Cosmic Ray Tracker and Detector Control System at the GIF++

A. Polini (INFN Bologna)
on behalf of WP 8.5.3 group

Outline

- Cosmic Ray Tracker
- Infrastructure, monitoring and DCS
- Plans

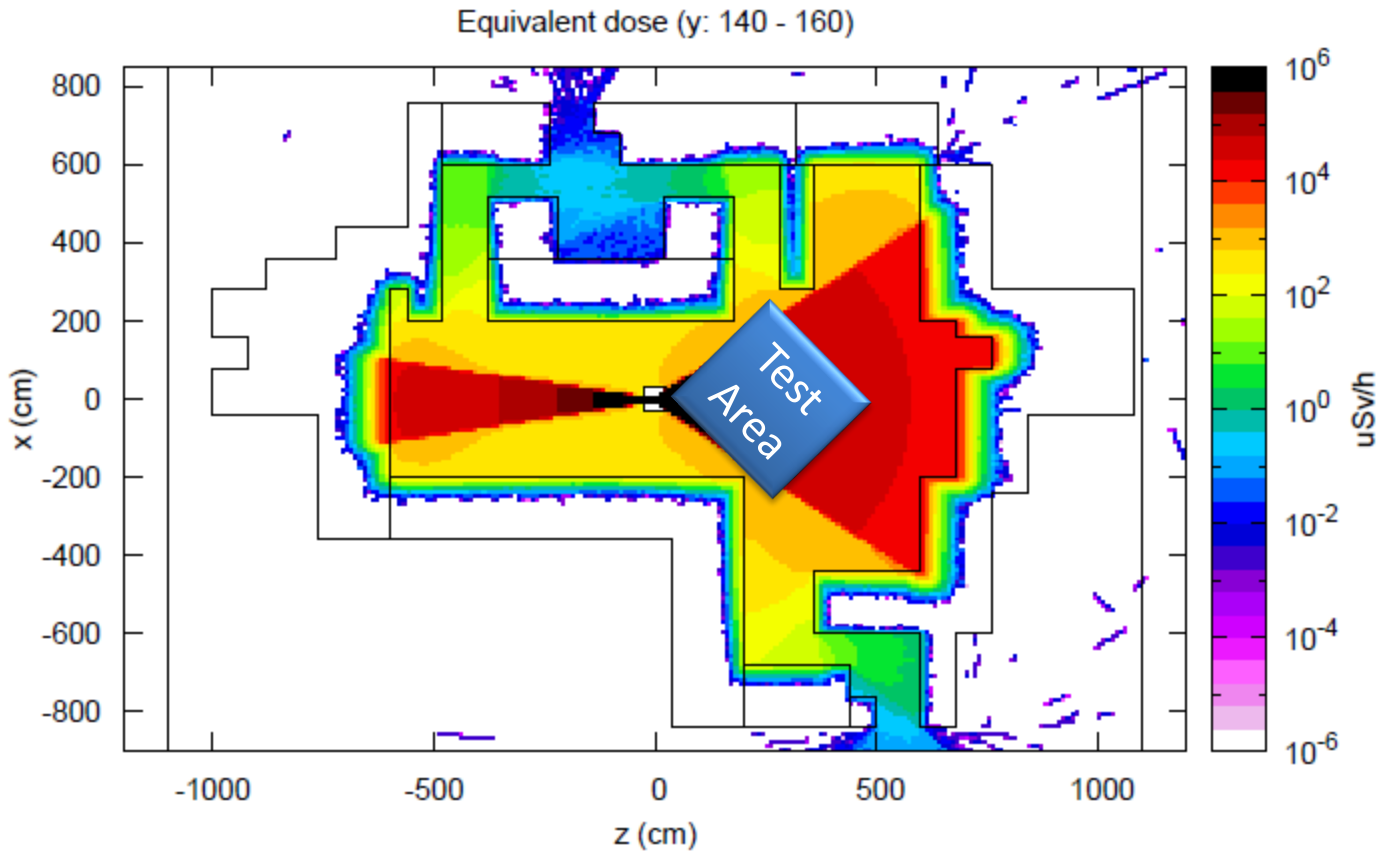
Cosmic Ray Tracking Trigger for the GIF++

