



FCCee: the IDEA vertical slice test with beam

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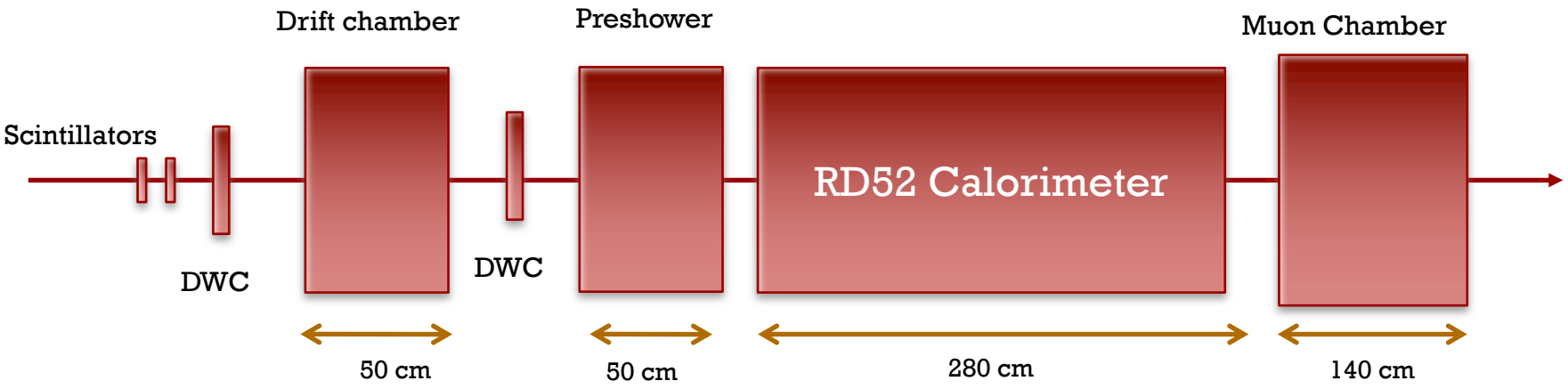
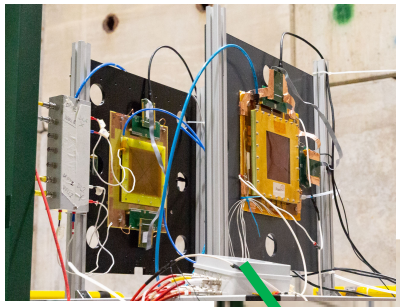
On behalf of quite some people

Setup schema



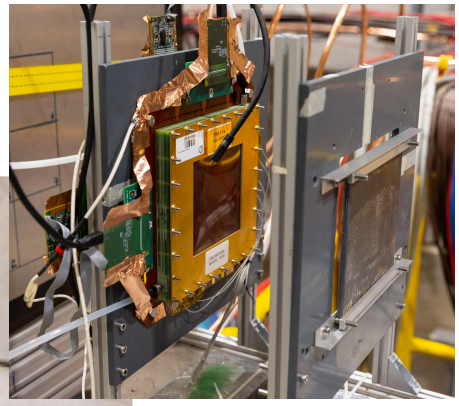
- Trigger with 2 scintillators in coincidence + 1 veto
- 2 DWC (Delayed Wire Chamber)
- 2 CEDAR (Differential Cherenkov detector)
- Drift Chamber Prototype
- Preshower with GEM: 2 layers GEM + absorber (1 – 2.5 X_0)
- Different Dual Readout prototypes
  - RD52 calorimeter with PMT readout
  - RD52 calorimeter with staggered fibers
  - Small calorimeter module with SiPM readout
- Muon chamber: 1 layer GEM + 2 layers μRWell

