Testing of Real-Size Prototype GEM detectors for CBM-MUCH with Pb+Pb Collisions at SPS CERN

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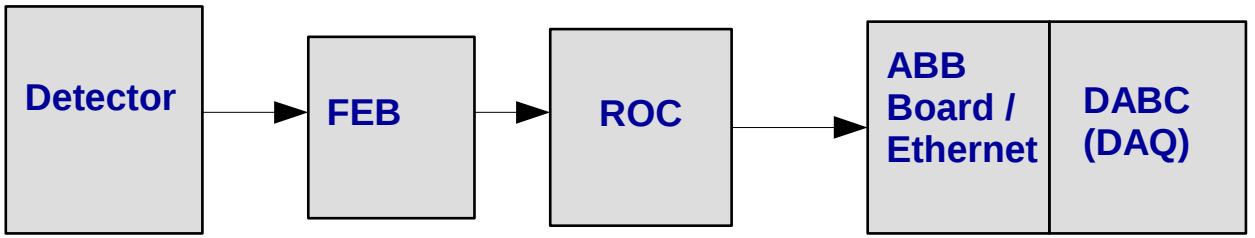
Plan of the talk

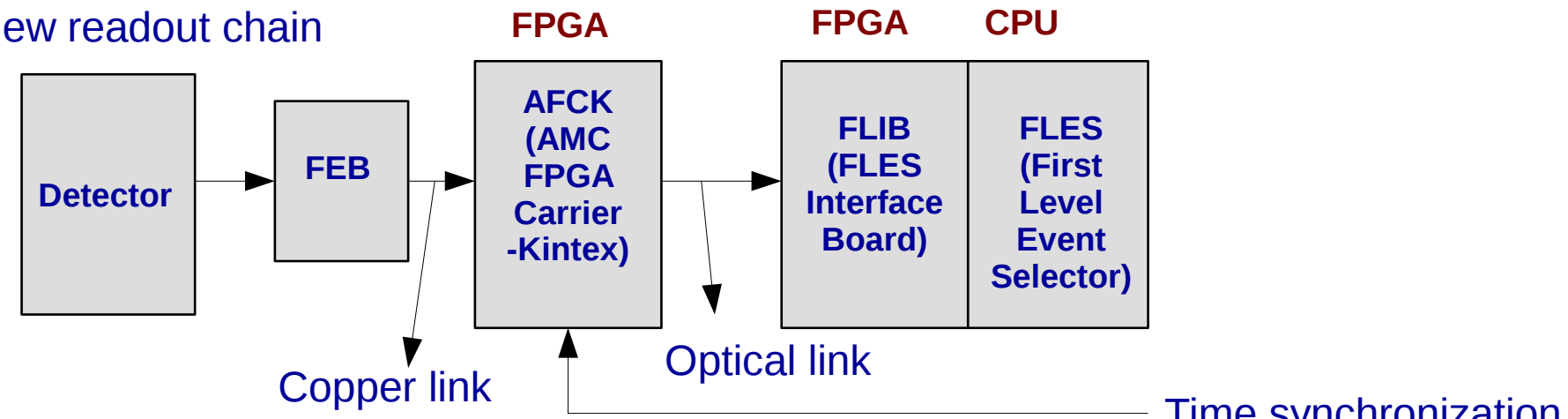
- Motivation for the Pb+Pb test at SPS
- Schematic of Experimental Setup
- Data taking at different run
- Results

Motivation for the Pb+Pb test at SPS

- Almost whole area of the detector is populated with particle beams
- For this we need many FEBs ---> which requires colling of chips
  (one real size prototype GEM chamber require 15 FEBs)
- Two water based colling plates are built :
  1. At bose institute (6 mm Al pipe winding inside 10 mm Al plate)
  2. At VECC (Grooved channels inside 10 mm Al plate)
- New CBM DAQ
  1. Old readout chain