G. Aielli (Univ. and INFN Rome 2)

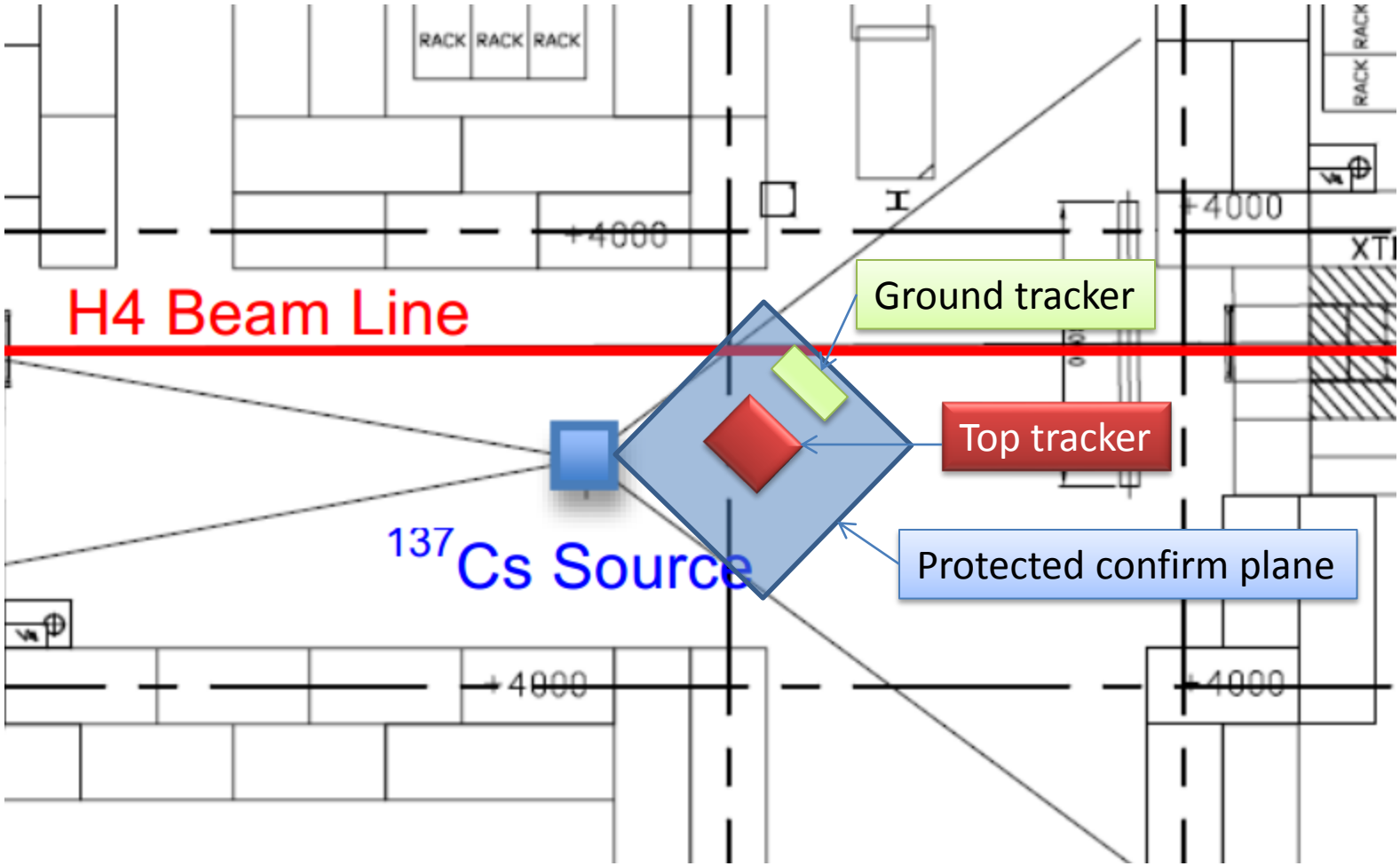
Proposal guidelines

- Amount of money limited…..
- Need for a CR tracking trigger to ensure test operation for most of the time (beam presence a few weeks/year)
- Large area desirable to fit multiple users
- Tracking performance: small dimensions tracker facing a large protected confirm plane→ minimize channels
- Timing performance ~1ns to provide an easy and clean trigger setup
- High rate to be sustained ~20 kHz/cm^2

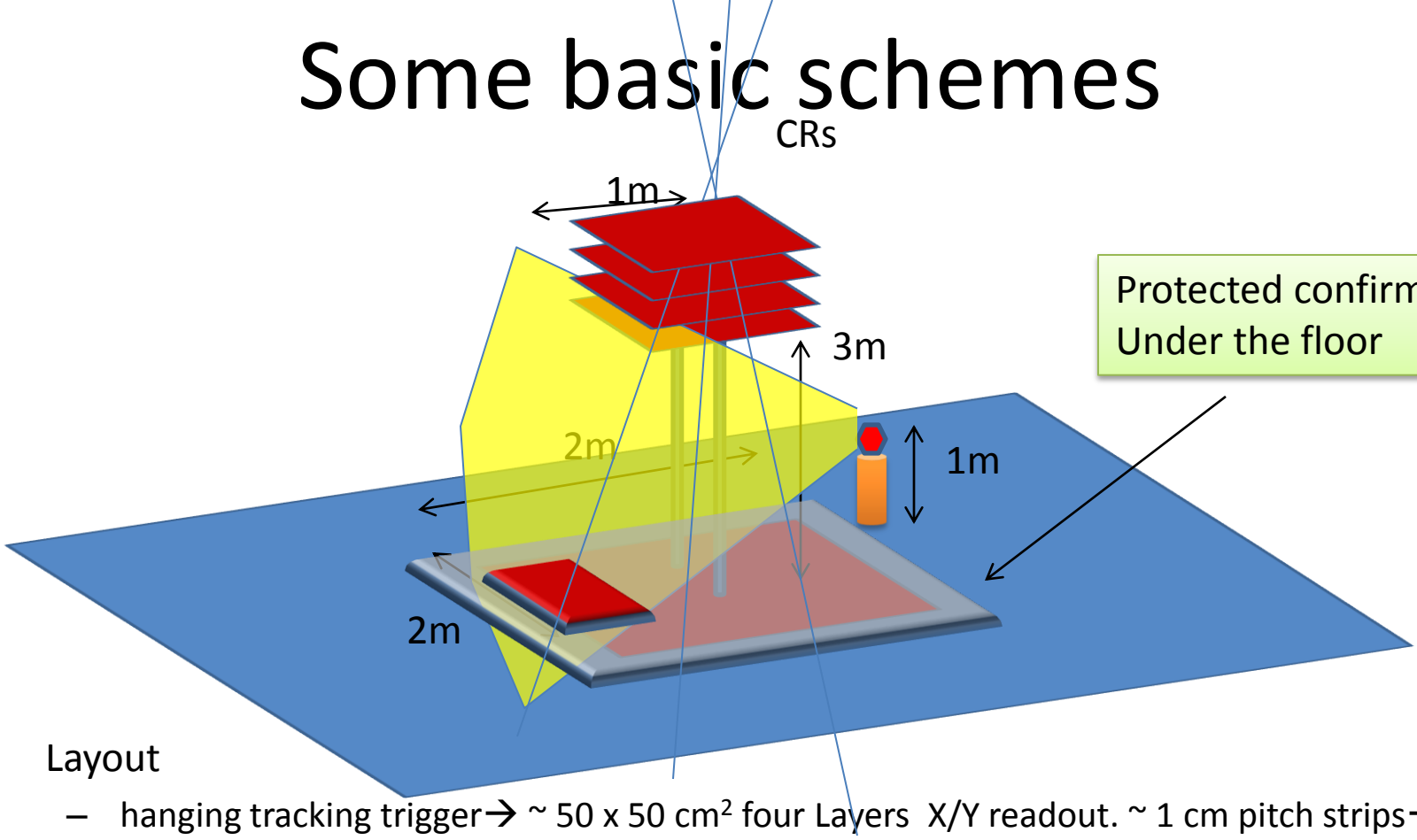
The GIF++ area


Equivalent dose (y: 140 - 160)
800
600
400
200
0
-200
-400
-600
-800
x (cm)
-1000
-500
0
500
1000
z (cm)
Test Area
10^{6}
10^{4}
10^{2}
10^{0}
10^{-2}
10^{-4}
10^{-6}
uSv/h