The real setup

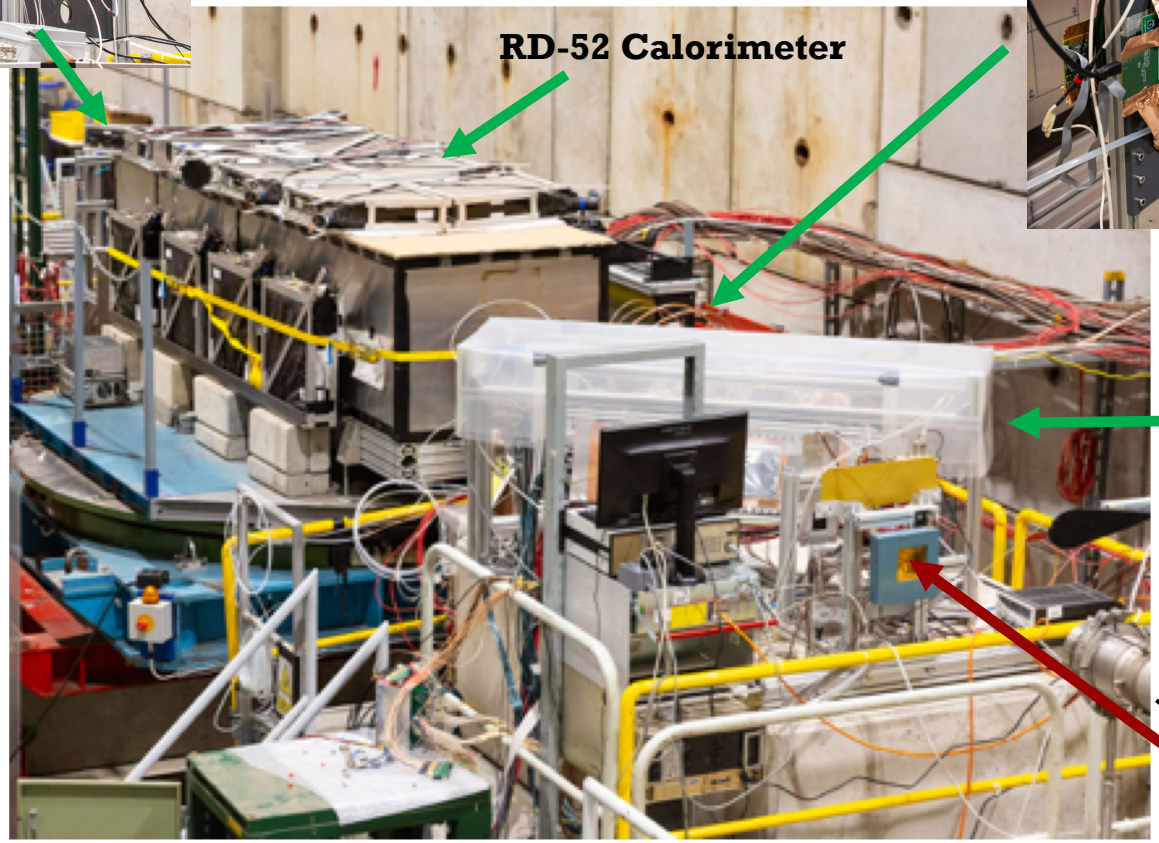


GEM + μR-Well

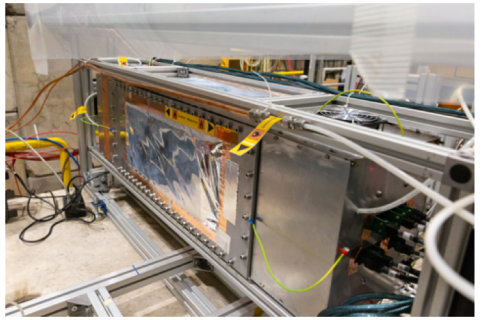
GEM



RD-52 Calorimeter



Drift Chamber



Beam line

Phase I: Calibration and commissioning (≈ 2 days)

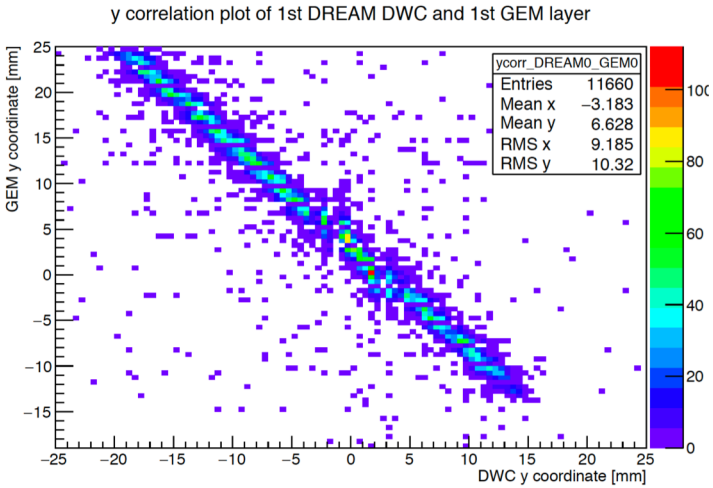
- 80 GeV Secondary beam (pions + ≈ 5% electrons)
  - RD52 calorimeter: equalization runs
    - Beam centered in each Tower (36 + 36 runs)
  - Muon chamber and Preshower
    - Integration test and commissioning
  - Drift Chamber calibration runs:
    - Integration test and HV scan
- We didn't managed to get a good electron beam. We asked to change the wobbling (from 80 to 60 GeV) with the idea to re-use the configuration files from the previous test beams which allowed to have good electron beams at different energies
  - Also with the 60 GeV wobbling the beam condition were different from the previous years. Alexander managed to find a good compromise