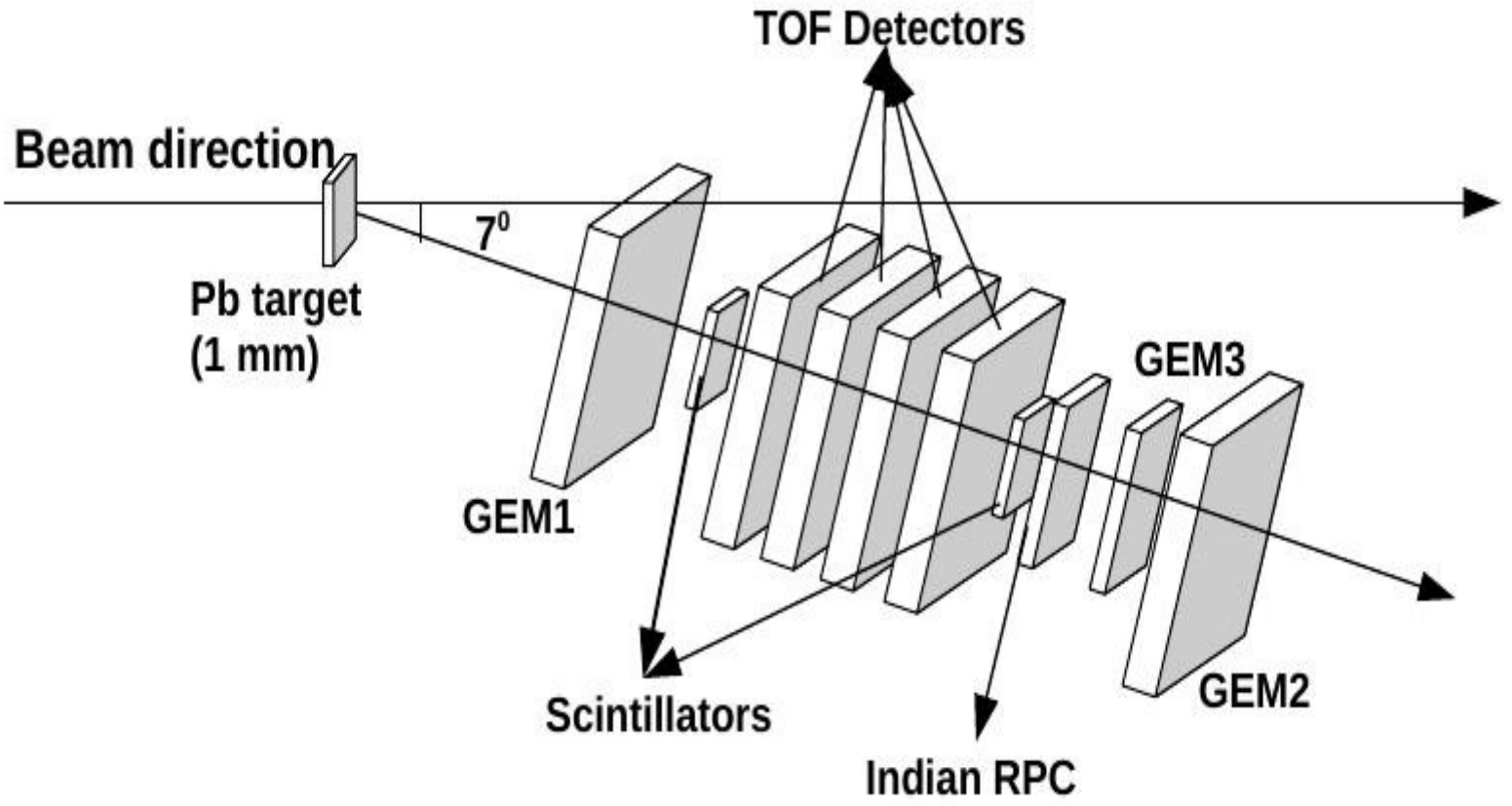


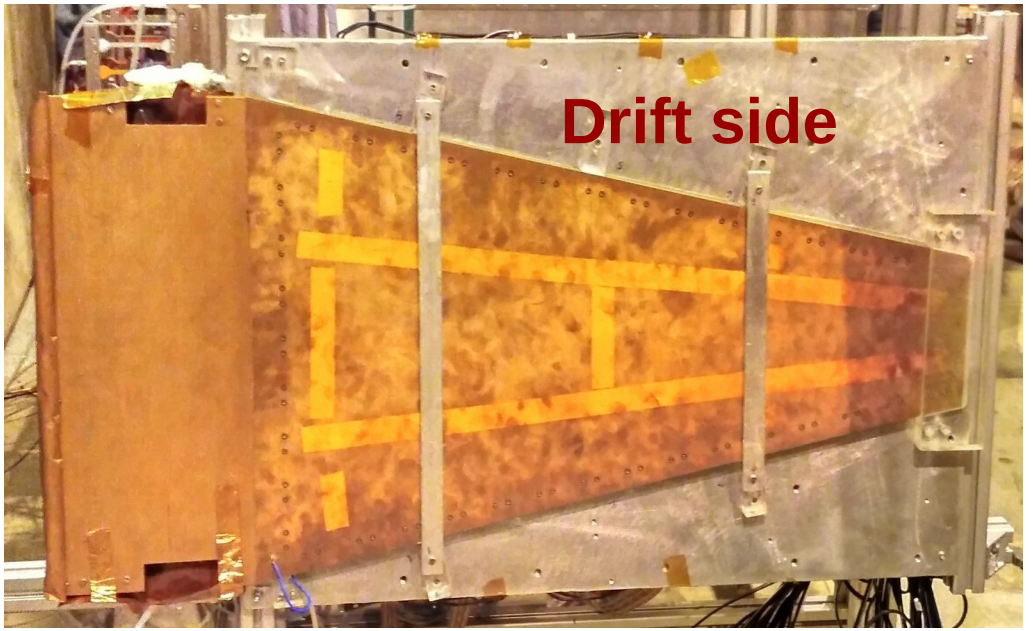
2. New readout chain



Schematic of experimental setup

Beam energies : 13 AGeV/c, 30 AGeV/c, 150 AGeV/c
Target : Lead (1mm thickness)





Lateral view of the experimental setup

Experimental setup

Target (Pb)