Cosmics monitor Layout

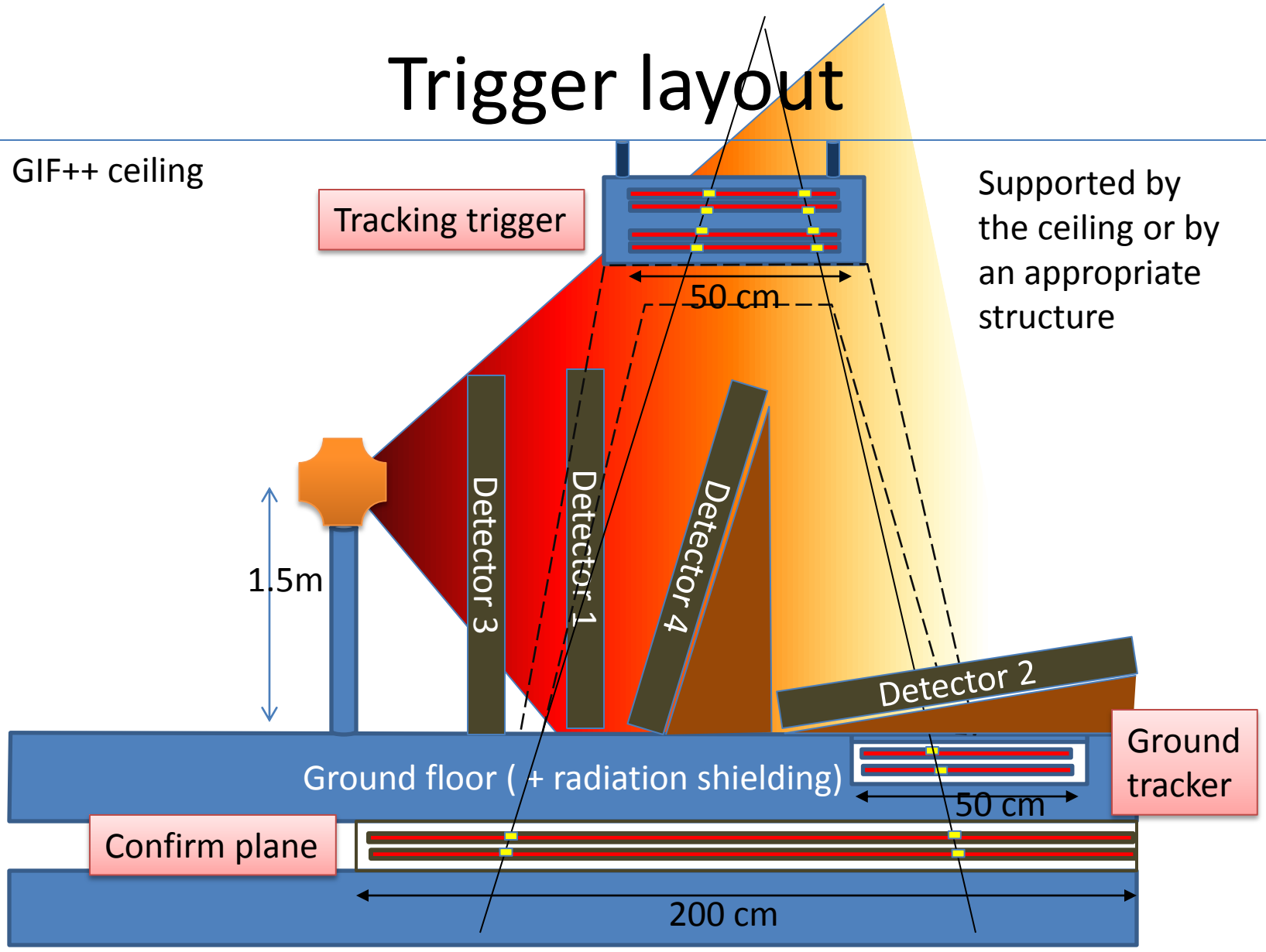


Some basic schemes



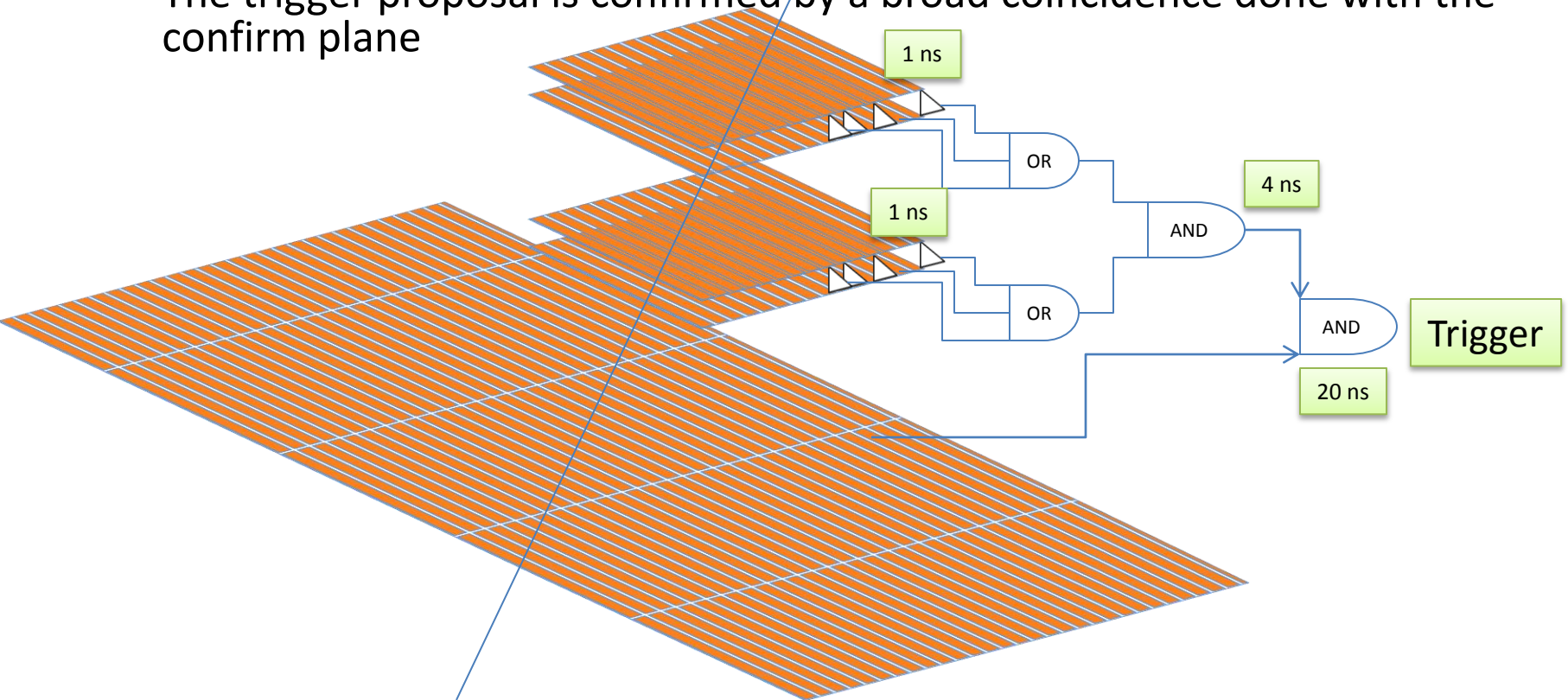
- Layout
  - hanging tracking trigger→ ~ 50 x 50 cm^2 four Layers X/Y readout. ~ 1 cm pitch strips→ 200 channels
  - Large confirm plane under the floor → 200 x 200 cm^2 singlet or doublet . ~ 3 cm pitch strips→ 100 channels
  - Ground tracker (optional) → 50 x50 cm^2 doublet X-Y. ~ 1 cm pitch strips→ 100 channels
  - Readout system: Digital pattern for the big chamber. Analog readout for small trackers (time+charge) or part of them.

