large GEM test beam November 2012

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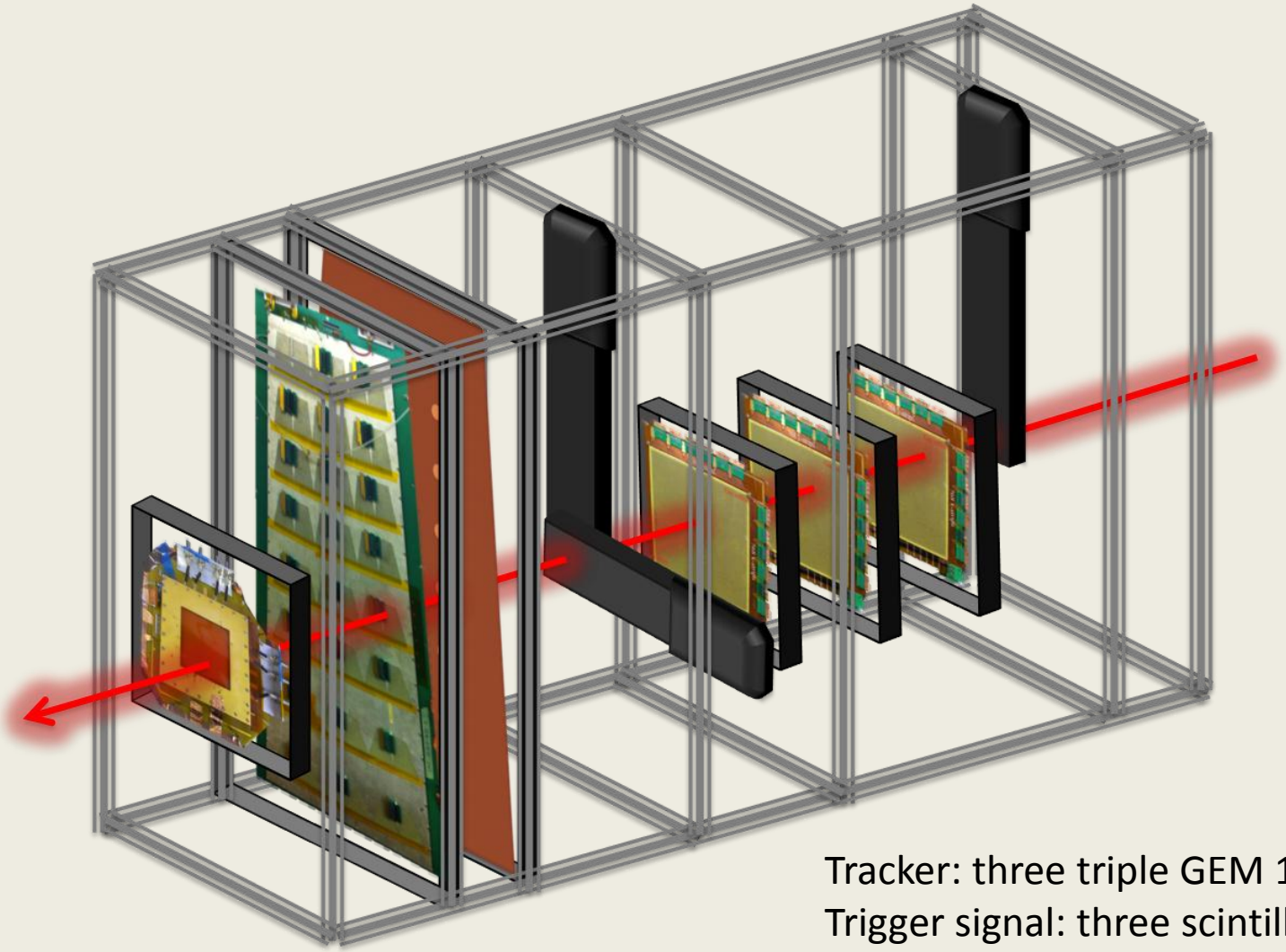
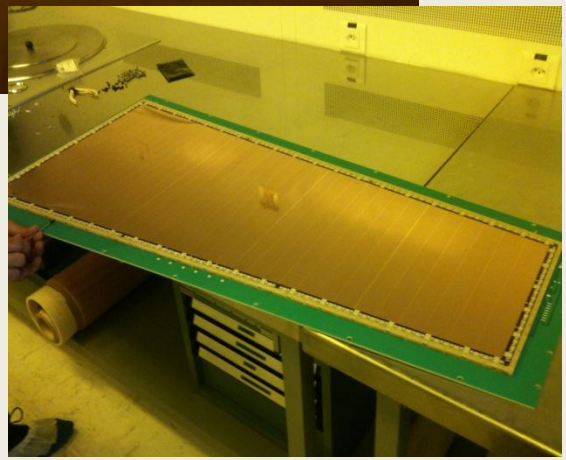
SET UP