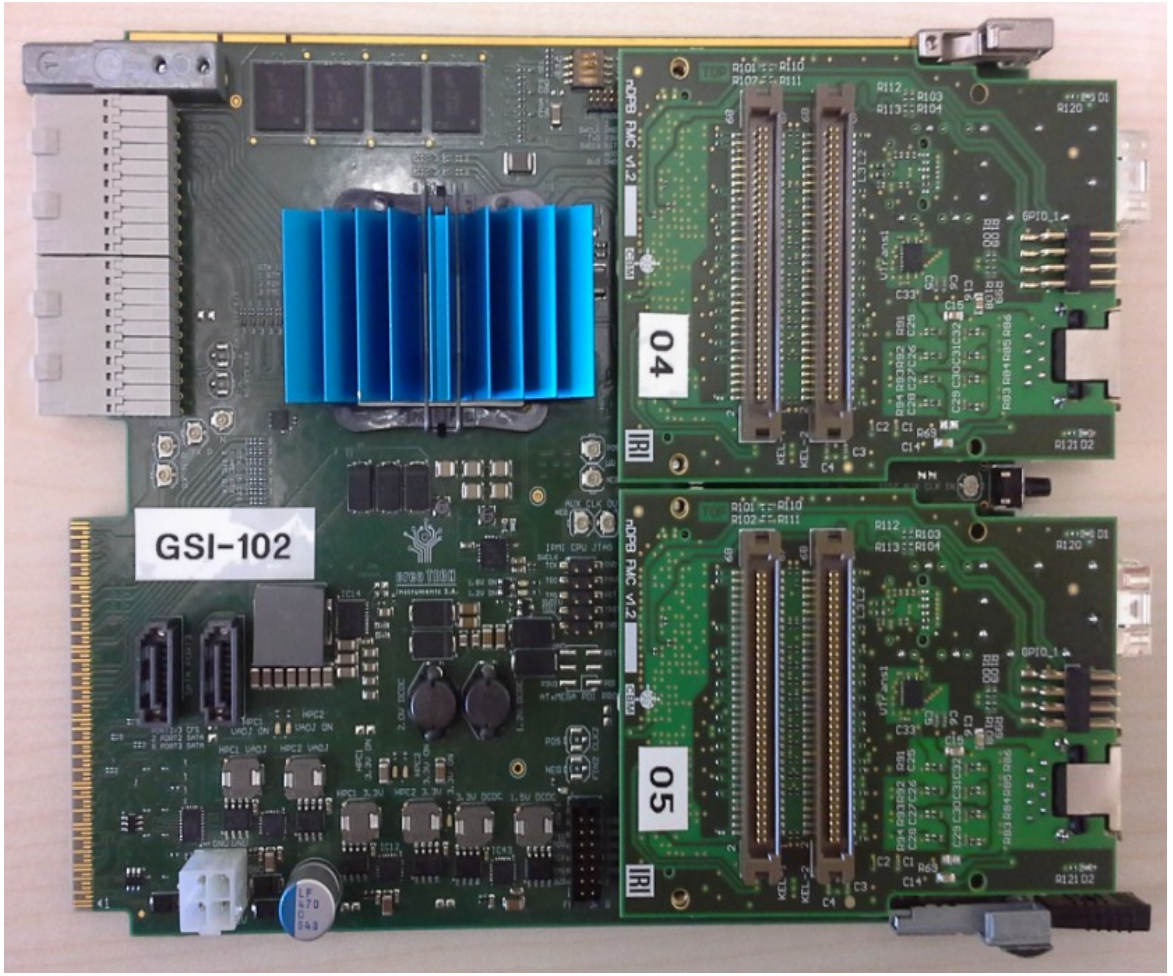
Real Size GEM Prototype 2

Small Size GEM Prototype 3

Al Cooling Plate

Real Size GEM Prototype 1

AFCK board with nDPB configuration for MUCH



mTCA crate

Data Taking

Data were taken in 4 phases

1. Phase1 : Preliminary test without beam

2. Phase2 : 13 AGeV/c (only GEM1 was used for testing)

3. Phase3 : 30 AGeV/c (GEM1 and GEM2 was used for testing)

4. Phase4 : 150 AGeV/c (GEM1, GEM2 and GEM3 was used for testing)

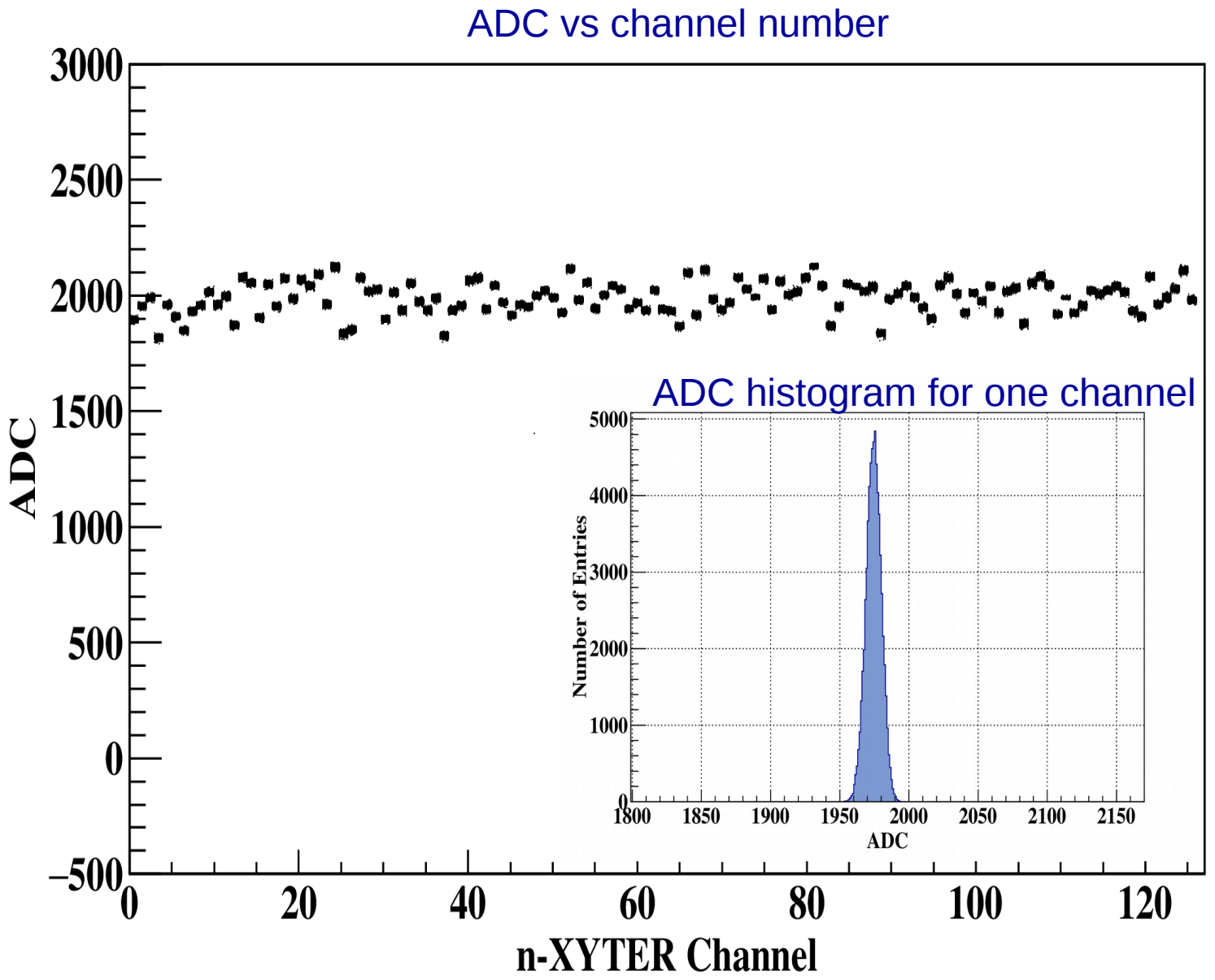
(We have also used **20 cm thick** **Fe absorber** in front of **GEM2 and GEM3** in phase4 data to study the absorber effect.)