Trigger layout



A possible Trigger scheme

- The CR are triggered by a high performance RPC chamber which also provides a 3D track extrapolation
  - The photon background is suppressed by 2 cascaded double narrow coincidence (1 ns)
  - The first coincidence is done at the end of each couple of facing strips
  - The second coincidence is done globally
- The trigger proposal is confirmed by a broad coincidence done with the confirm plane



Power System and DCS at the GIF++

A. Polini (INFN Bologna)

Outline

- What needs to be provided
- Manpower
- First Design Consideration
- Hardware + Software Options
- Plans

Manpower

- Groups:
  - INFN Bologna
    - A. Polini et al.
  - NTUA group
    - E.N.Gazis, T. Alexopoulos, G.Tsipolitis, + 5 students (NTUA group)
  - Techion Univ.
    - S. Tarem et. Al.

  Groups with good experience in DCS

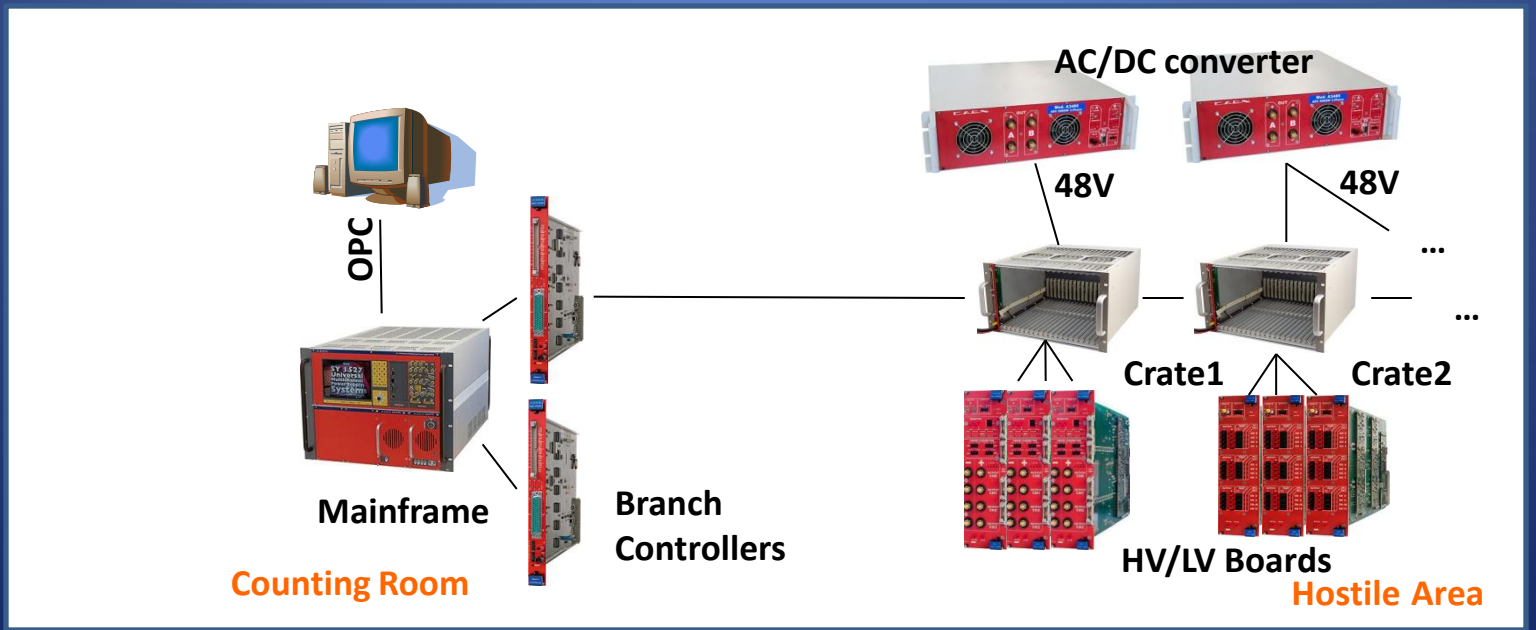
A possible System Architecture

- Use wherever possible existing knowledge and work
- One versatile standard well known in ATLAS/CMS … LHC

➔ CAEN EASY System

  - Large Systems (Detector and Environment Control)
  - Includes: setting of detector parameters
    monitoring of detector and environmental variables

- Windows Server/Linux + PVSS + OPC → CAEN (SY1527 Mainframe)
- Large choice of dedicated HV/LV modules
- Monitoring and Setting via CAEN ADC + DAC Modules
- New faster systems being developed



