RE4 Cosmic Stands Progress CERN, BARC, UGent

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Talk Outline

- Present status in CERN site
- Present status in BARC
- Present status in Gent
- Summary

Scintilator Counters

- Recycling the previous scintilator counters by replacing the old PMT with a new one from Hamamatsu.

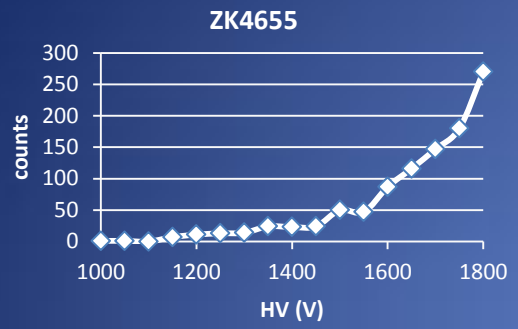
  Using H11284 “all in one” PMT Module

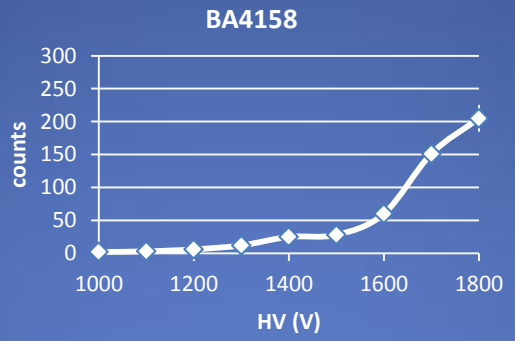
Ready Counters

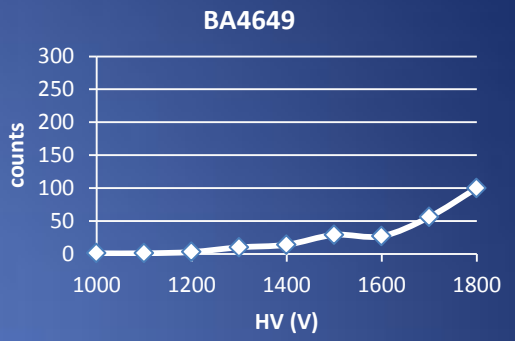
R7724

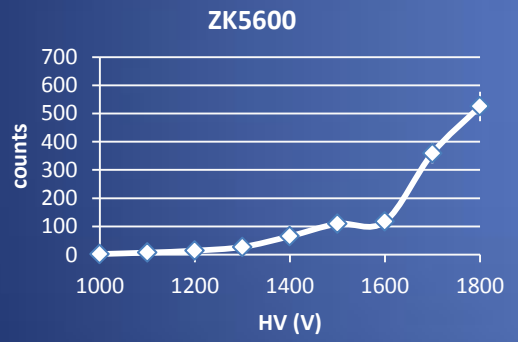
