2 gas mix for 2 energies
- High Voltage scan for one energy

Preshower and muon chamber (I)

■ Geometry

- Preshower: (detector + support) $35 \times 50 \times 50 \text{ cm}^3$ (xyz)
- Muon chamber: (detector + support) $35 \times 50 \times 100 \text{ cm}^3$ (xyz)

■ Detector

■ Preshower

- 2 layers of Gem (2 points xy)
- Different absorber layers (0 – 2 X0) (4 points?)
- Detector planes $10 \times 10 \text{ cm}^2$

■ Muon chamber

- 2 layers of Gem (2 points xy)
- 2 layers of muR-Well (2 points xy)

■ Electronics

- SRS system (ok) + SRU module (delivered soon)

Preshower and muon chamber (I)

■ Services

- 1 fill ArCO₂ (70/30)
- Pipes to be verified by expert
- 1 Crate high voltage (Sy1527?) from Ferrara (exp. area)
- High voltage module from Ferrara (exp. area)

■ DaQ

- System in the experimental area
- Remote control from counting room

■ Trigger

- Latency (ok)
- Busy propagation (it should be ok... under test)
- Trigger counting (ok)
- Rate 1 kHz

■ Measurements

- No request for a dedicated program to characterize the detector
- Space point will be provided for the others detectors

RD-52 Calorimeter

- **Detector**
 - 9 modules, 4 tower each
 - 36 PMT (Cherenkov light)
 - 36 PMT (scintillating light)
- **Electronics**
 - VME → 2+1/4 V792AC 32-channel QDC
- **Services**
 - 6 x 12-channel A1832N (Sy1527)
- **DaQ**
 - Control room

Ancillaries

- 2x DWC, 1 PS, 1 Muon Counter
- VME → V775N 16-ch TDC, V862 32-ch QDC
- few ch. A1832P (DWC) + few ch. A1832N (PS+MuC)
- DAQ running in control room

RD-52 module with displaced fibers

- 8+8 PMT
- VME \rightarrow $\frac{1}{2}$ V792AC (32-ch QDC)
- 2 x A1832N
- DAQ running in control room

SiPM equipped module

- **Detector geometry**
 - Mechanics: 30 x 30 x 150 cm³ (xyz)
 - Detector: 1 x 1 x 110 cm³
- **Electronics (exp area)**
 - Readout: 2 mada boards (from Como)
 - Desktop power supply (from Como)
- **Services**
 - Cabling (ok)
- **DaQ**
 - Laptop installed in the exp area (+ remote desktop)
- **Trigger**
 - Latency (ok)
 - Busy propagation (??)
 - Trigger counting (ok)
 - Rate 1 kHz

Quasi on-line tool

- Tom has started to collect exemplary data collected in previous test beam by each subsystem. This is a starting point for the integration
- A working repository for the tesbteam-specific modules for DQM4HEP is available on Github:
<https://github.com/tcoates3/dqm4hep-dream>