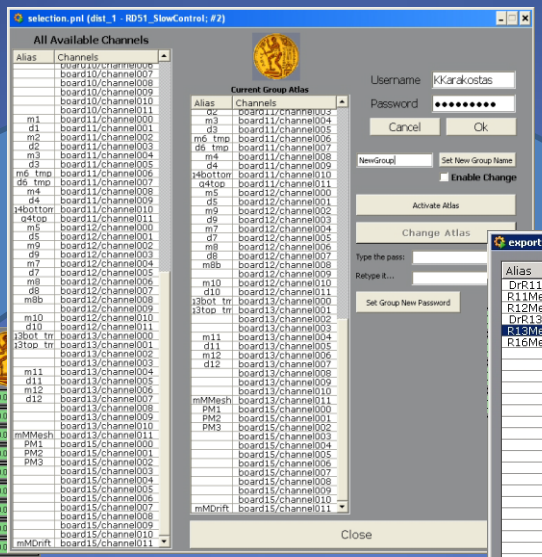
RD 51 NTU Athens System

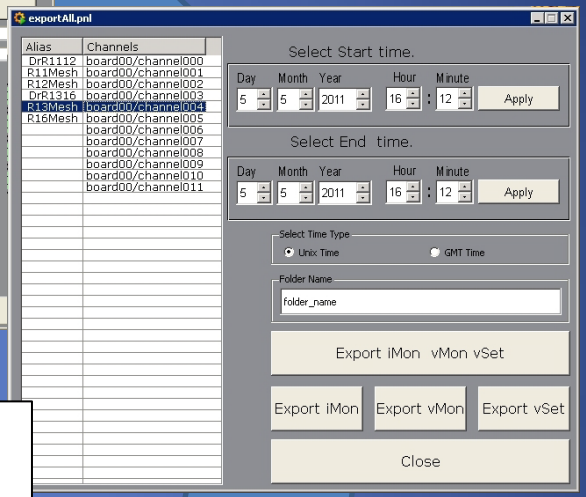
Configuration +
Access Control + internal Archiving

System Overview +
Group Handling

External Export

Root + Gnuplot Analysis





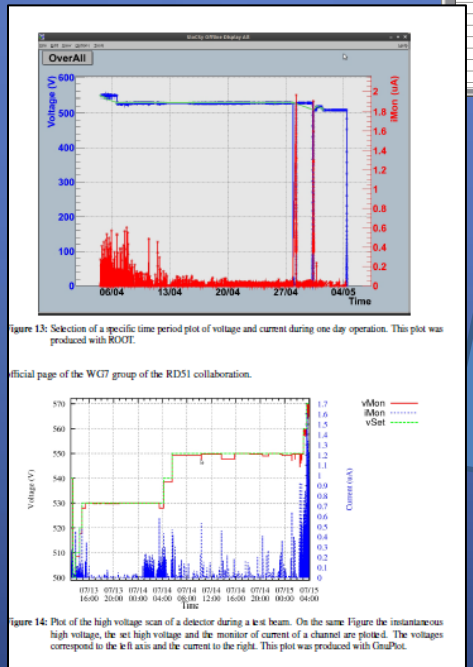


Figure 13: Selection of a specific time period plot of voltage and current during one day operation. This plot was produced with ROOT.

Official page of the WG7 group of the RD51 collaboration.

Figure 14: Plot of the high voltage scan of a detector during a test beam. On the same Figure the instantaneous high voltage, the set high voltage and the monitor of current of a channel are plotted. The voltages correspond to the left axis and the current to the right. This plot was produced with GnuPlot.

RD51-NOTE-2011-011

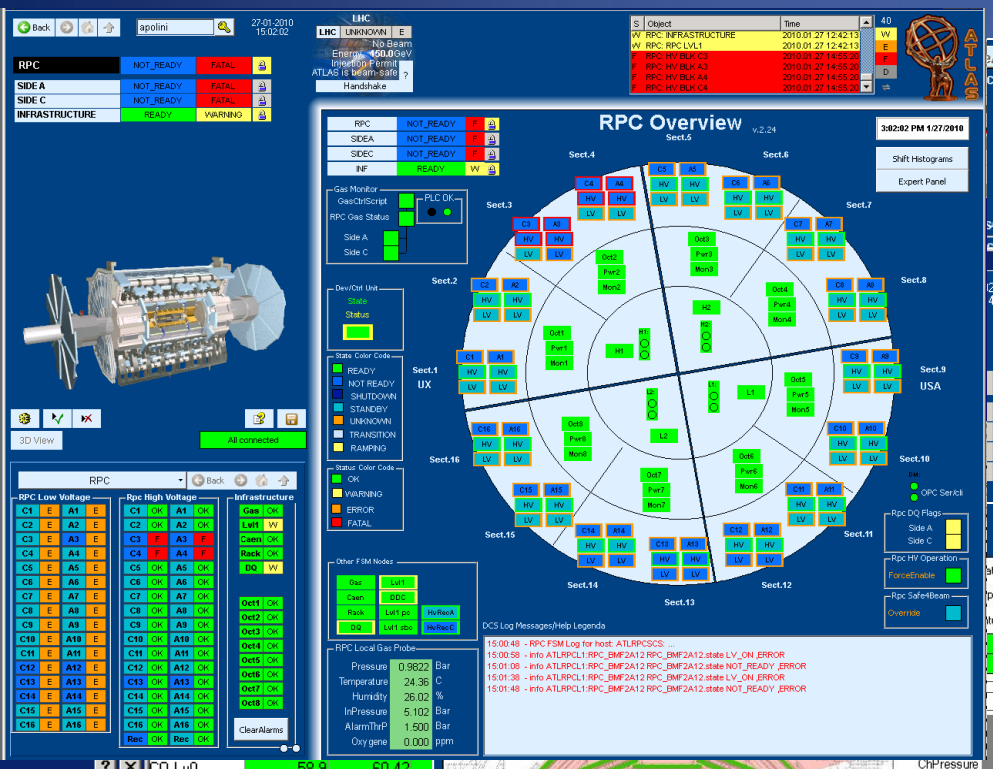
November 18, 2011

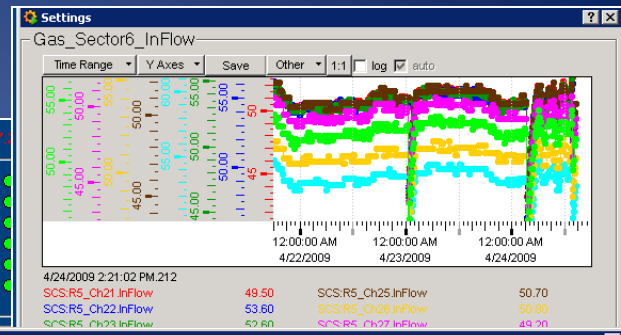
A Slow Control System for RD51 Test Facilities