GEM1 : Real size prototype GEM (Trapezoidal shaped) built at VECC

GEM2 : Real size prototype (Trapezoidal shaped) built at RD51 Lab CERN

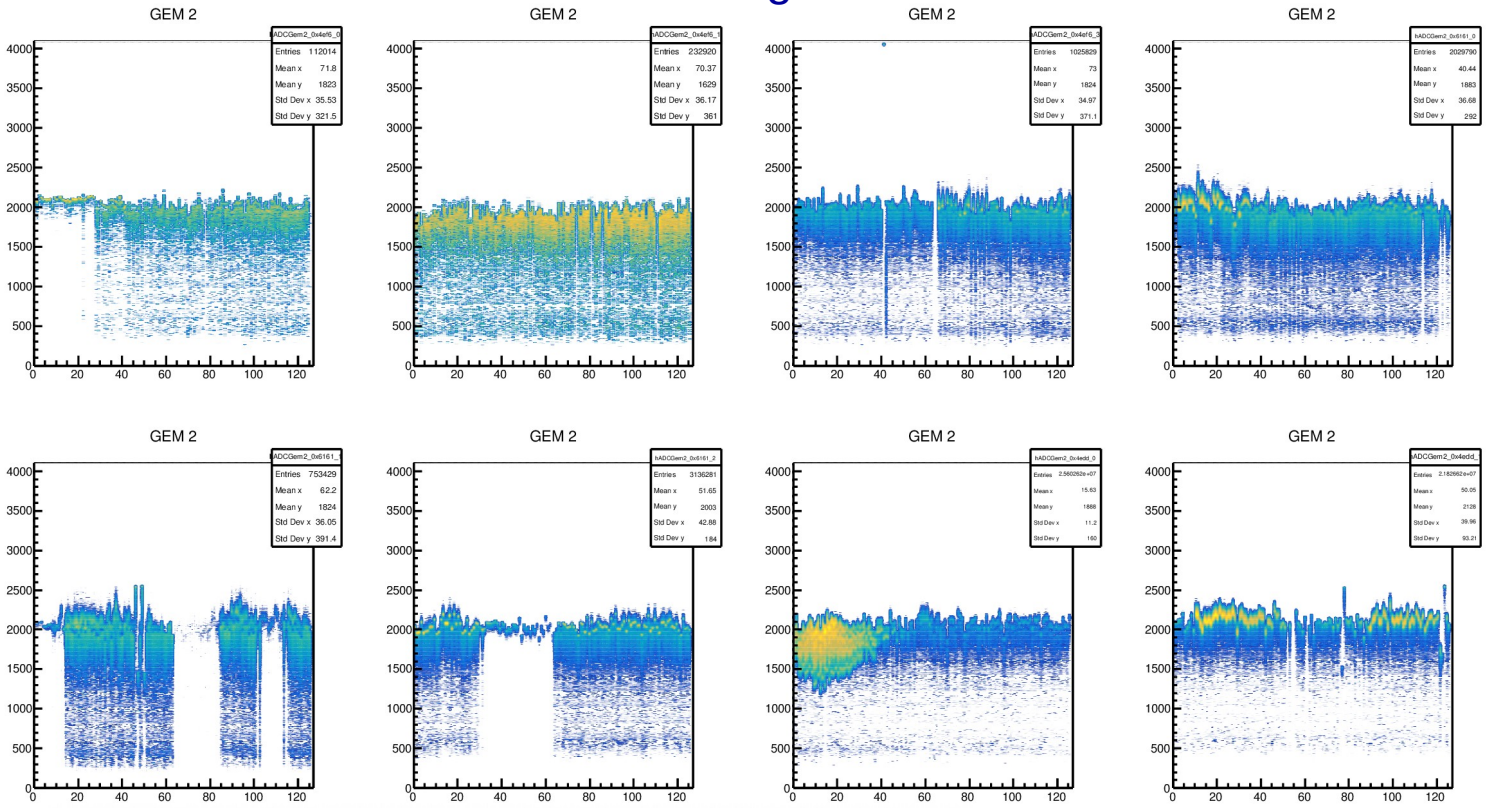
GEM3 : Small size prototype 3 built at GSI (10 cm x 10 cm dimension)