Muons or pions beam 150Gev

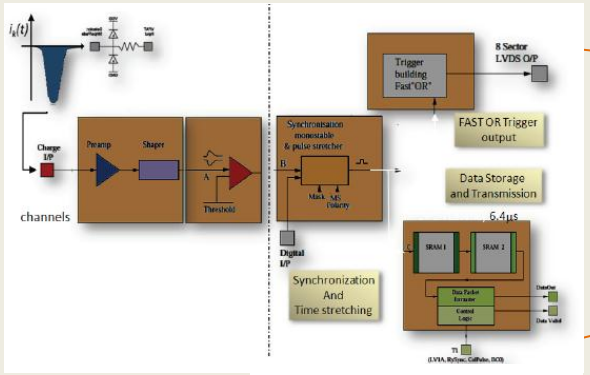
Tracker: three triple GEM 10x10Cm
Trigger signal: three scintillators
2 large chambers to test
1 Timing GEM

Detectors tested



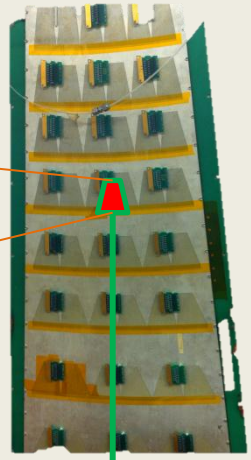
- **2 large chamber (NS2 technic) No spacers in active area.**
- **3-1-2-1 gap configuration**
- **E-fields at High efficiency :**
  drift : 3KV/cm
  transfert 1 and 2 : 3.5KV/cm
  induction : 5KV/cm
- **2 Sectors tested with pitch 0.83 and 0.88.**
- **Data taken with VFAT system and SRS system.**