Spectral response – 300-650nm

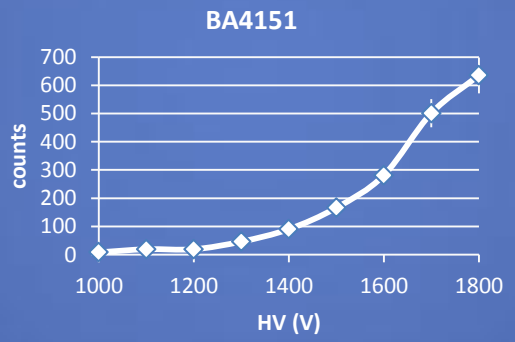
Scintillators testing

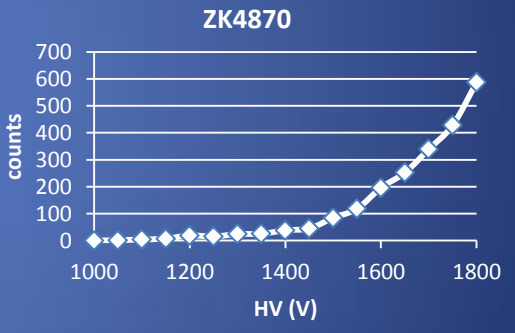


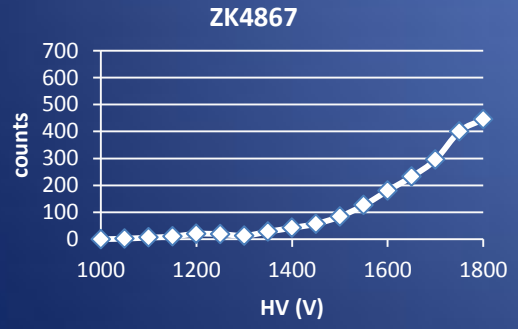


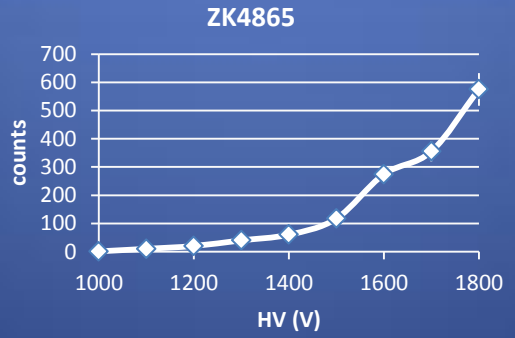


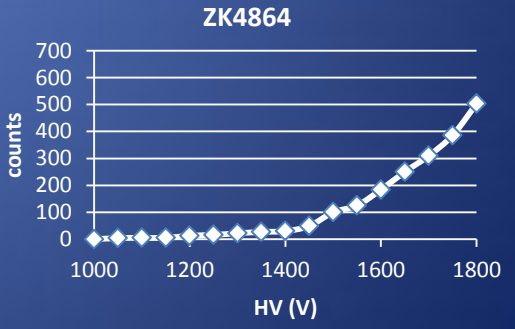












DAQ status

- VME based
- 1x CAEN V2718 – VME bridge
- 5x TDC modules CAEN V1190A – 128LVDS input channels
- V1290 TDC implemented in the DAQ software for the BARC site
- PC

V1190A

128 LVDS/ECL Input channels

Dynamic Range

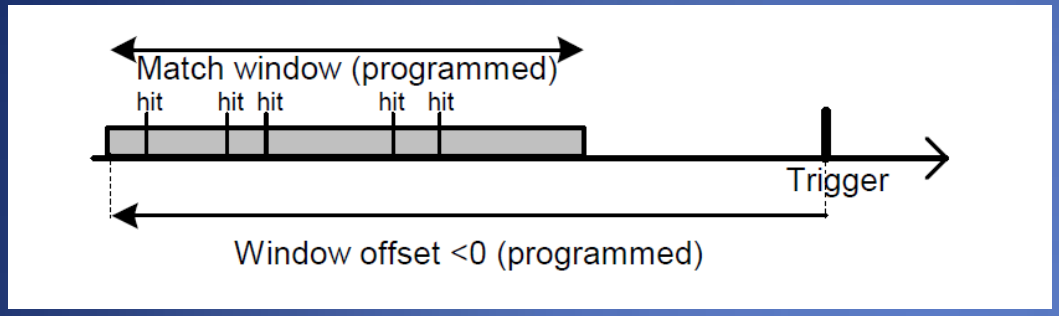
Resolution – up to 100ps.