Phase II: Vertical slice test (≈ 2.5 days)

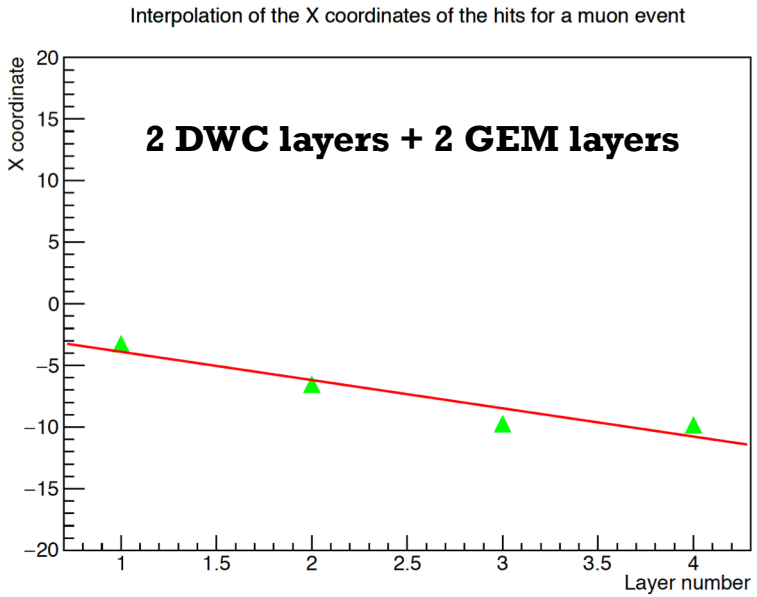
- μ beam
  - Alignments for all detectors
- Electron Beam (20 GeV)
  - Rd-52 calorimeter
    - Performance study with different absorbers (1 – 2.5 X_0)
  - Drift Chamber
    - Tracking performances at different HV
- Energy Scan with hadron beams (50, 60 GeV)
  - Drift Chamber
    - Tracking performance
    - PID: even if this energy is not optimal, we guess it may be useful for
      - Algorithm comparison
      - Comparison with simulation and parametrization
  - RD52 Calorimeter
    - Performance study with hadrons