VFAT



ANALOG AND ASYNCRONOUS

DIGITAL AND SYNCRONOUS



Analogic signal

data

scintillators

discriminateur

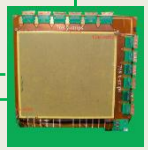
coïncidence

Trigger information

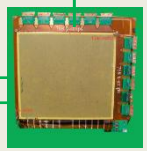
Turbo0

Turbo1

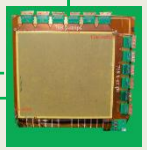
Turbo2



Tracker1

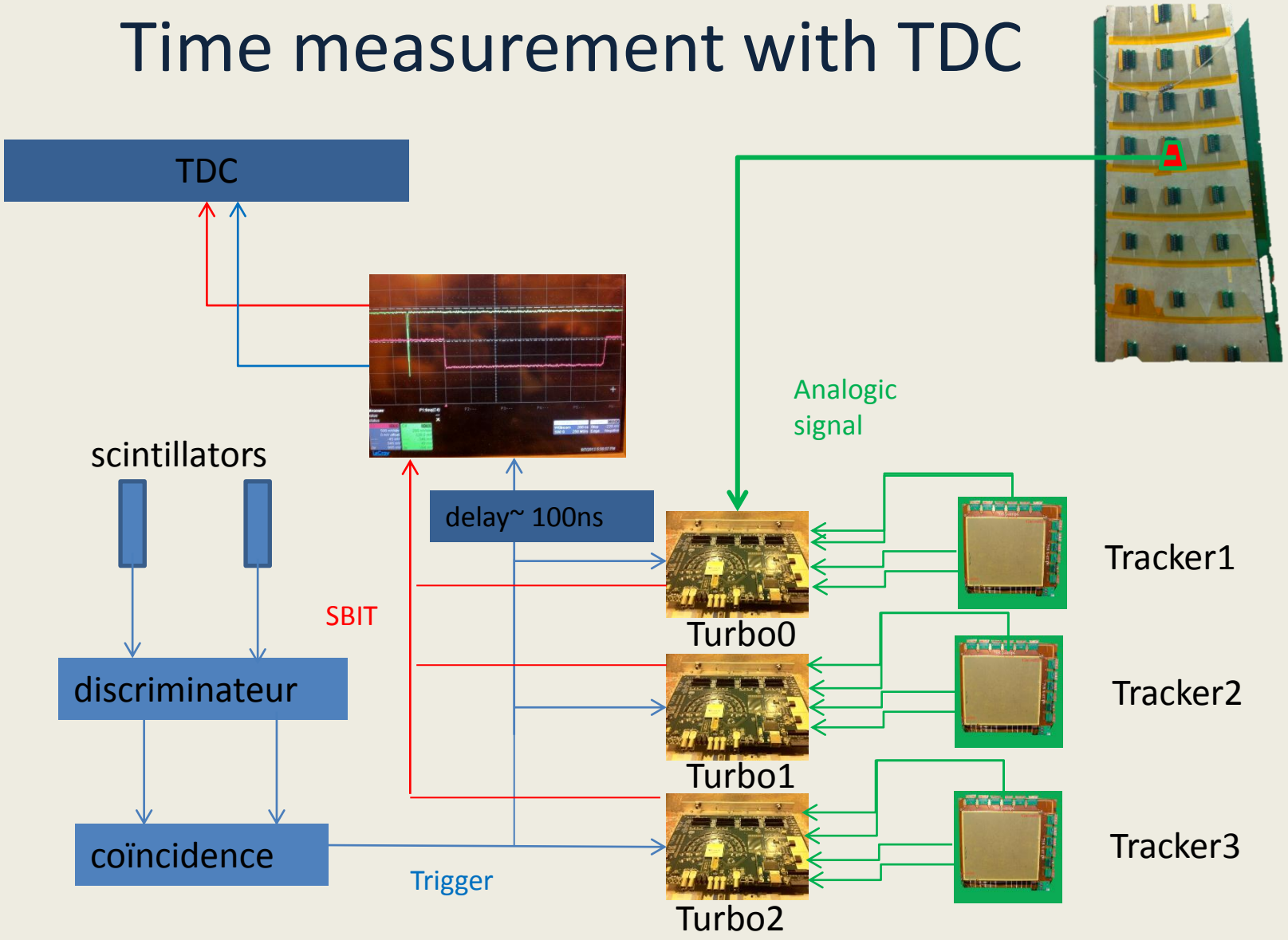


Tracker2

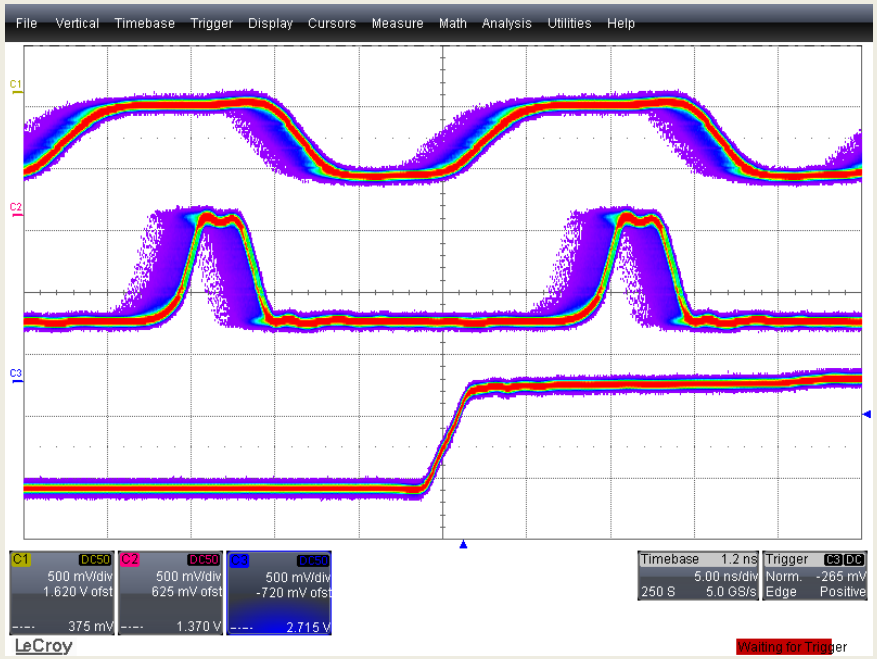


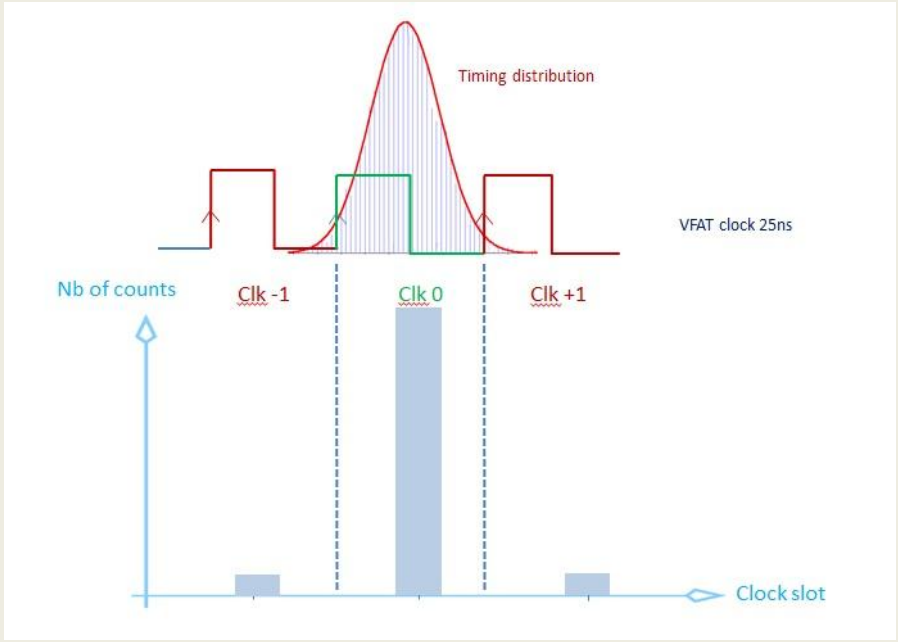
Tracker3

Time measurement with TDC



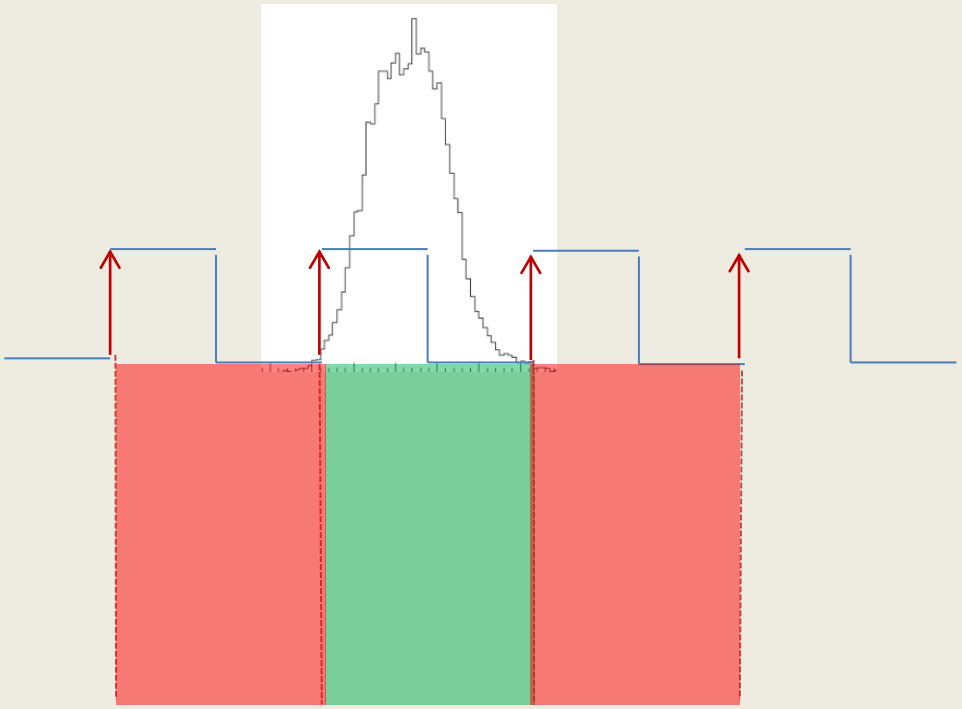