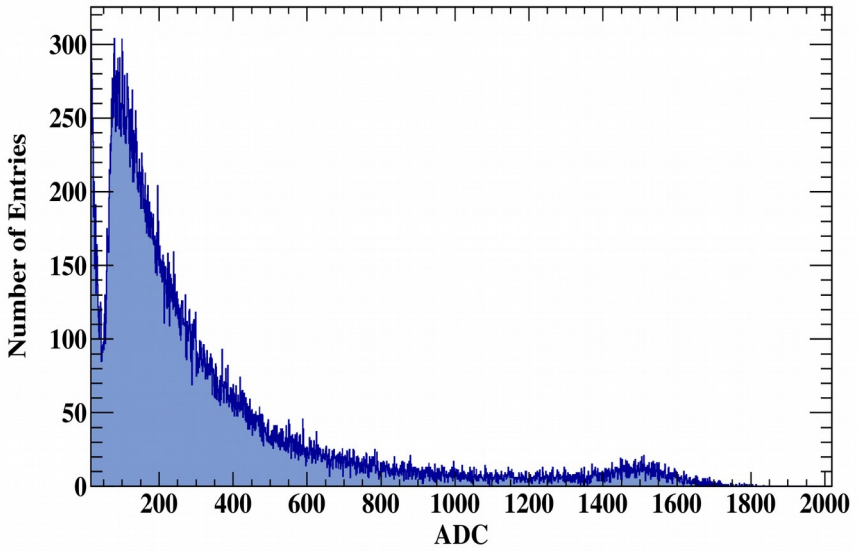
Baseline ADC histogram



ADC histogram

Raw ADC histogram of GEM2

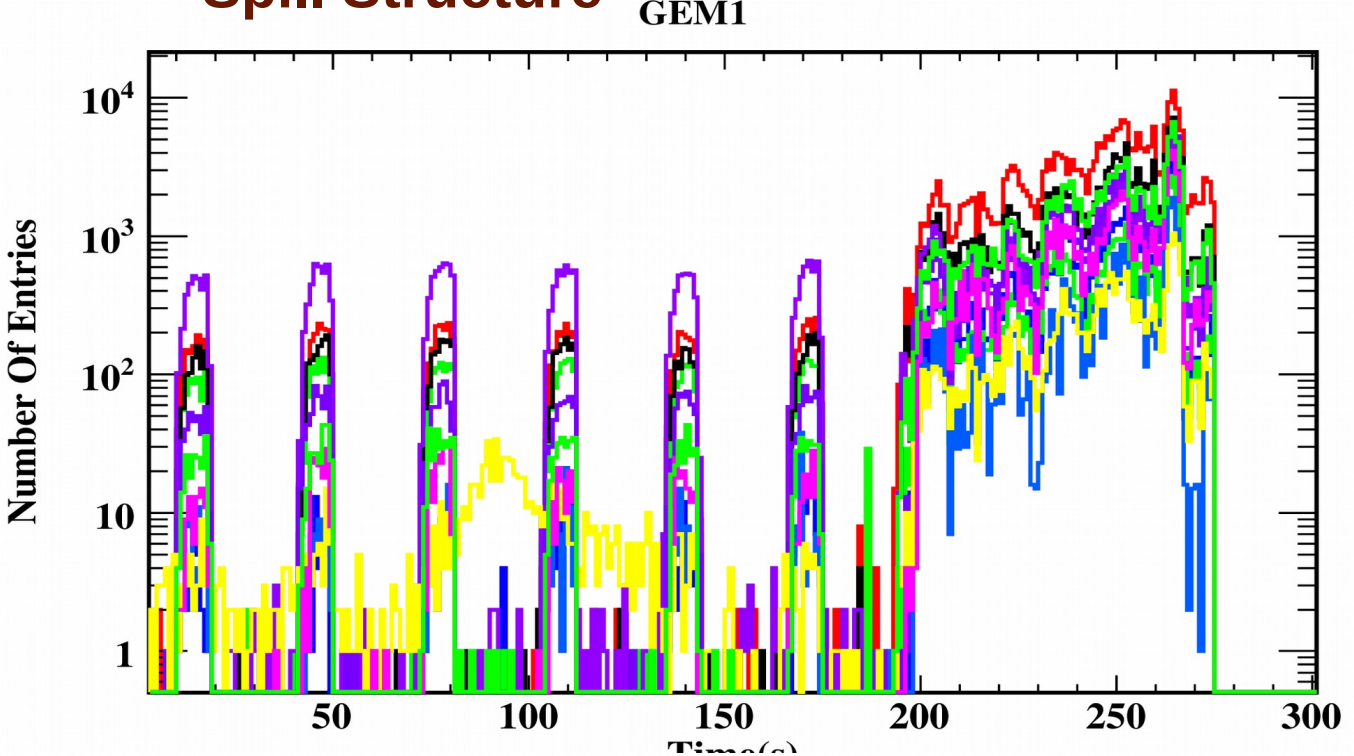




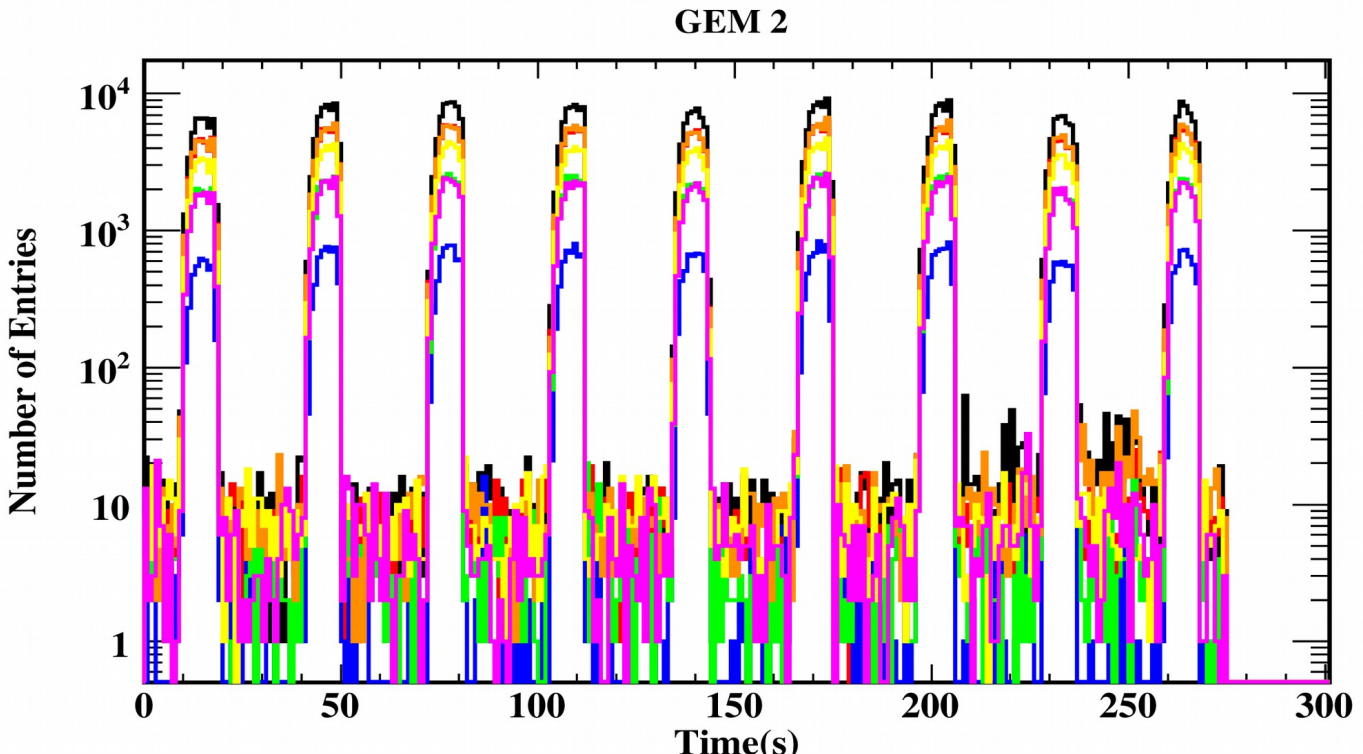
Baseline corrected adc histogram for one FEB and 10 channels combined