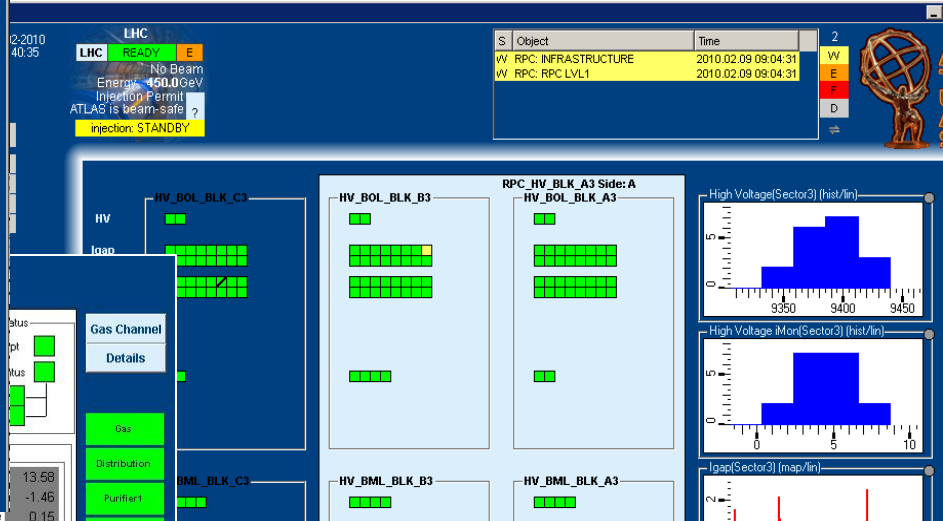
Konstantinos Karakostas[a], Theodoros Alexopoulos[a], Georgios Tsipolitis[a]

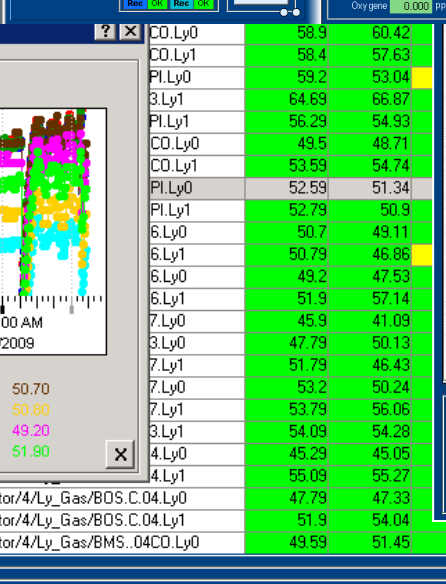
[a]*National Technical University of Athens*