Very Preliminary Results

- Data synchronization: important because we were using different DAQ systems



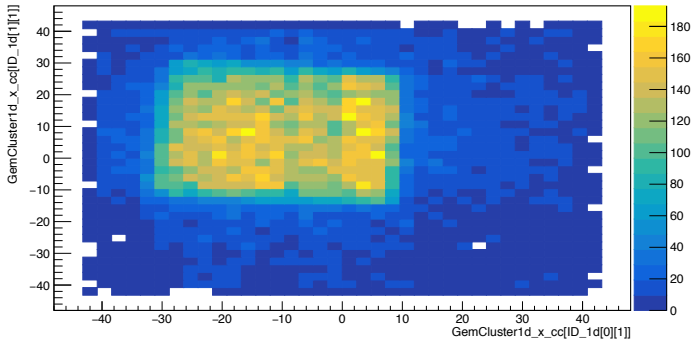
Correlation plots between GEM and DWC



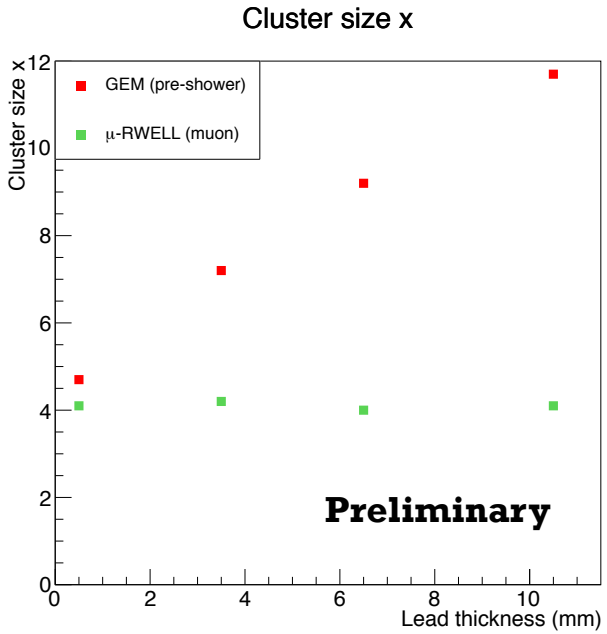
- Alignments with μ beam

20 GeV Electron beam

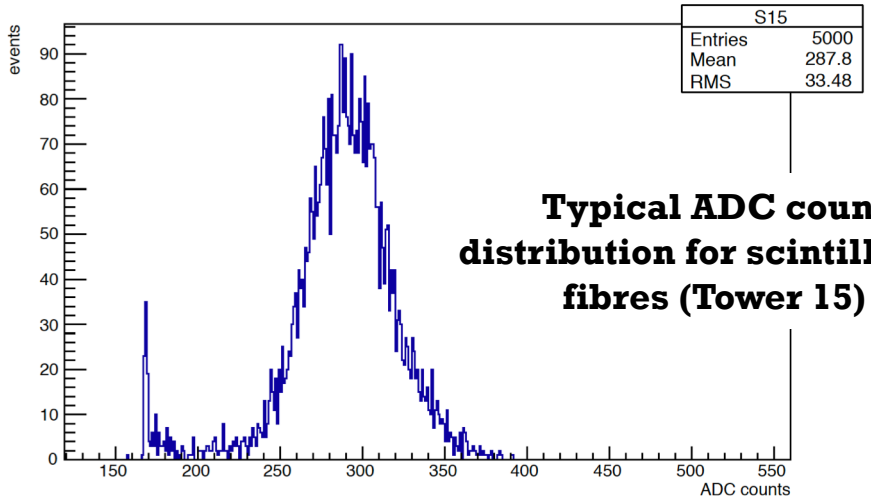
Beam profile (GEM)