TDC with synchronized clocks

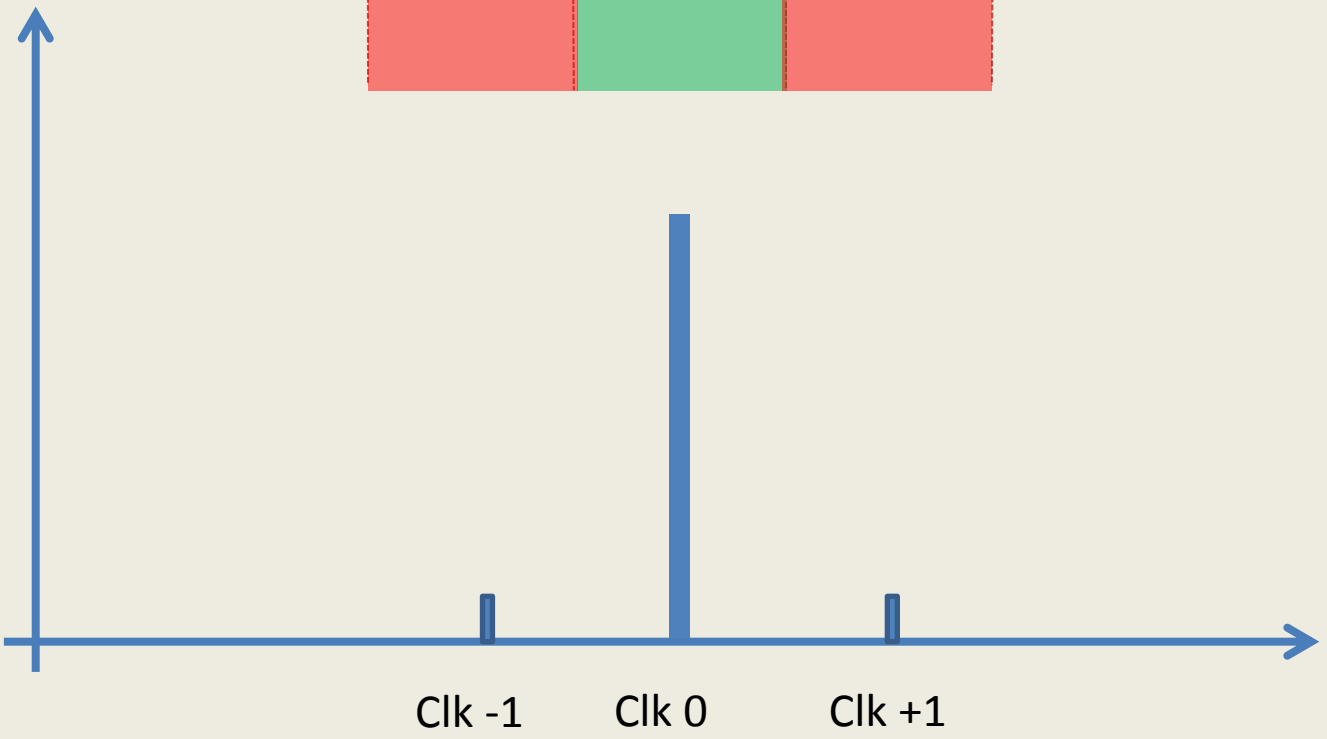




- Goal: Which purcentage of event is recorded in one clock cycle?
- New trigger: coincidence between scintillators (previous trigger) and turbo's clocks.
- Event recorded per clock cycle.