Spill Structure

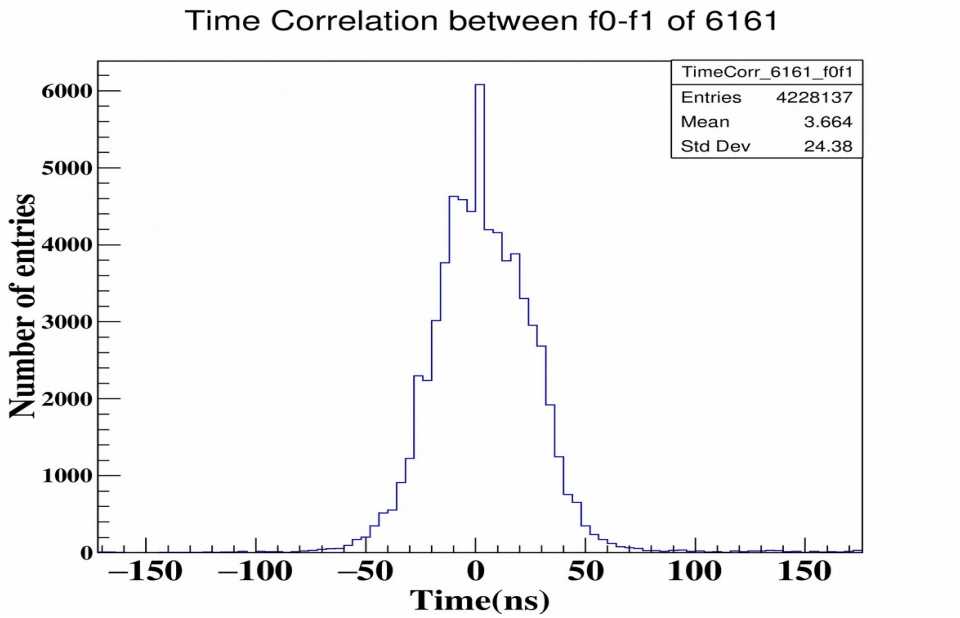
Spill structure for GEM1

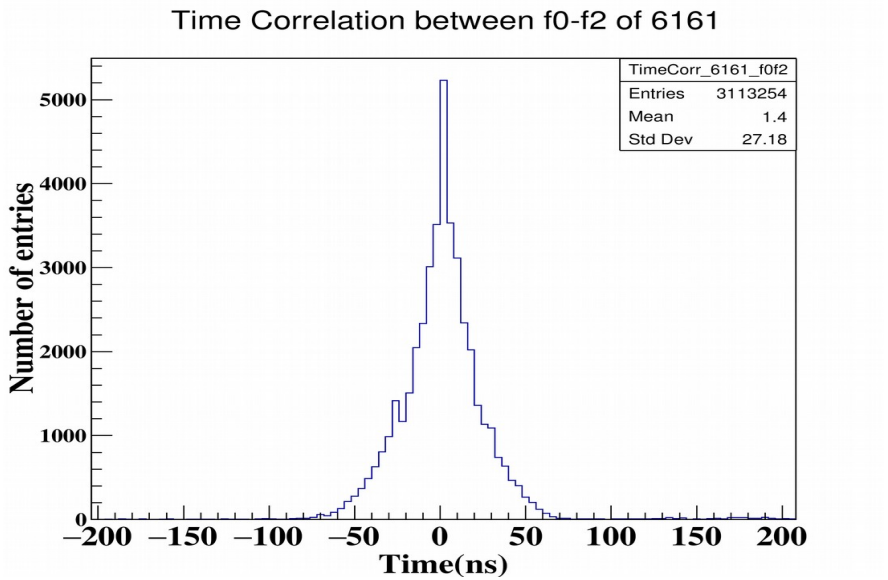


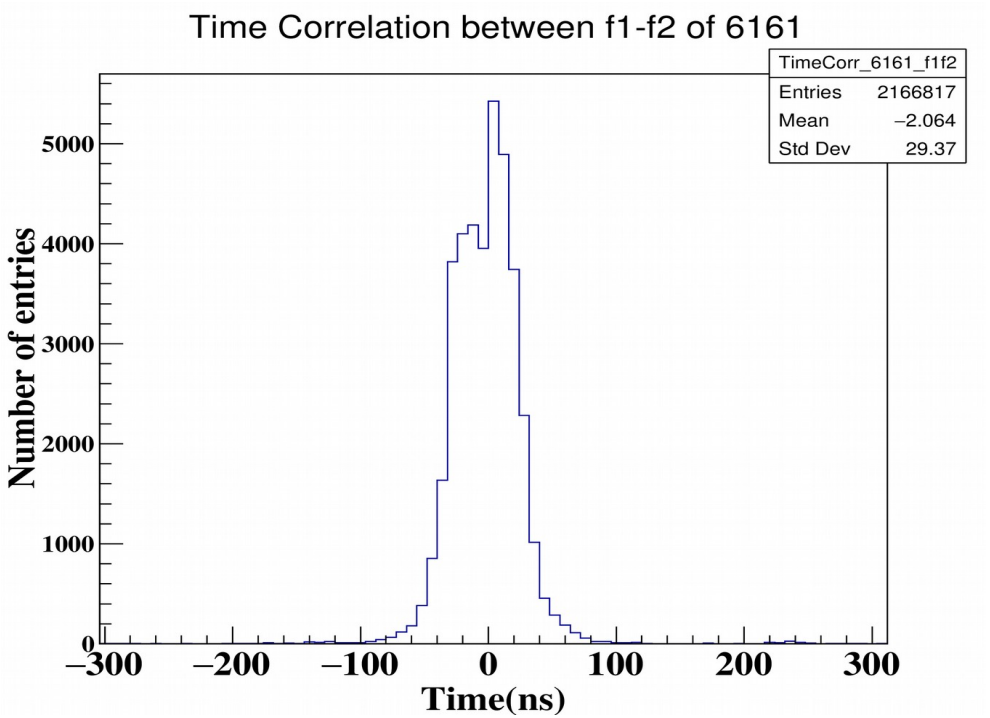
Spill structure for GEM2

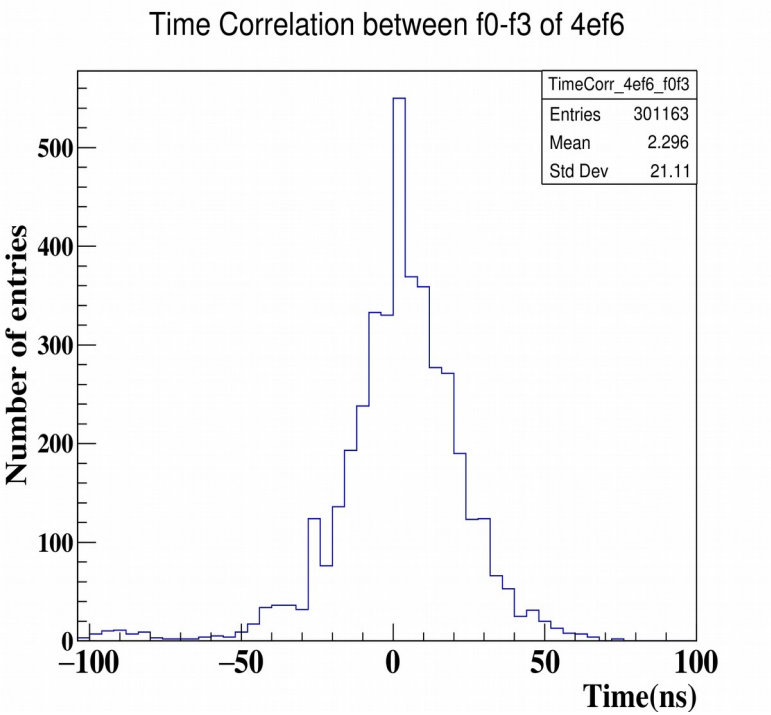