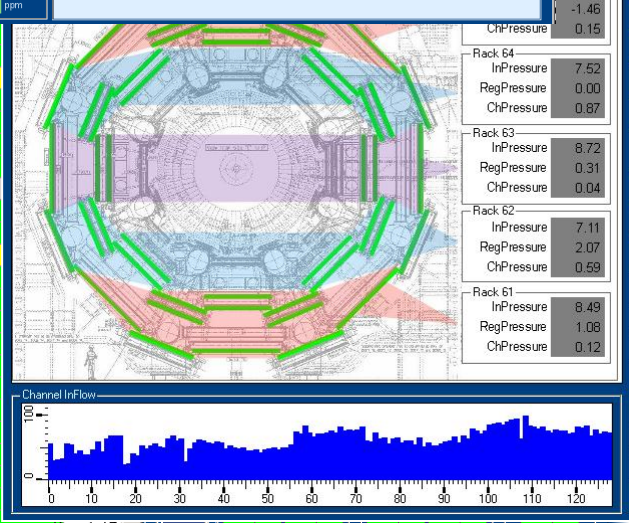
Atlas RPC/Muon DCS

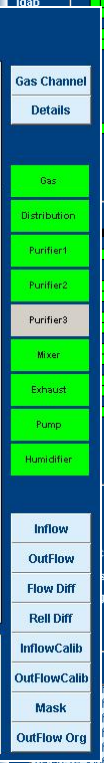


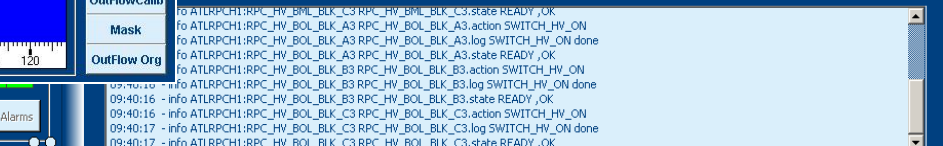




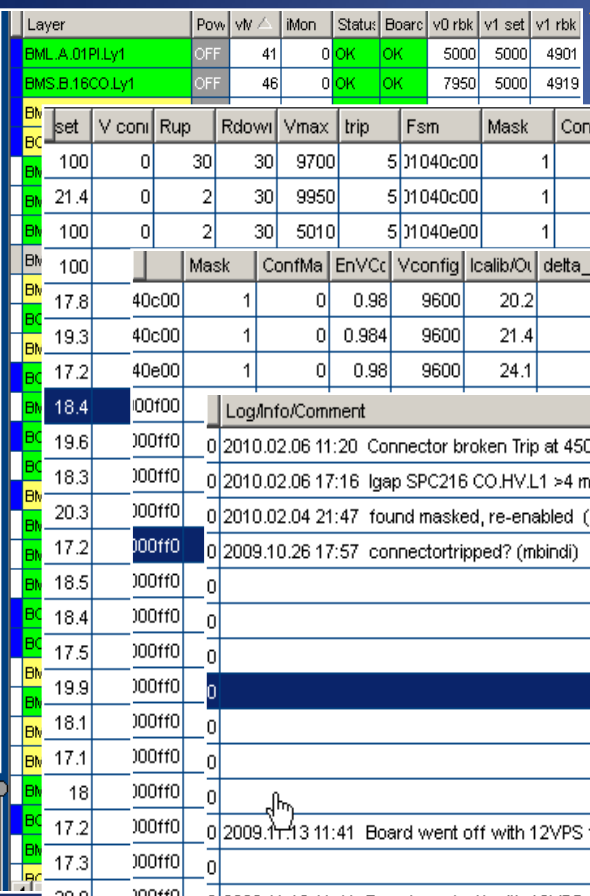








Online Analysis Tools

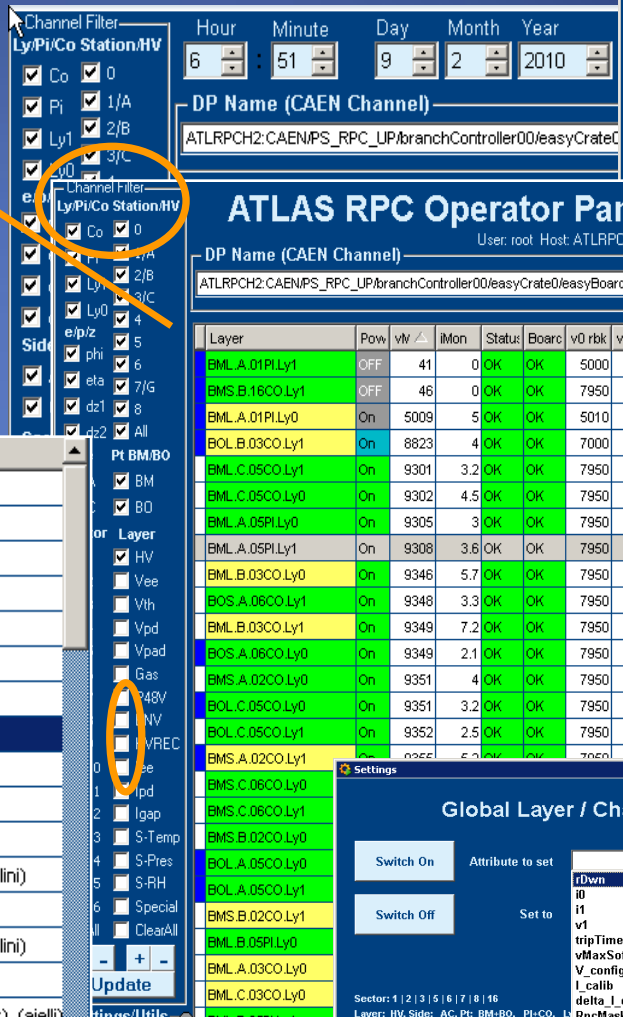


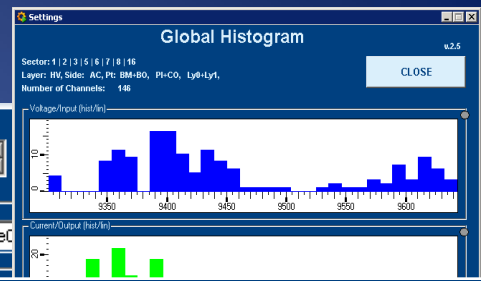
Layer	Pow	vM	iMon	Status	Boarc	v0 rbk	v1 set	v1 rbk
BML.A.01PI.Ly1	OFF	41	0	OK	OK	5000	5000	4901
BMS.B.16CO.Ly1	OFF	46	0	OK	OK	7950	5000	4919

set	V conf	Rup	Rdown	Vmax	trip	Fsm	Mask	ConfMa	EnVCorr
100	0	30	30	9700	5	01040c00	1	0	0.98
21.4	0	2	30	9950	5	01040c00	1	0	0.984
100	0	2	30	5010	5	01040e00	1	0	0.98

100		Mask	ConfMa	EnVCc	Vconfig	Icalib/Ou	delta_I	Map	ScriptAct
17.8	40c00	1	0	0.98	9600	20.2	0	r0 bo12 ch000	2010.02.0
19.3	40c00	1	0	0.984	9600	21.4	0	r0 bo06 ch004	2010.02.0
17.2	40e00	1	0	0.98	9600	24.1	0	r5 bo12 ch000	2010.02.0

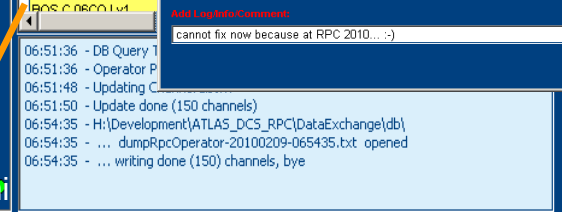
	Log/Info/Comment
18.4	00ff00
19.6	00ff00
18.3	00ff00
20.3	00ff00
17.2	00ff00
18.5	00ff00
18.4	00ff00
17.5	00ff00
19.9	00ff00
18.1	00ff00
17.1	00ff00
18	00ff00
17.2	00ff00
17.3	00ff00
20.9	00ff00
18.1	00ff00
19.4	00ff00
20	00ff00
0	2010.02.06 11:20 Connector broken Trip at 4500 V (mbianco)
0	2010.02.06 17:16 Igap SPC216 CO.HV.L1 >4 microA (mbianco)
0	2010.02.04 21:47 found masked, re-enabled (apolini)
0	2009.10.26 17:57 connectortripped? (mbindi)
0	
0	
0	
0	
0	
0	
0	
0	2009.11.13 11:41 Board went off with 12VPS fail. Board to be monitored (apolini)
0	
0	2009.11.13 11:41 Board went off with 12VPS fail. Board to be monitored (apolini)
0	
0	2009.09.18 12:48 bms6a02.co leak gas e problema canale ADC di lettura (root) (aielli)
0	
0	
0	
0	2009.11.13 11:41 Board went off with 12VPS fail. Board to be monitored (apolini)
0	2009.11.03 12:28 patch broken BOL5-6A05 (root)--> replaced (mbindi)
0	
0	





Layer	Pow	vM	iMon	Status	Boarc	v0 rbk	v1 set	v1 rbk
BML.A.01PI.Ly1	OFF	41	0	OK	OK	5000	5000	4901
BMS.B.16CO.Ly1	OFF	46	0	OK	OK	7950	5000	4919
BML.A.01PI.Ly0	On	5009	5	OK	OK	5010	8600	5010
BOL.B.03CO.Ly1	On	8823	4	OK	OK	7000	9000	8822
BML.C.05CO.Ly1	On	9301	3.2	OK	OK	7950	9600	9299
BML.C.05CO.Ly0	On	9302	4.5	OK	OK	7950	9600	9299
BML.A.05PI.Ly0	On	9305	3	OK	OK	7950	9600	9303
BML.A.05PI.Ly1	On	9308	3.6	OK	OK	7950	9600	9303
BML.B.03CO.Ly0	On	9346	5.7	OK	OK	7950	9600	9348
BOS.A.06CO.Ly1	On	9348	3.3	OK	OK	7950	9600	9344
BML.B.03CO.Ly1	On	9349	7.2	OK	OK	7950	9600	9348
BOS.A.06CO.Ly0	On	9349	2.1	OK	OK	7950	9600	9344
BMS.A.02CO.Ly0	On	9351	4	OK	OK	7950	9600	9350
BOL.C.05CO.Ly0	On	9351	3.2	OK	OK	7950	9600	9347
BOL.C.05CO.Ly1	On	9352	2.5	OK	OK	7950	9600	9347
BMS.A.02CO.Ly1								
BMS.C.06CO.Ly0								
BMS.C.06CO.Ly1								
BMS.B.02CO.Ly0								
BOL.A.05CO.Ly0								
BOL.A.05CO.Ly1								
BMS.B.02CO.Ly1								
BML.B.05PI.Ly0								
BML.A.03CO.Ly0								
BML.C.03CO.Ly0								
BML.B.05PI.Ly1								
BOS.C.06CO.Ly0								
BML.B.01CO.Ly0								
BOS.C.06CO.Ly1								