We need to position the time distribution in the middle of one clock cycle.





VFAT TURBO TDC

TDCRun 000 to 013 :
Ar/CO2/CF4-45/15/40 ------ Sectors 3/4 and 1/4
Icomp Scan from 40 to 140 at 4250 V // 800 uA
Delay 12 ns // Ishaper=200
Pions 150 GeV

TDCRun 014 to 020 :
Ar/CO2/CF4-45/15/40 ------ Sectors 3/4 and 1/4
HV Scan from 3650 V // 687 uA to 4250 V // 800 uA
Icomp=76 // Delay 12 ns // Ishaper=200
Muons 150 GeV

TDCRun 021 to 028 :
Ar/CO2/CF4-45/15/40 ------ Sectors 3/4 and 1/4
Ishaper Scan from 175 to 225 at 4250 V // 800 uA
Icomp=76 // Delay 12 ns
Muons 150 GeV

TDCRun 029 to 051 :
Ar/CO2/CF4-45/15/40 ------ Sectors 3/4 and 1/4
Icomp Scan from 40 to 140 at 4250 V // 800 uA
Delay 23.5 ns // Ishaper=200
Pions 150 GeV

TDCRun 054 to 059 :
Ar/CO2/CF4-45/15/40 ------ Sectors 3/4 and 1/4
HV Scan from 3650 V // 687 uA to 4250 V // 800 uA
Icomp=100 // Delay 23.5 ns // Ishaper=150
Pions 150 GeV MSPL 4

TDCRun 060 to 066 :
Ar/CO2/CF4-45/15/40 ------ Sectors 3/4 and 1/4
HV Scan from 3650 V // 687 uA to 4250 V // 800 uA
Icomp=100 // Delay 23.5 ns // Ishaper=150
Muons 150 GeV MSPL 1

APV+SRS

Run01 :
Ar/CO2-70/30 ------ **Sectors 3/5 and 1/5**
HV Scan from 3000 V // 562 uA to 3600 V // 675 uA
Muons 150 GeV

Run02 :
Ar/CO2-70/30 ------ **Sectors 3/4 and 1/4**
HV Scan from 3000 V // 562 uA to 3600 V // 675 uA
Muons 150 GeV

Run03 :
Ar/CO2/CF4-45/15/40 ------ Sectors 3/4 and 1/4
HV Scan from 4050 V // 762 uA to 4250 V // 800 uA
Muons 150 GeV

Run04 :
Ar/CO2/CF4-45/15/40 ------ Sectors 3/4 and 1/4
HV Scan from 3950 V // 744 uA to 4250 V // 800 uA
Pions 150 GeV

Run05 :
Ar/CO2/CF4-45/15/40 ------ Sectors 3/4 and 1/4
HV Scan from 3750 V // 706 uA to 4250 V // 800 uA
Pions 150 GeV

Run06 :
Ar/CO2/CF4-45/15/40 ------ Sectors 3/4 and 1/4
HV Scan from 3750 V // 706 uA to 4250 V // 800 uA
Muons 150 GeV

Run07 :
Ar/CO2/CF4-45/15/40 ------ Sectors 3/4 and 1/4
HV Scan from 3850 V // 725 uA to 4250 V // 800 uA
Pions 150 GeV

Run08 :
Ar/CO2/CF4-45/15/40 ------ Sectors 3/4 and 1/4
HV Scan from 3750 V // 706 uA to 4250 V // 800 uA
Muons 150 GeV

+ Some long runs (muons/pions)
+ Pedestal runs

Conclusion

- Data analysis in progress.
- Data taken with both SRS and VFAT systems. It will be interesting to compare results given by two different electronic readout from one common run.
- Timing measurement done in two different ways (synchronised clock, or « online » time distribution).
- We learned SRS system, THANK YOU ERALDO. Very powerful system, it will be used in the future.