Time Correlation

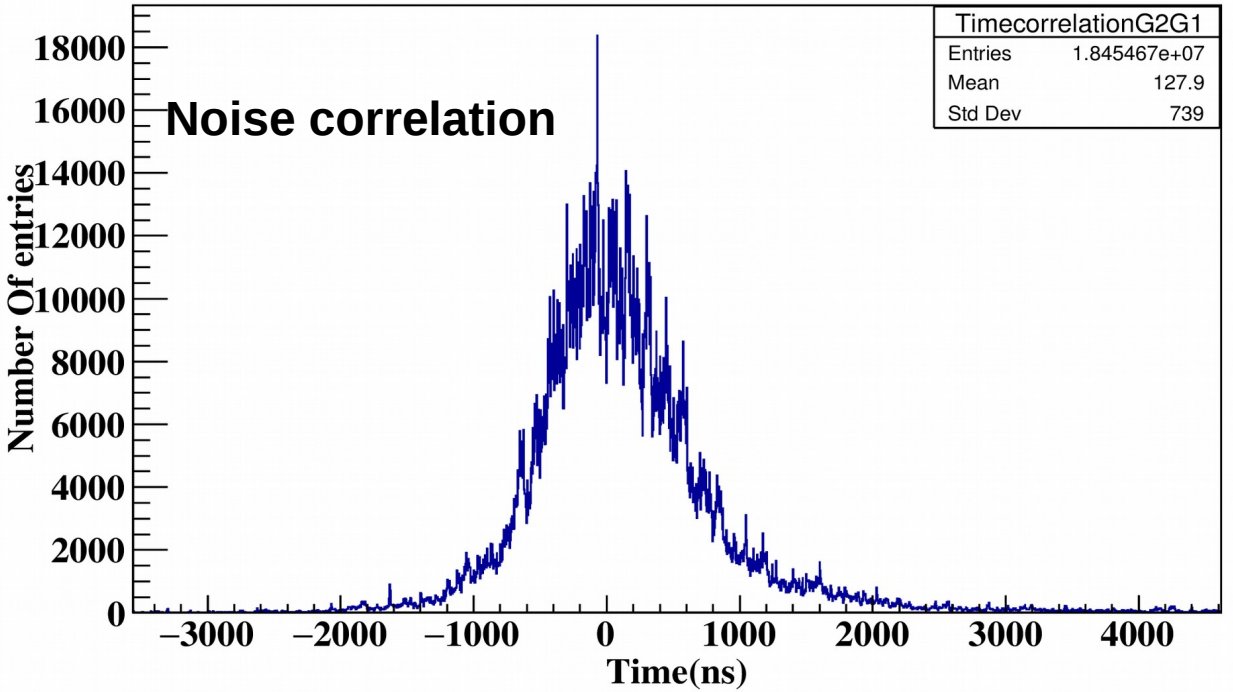




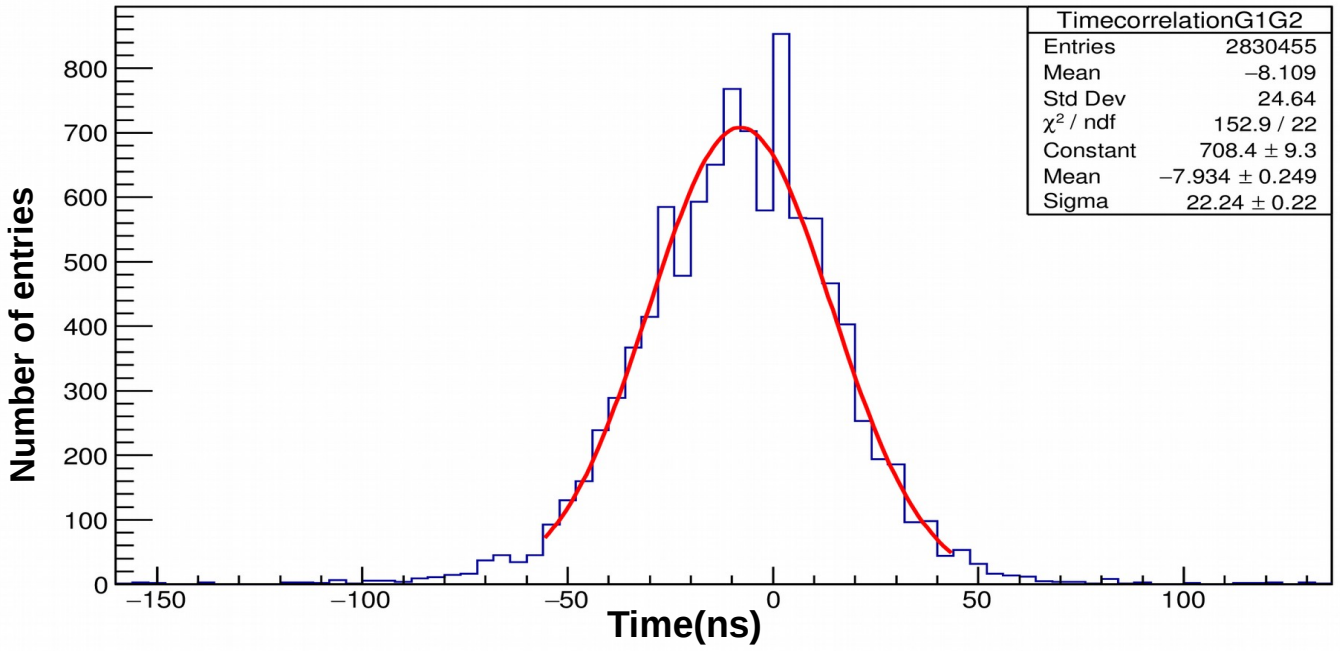




Time Correlation



Time Correlation between gem1-gem2



Thank You for your kind attention

Experimental Setup
Pb+Pb Collisions

1. At 13 AGeV/c