Igap (uA)	HV GasGap actual mean
0.056	BML3A05.PI.Igap,PI.HV.L3
0.084	BML3A05.PI.Igap,PI.HV.L1
0.094	BML3A05.PI.Igap,PI.RO.L3
0.172	BML3A05.PI.Igap,PI.RO.L1
0.06	BML4A05..Igap,PI.HV.L3
0.1	BML4A05..Igap,PI.RO.L3
0.068	BML5A05..Igap,PI.HV.L3
0.1	BML5A05..Igap,PI.RO.L3
0.012	BML6A05.PI.Igap,PI.HV.L3
0.042	BML6A05.PI.Igap,PI.HV.L1
0.008	BML6A05.PI.Igap,PI.RO.L3
0.044	BML6A05.PI.Igap,PI.RO.L1
0.082	BMLGA05.PI.Igap,PI.HV.L3



AIDA 8.5.3
ENVIRONMENTAL SENSORS
STATUS REPORT

Stefano Bianco
for the Frascati and
Napoli (S.Buontempo et al.) groups
March 16, 2012
In collaboration with Richard Fortin - PH-DT-DI CERN

OBJECTIVE

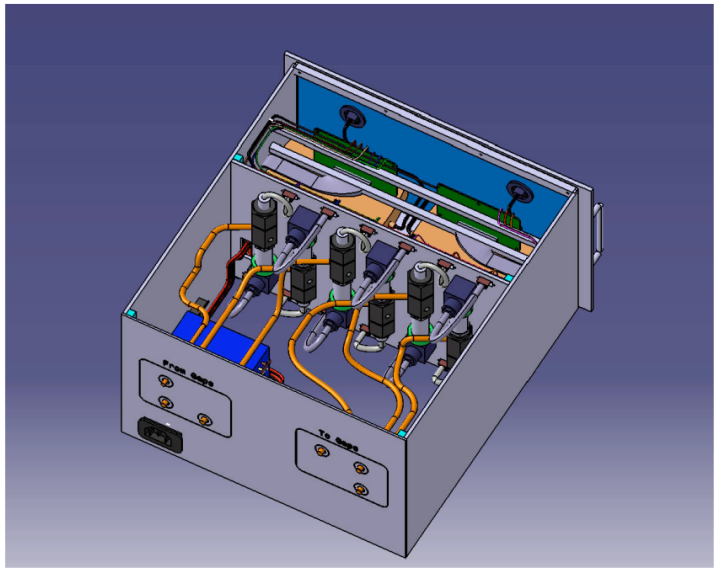
- atmospheric (p), temperature (T), relative humidity (RH) monitoring of GIF++ experimental area
- possibly include experimental gases RH monitoring
- o(10) sampling points total, in irradiated and non-irradiated areas
- Precision
  - +-0.2^{o}C T
  - +-2% RH
- Simple, cost- and labour- effective technique
- Complying to CERN monitoring standards PVSS/DCS
- Reusing existing material if possible

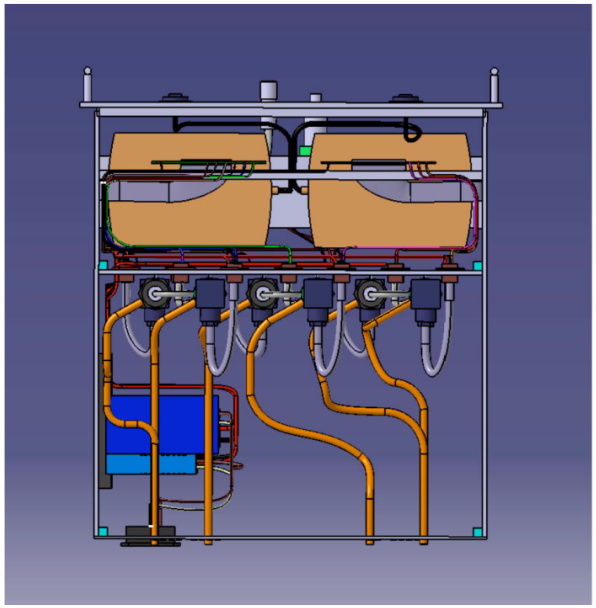
BASELINE CONCEPT

- NON IRRADIATED AREAS & GAS
  - PICO (National Instr.) + PT100
  - Labview + PVSS + DCS

- IRRADIATED AREAS
  - As above, in shielded garage, OR:
  - RadHard Optical Fiber Bragg Grating sensors
    - CAVE: only if very expensive interrogation system is available

EXAMPLE IN OPERATION @ SGX5: SENSORS BOX OF CMS RPC GAS GAIN MONITORING SYSTEM





- n.2 PICO ADC + PT100
- 10 sampling points
- Stainless steel gas receptacles (3 gas lines) and environmental sensors
- LabView + PVSS + DCS

Present Baseline

- Possibility of integrating into CAEN EASY+PVSS system
- Many argument in favor: one argument against could be the cost
- Many components, HW and SW already available (CAN PSU, ELMB, ENV Sensors, VME crates)
- A baseline system could be:
  - 1 mainframe, 1 Power Generator 2 crates +

    HV and LV boards and on ADC A-3801 board for monitoring (128 channels)

Conclusions

- A first design of a Cosmic Ray tracking trigger is available
- Try and re-use where possible experience and equipment already known from LHC experiments
- Resources in terms of manpower and experience not problematic

Next Steps:

- Finalize tracking design
- Establish the system requirement and collecting information from different counterparts involved
- Converge towards a more concrete design
- Produce HW cost + time + work estimates