V1190A is suitable for wide range applications

Table 3.2 : Model V1190 A/B technical specifications

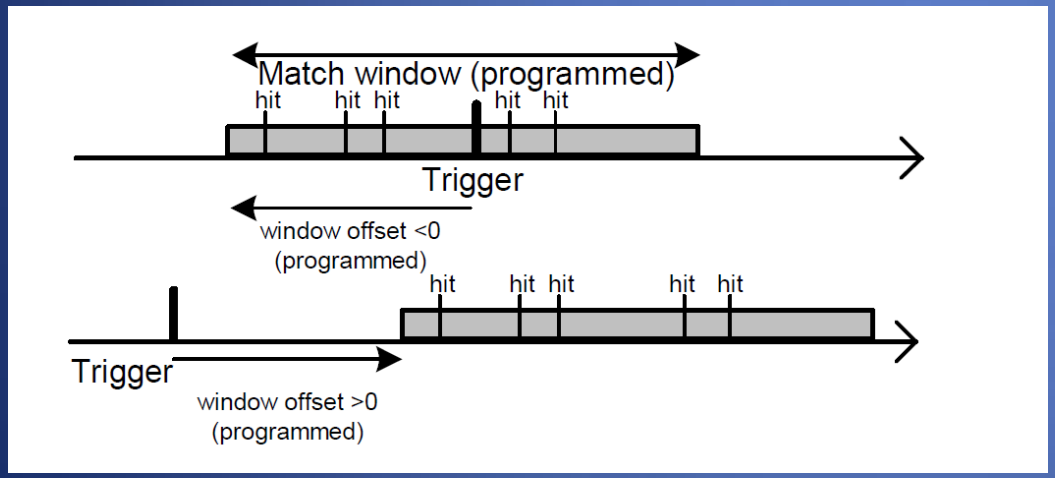
Packaging	6U-high, 1U-wide VME unit
Power requirements	Refer to Table 3.1
Inputs	V1190 A/B: 128/64 ECL and LVDS inputs, 110 Ω impedance
Double hit resolution	5 ns
Acquisition modes	Trigger Matching Mode; Continuous Storage Mode
Match window	Programmable (see § 5.3)
Built-in memory	32 kwords deep Output Buffer
LSB	VME programmable: 100 / 200 / 800 ps
Dynamic Range	104 μs (200 ps and 800 ps LSB); 52 μs (100 ps LSB)
RMS resolution (with compensation[8] enabled)	<320 ps @ 800 ps res. <140 ps @ 200 ps res. <80 ps @ 100 ps res.
Integral non linearity (with compensation[6] enabled)	<0.3 LSB @ 800 ps res. <1 LSB @ 200 ps res. <1 LSB @ 100 ps res.
Max. differential non linearity (with compensation[6] disabled)	<0.2 LSB @ 800 ps res. <0.3 LSB @ 200 ps res. <0.5 LSB @ 100 ps res.
Interchannel Isolation	≤0.7 LSB
Offset spread	<2 ns[7]
EXT TRIGGER input	Two LEMO 00 bridged connectors, NIM signal, 50 Ω
Double Trigger resolution	75 ns
Clock source	Internal (40 MHz) or External (on *Control* connector), dip switch selectable
Control inputs	active-high, differential ECL input signals: CLR: performs the Hardware CLEAR (min. width: 25 ns), see § 4.8.1 rising-edge active, differential ECL input signals: CRST: performs the Bunch RESET (min. width: 25 ns), see § 4.8.5 CLK: external clock (max. freq.: 40 MHz) TRG: trigger for the TDC latching (min. width: 25 ns) L2_A; L2_REJ.
Control outputs	differential ECL output signal: OUT_PROG: control output signal, programmable via the *out prog control* register (see § 6.23)
Displays	DTACK: green LED; lights up at each VME access. PWR: green/red LED; green: power ON, red: failure status. TERM: green LED; control bus termination ON. FULL: red LED; memory full. ERROR: red LED; TDC global error. DRDY: yellow LED; at least one datum/event in the Output Buffer
VME	*Addressing modes*: A24, A32, MCST *Data transfer modes*: D16, D32, MBLT32, BLT64, CBLT32, CBLT64 *Readout rate*: 33 Mbyte/s

V1190A - Trigger matching mode



Similar as Common Stop

The trigger signal is after the "Match Window"



The trigger is inside the "Match Window"

The trigger is before the "Match Window"

Similar as Common Start

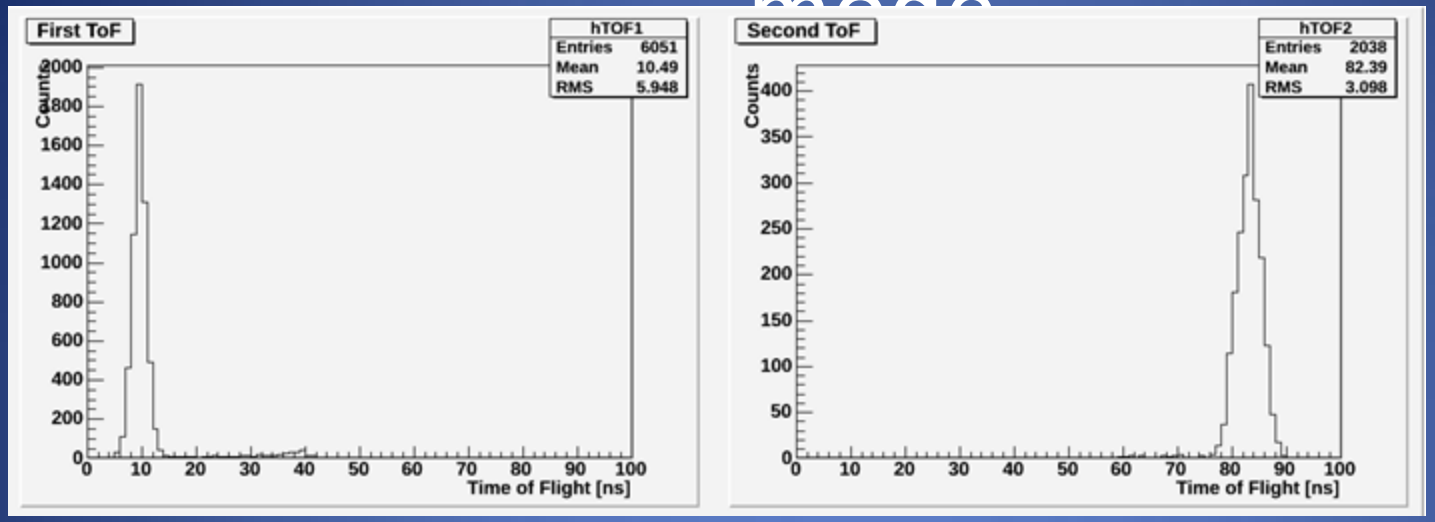
V1190A is designed for LHC applications and it consist 25ns pattern from the internal 40MHz clock. The trigger signal must be connected to one of the input TDC channels