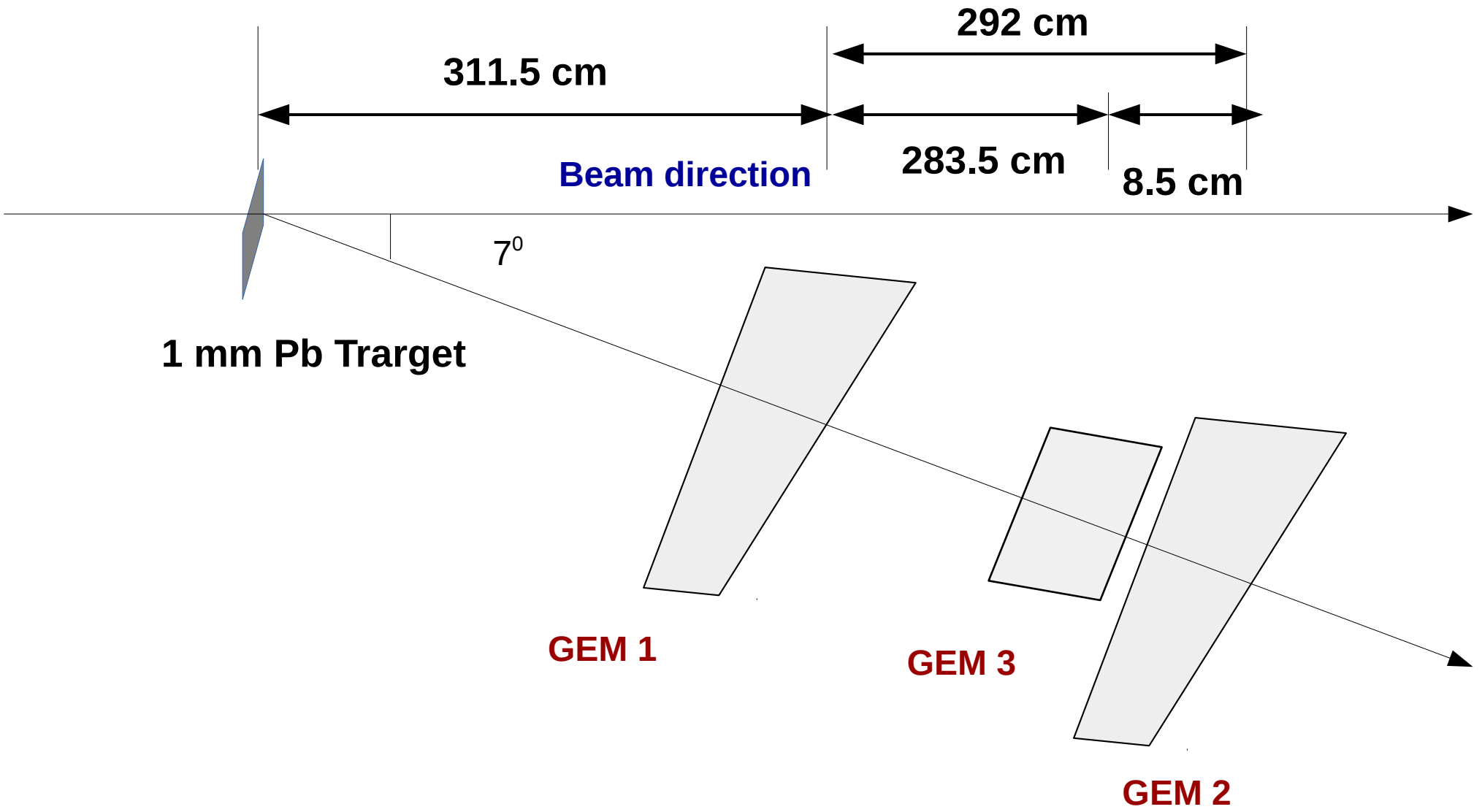
Only prototype 1 was tested

2. At 30 AGeV/c

2 prototype was tested

3. At 150 AGeV/c

3 prototype was tested


292 cm
311.5 cm
Beam direction
283.5 cm
8.5 cm
7^0
1 mm Pb Trarget
GEM 1
GEM 3
GEM 2