The effect of the extra material (up to 2 X_0) placed in front of the GEM



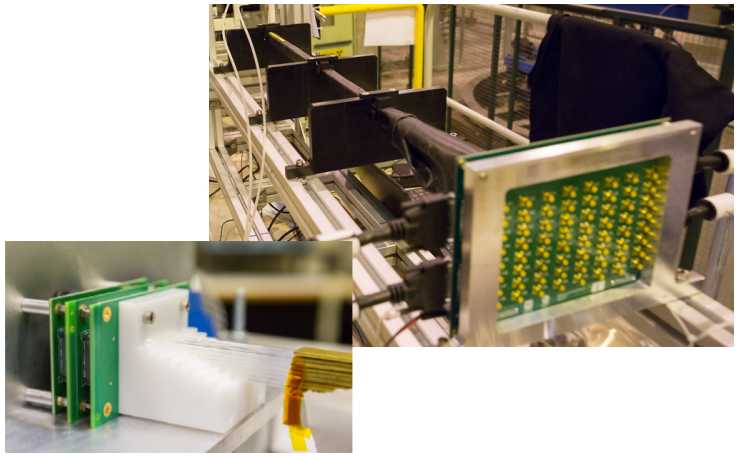
RD-52 Calorimeter $_{S15}$

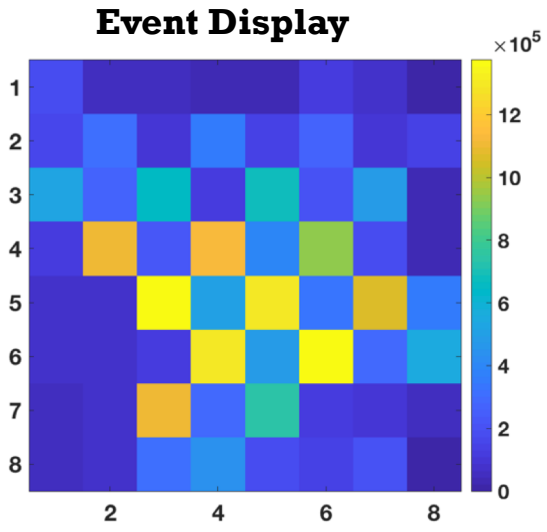


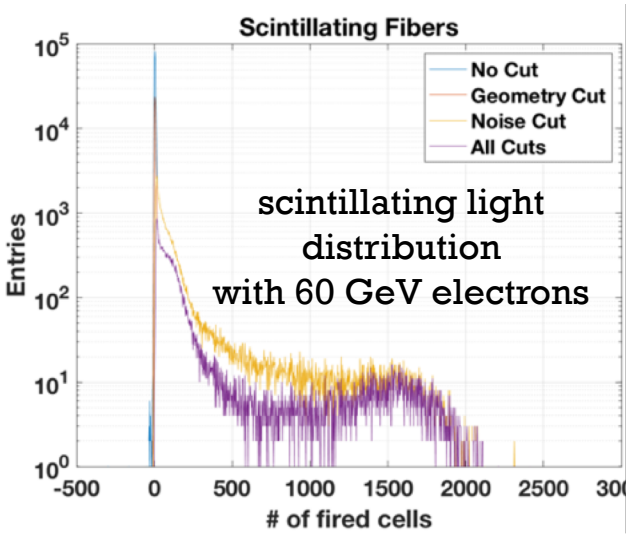
Typical ADC count distribution for scintillating fibres (Tower 15)

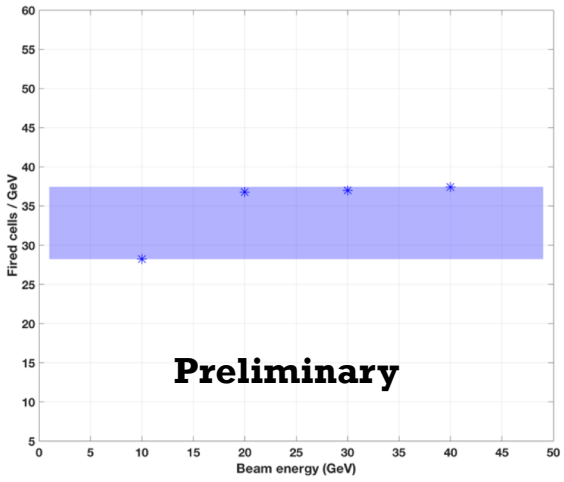
Standalone program (1 day)

- Dual readout calorimeter prototype module readout by SiPM (1 day)
  - Energy Scan with electrons beams (10, 20, 30, 40 GeV): Ph-e / Gev measurement



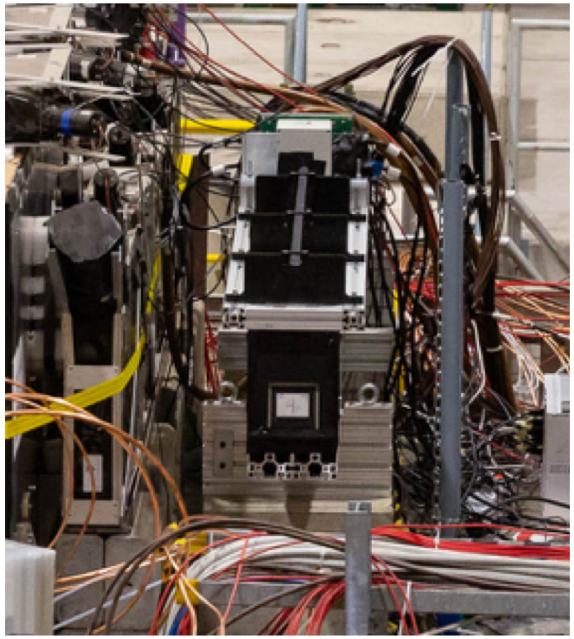






Standalone program (1 day)

- Dual readout calorimeter prototype module with staggered fibres readout by PMTs (1 day)
  - Response equalization and calibration
    - 20 GeV Electron beam for the long fibres (beam centered in each tower)
    - 60 GeV π beams for the short fibres (beam centered in each tower)
  - Long runs with the detector centered in the beam
    - 20 GeV electrons
    - 60 GeV π beams



Summary

- Even if the program was very tough, we managed to collect good data to better understand the detector performances
- We had some problem along the way but thanks to the expert support we managed to fulfill a good part of our program