b.904 DAQ test bench

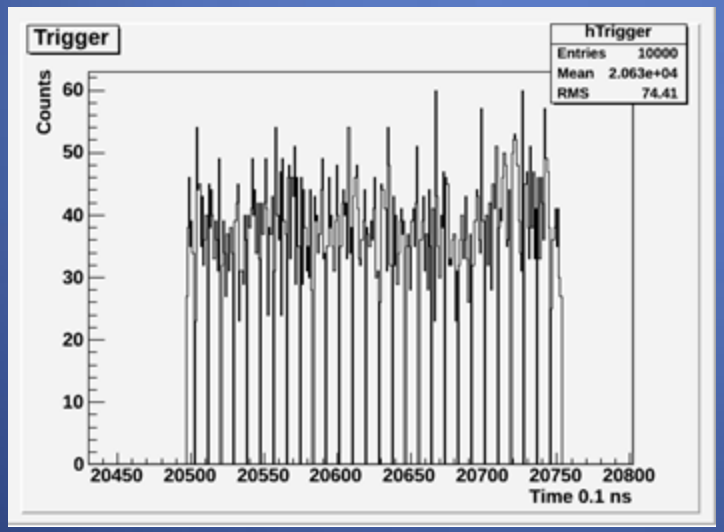
DAQ software progress

- Online DAQ datataking application – 90% done
  - External rpc.ini file for setting up all the parameters – 100% done (base address, number of events, etc..)
  - Output data format using root “TTree” – 100% done
  - Small offline tool to plot the data – 100% done
  - Implementing another type of TDC V1290A – 100% done (needed for BARC site in India)
- Offline – Under development - 10% done
- Database coupling – Under development
- Web interface – Under development

DAQ simple run as trigger matching mode



10k events from the Scintilators as DUT



Trigger comes random in the 25ns window

rpc 904 Cosmic Telescope present status

- Scintilator Counters – 100% ready
- HV cables for the SC – 100% ready
- 11 signal cables – 100% ready
- NIM logic modules and crates – 100% ready
- VME crate – 100% ready
- TDC modules – 100% ready
- TDC data cable adapters – 100% ready and tested.
- 25ns Synchronization clock generator – 100% ready
- Level convertors with cables – 100% ready

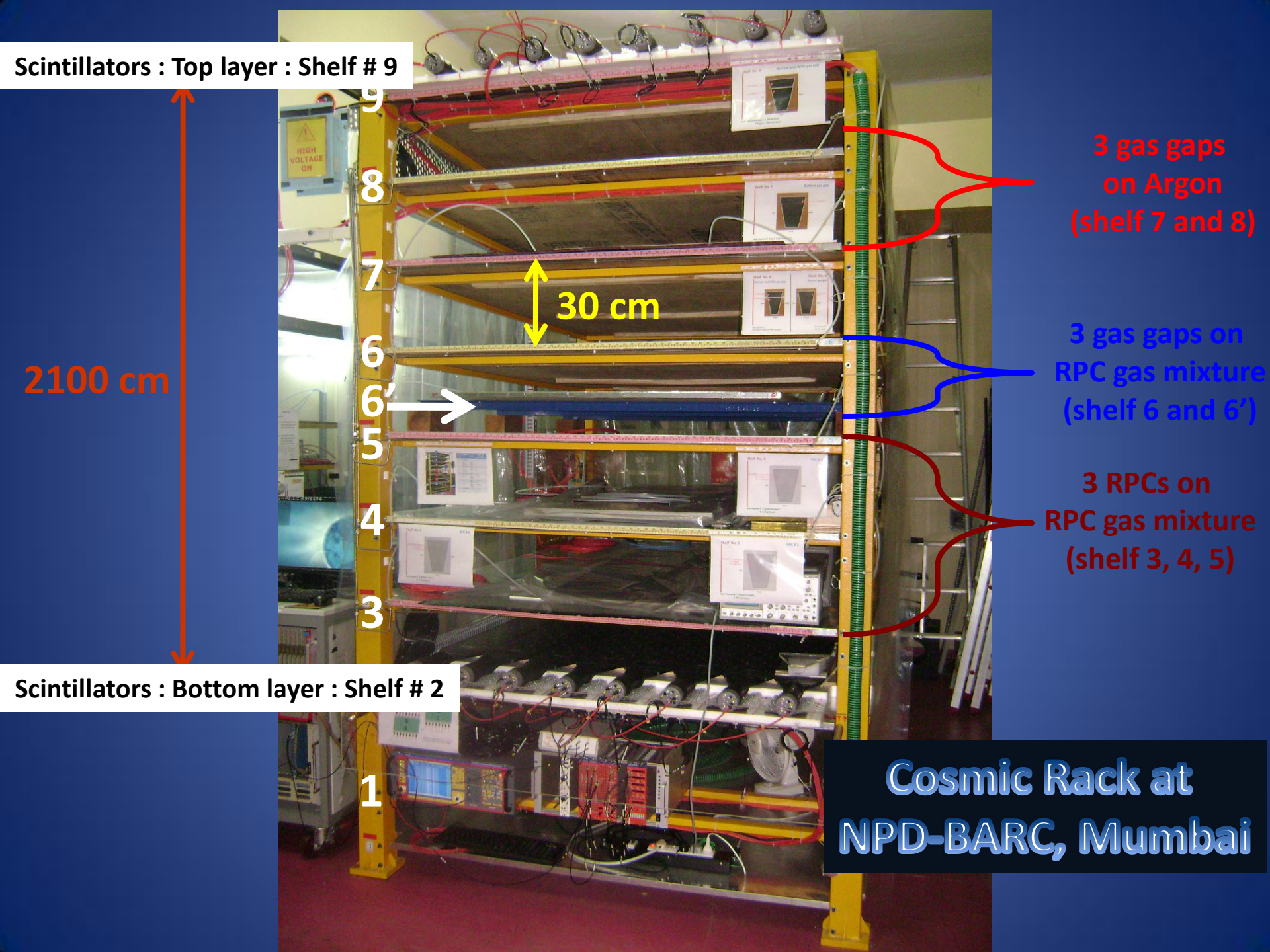
Waiting to enter in the big RPC lab

904 RPC construction lab (inside)

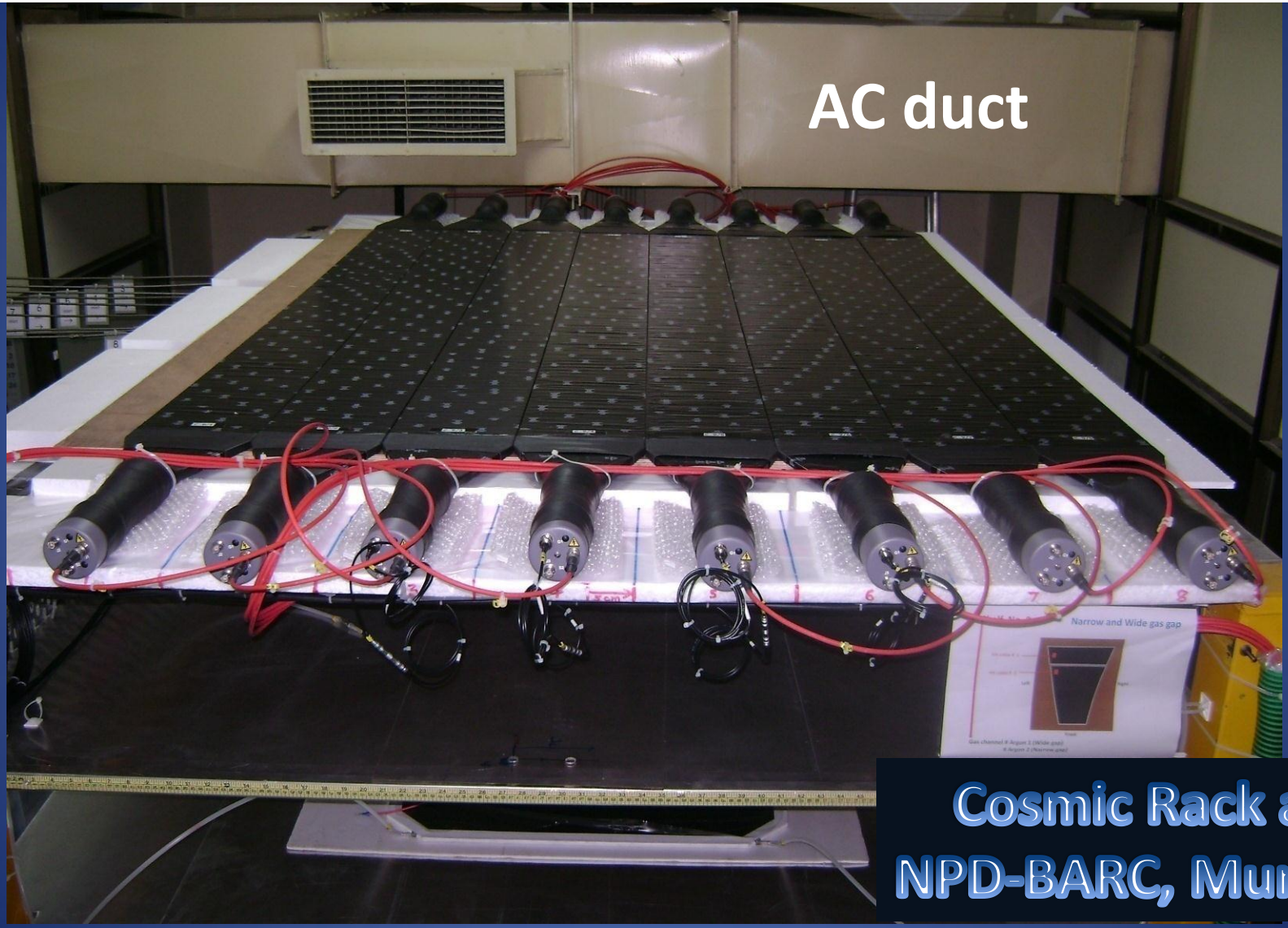
904 RPC Lab – present status

- Power network is under procurement. – Should be done finish next week.
- Air conditioning. – Still under construction. No near estimation.

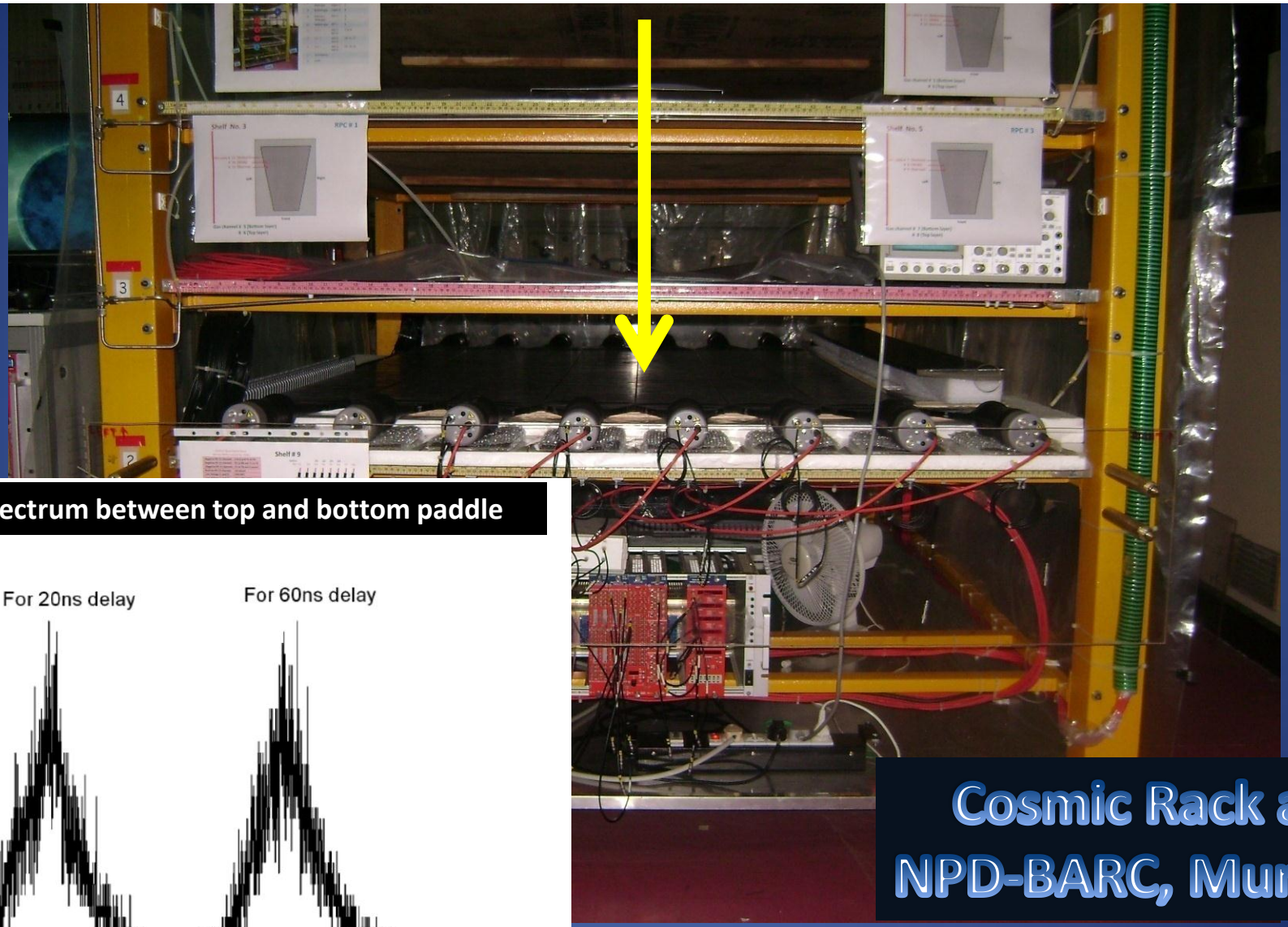
BARC Site


Scintillators : Top layer : Shelf # 9
2100 cm
Scintillators : Bottom layer : Shelf # 2
9
8
7
6
6'
5
4
3
1
30 cm
3 gas gaps on Argon (shelf 7 and 8)
3 gas gaps on RPC gas mixture (shelf 6 and 6')
3 RPCs on RPC gas mixture (shelf 3, 4, 5)
Cosmic Rack at NPD-BARC, Mumbai

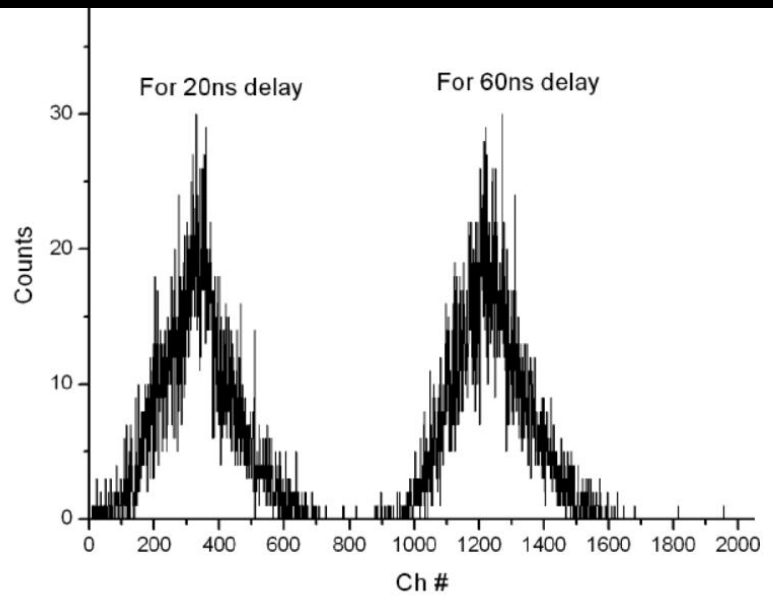
Top layer : Shelf # 9 : Eight scintillators : (180 cm x 18 cm x 1 cm)
PMT (ET) read out from both the ends



Bottom layer : Shelf # 2 : Eight scintillators : (180 cm x 18 cm x 1 cm) PMT (ET) read out from both the ends



TAC spectrum between top and bottom paddle



Cosmic Rack at NPD-BARC, Mumbai

Table for leak and spacer tests (RE4/2, Bottom Gap), Mumbai

BARC Site

- This week we are planning to start the installation of the CERN DAQ software.

UGent Site

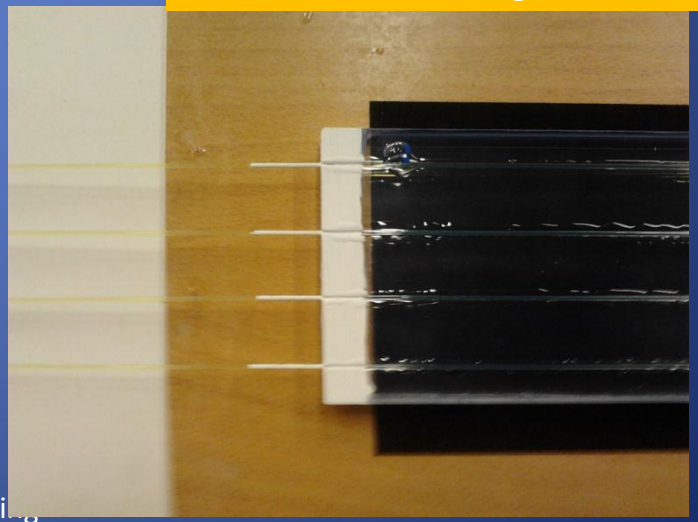
News from the Gent Site (I)

- Cosmic test bench under construction :

Test Bench Rack

Scintillators with glued fibers

Scintillators wrapped in 3M 1100 Mirror Film



News from the Ghent Site (II)

- **Status of setups :**
  - **Gas gap popped spacer test ready**
  - **Gas gap HV test :**
    - **Rack is ready, need to pull cables and gas tubes**
    - **Software nearly done (see next slide)**
  - **Cosmic test bench :**
    - **Rack is ready, need to pull cables and gas tubes**
    - **Most electronic modules are there**
    - **Online DAQ software to be worked on (see next slide)**
  - **Storage rack for assembled chambers ready (~15 chambers)**
  - **Racks for chamber transportation to CERN to be produced (how many do we need ??)**

News from the Ghent Site (III)

- **Software :**
  - HV scan software being finalized (C++ on Linux, with Qt/ROOT graphical interface) :
    - Implementation of environmental parameters nearly done (WMR-200 weather station)
    - Implementation of gas T&H measurements (from Pico EL026/EL030 sensor) to be done
    - Implementation of automatic HV correction procedure for long-term testing to be done
  - DAQ software (C++ on Linux, with Qt/ROOT graphical interface)
    - Basic software package for online DAQ is there
    - Need to implement new TDCs
  - Need to work on the interface of software - DB

Status of cable preparation for QC as on 31st October 2011

SN	Type of cable	Mumbai	Ghent	CERN	Total
1	**Low Voltage** cable with DB and Molex connectors. Test report on page 2	**3** (5 metres each) 3 / 3 Tested OK	**4** (10 metres each) 4 / 4 Tested OK	**5** (12 metres each) 5 / 5 Tested OK	**12** **12 / 12**
2	**HV cable** with Jupiter(F)-Jupiter (F) connectors	**Not required** procured directly from CAEN at Mumbai Tested OK	**25** 10 metres each Components awaited 18 / 25 prepared 7 / 25 Tested OK	**40** 12 metres each Components awaited	**65** **7 / 65**
3	**TDC cables** Each TDC connector, (Farnell), is connected to two, flat twisted pair cables, each of 50 cm in length	**16** TDC connectors 16 / 16 cables Tested OK	**20** TDC connectors Components awaited 13 / 20 cables	**40** TDC connectors Components awaited 20 / 40 cables Tested OK	**76** **36 / 76**
4	Flat cables (RPC to TDC) (40 pin to 34 pin)	**24** Retrieved from old stock (5 metres) 24 / 24 Tested OK	**36** Components awaited (10 meteres)	**72** Components awaited (12 metres)	**132** **24 / 132**

Summary

CERN	UGent	BARC
• Scintilator Counters – 100% ready • NIM logic modules and crates – 100% ready • VME crate – 100% ready • TDC modules – 100% ready • TDC data cable adapters – 100% ready and tested. • Synchronization - 100% ready – 25ns from V2718 • Online DAQ software – 100% ready • Small offline tool to plot the data – 100% ready	• Scintilator Counters – 100% ready • NIM logic modules and crates – 100% ready • VME crate – 100% ready • TDC modules – 100% ready • Synchronization - 100% ready (!) • Online DAQ software – 100% ready (!) • Small offline tool to plot the data – 100% ready (!) (!) - available from CERN	• Scintilator Counters – 100% ready • NIM logic modules and crates – 100% ready • VME crate – 100% ready • TDC modules – 100% ready • TDC data cable adapters – 100% ready and tested. • Synchronization - 100% ready • Online DAQ software – 100% ready • Small offline tool to plot the data – 100% ready

Summary

- All 3 sites will use the same offline software for chambers QC
- All 3 sites will use the same software for long term HV monitoring.
  - UGent – 100% done
  - CERN – still under testing and installation.
  - BARC site – under instalation.

To do

- Offline analysis software – we need operational RPC (efficiency, cl. Size …..)
- Database matching - OCCI or simple txt files?
- DAQ Web Interface

Thank You