

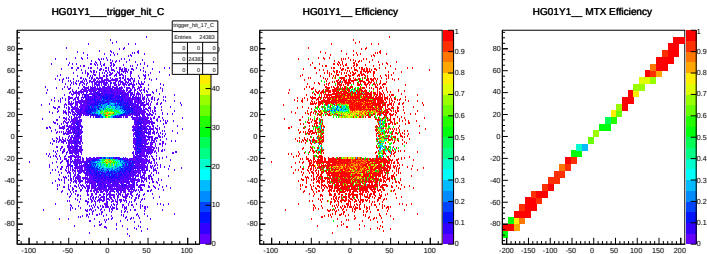
Compass 2017 Trigger

Benjamin Moritz Veit

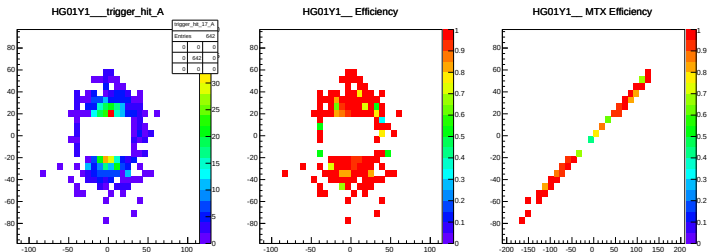
17. Oktober 2017

HG01Y1

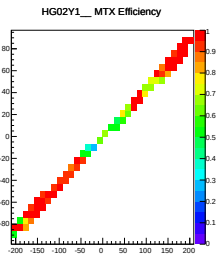
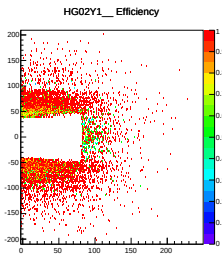
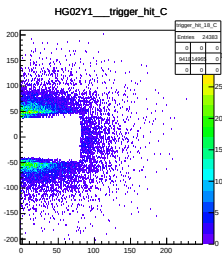
P7



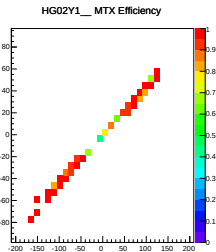
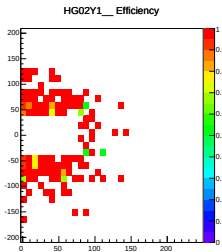
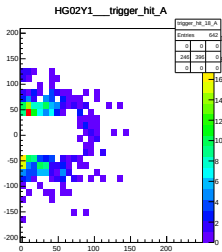
P9



P7

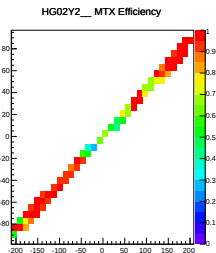
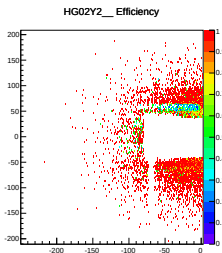
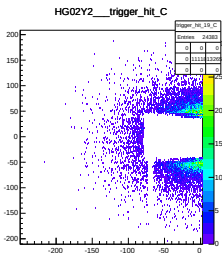


P9

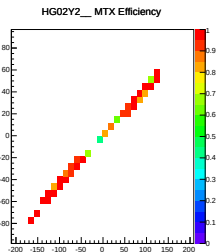
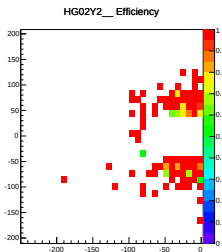
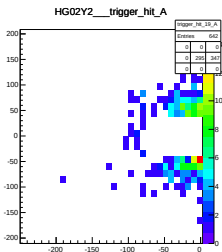


HG02Y2

P7

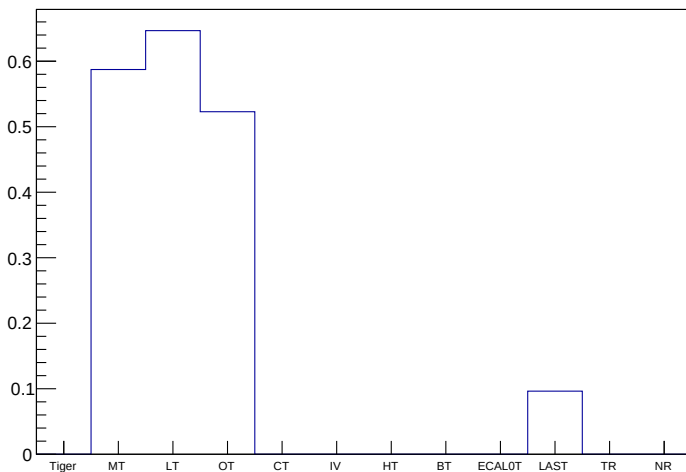


P9



Trigger reconstruction Efficiency

Trigger hit efficiency



Trigger reconstruction Efficiency Event

(PHAST) LASTC RUN: 274602 Spill: 84 EvtInSpill: 9412

1 0 0

(Decoded) CALO EVENT with LAST condition: 274602 84 9412

1 0 1

(PHAST) LASTC RUN: 274602 Spill: 108 EvtInSpill: 6348

1 0 0

(Decoded) CALO EVENT with LAST condition: 274602 108 6348

1 0 1

LAST in CORAL

calcMeanTime in CsTriggerHodoDetector.cc

- Get Time relative to trigger in tdc ticks for _j and _s

```
double time = d->GetTimeDecoded()/d->GetTimeUnit();
```

- Do t0 correction on each value

```
time -= calib[d->GetChannel()+i*getNWir()].data;
```

- Convert to ns and calculate the Meantime

```
// according to J.Barth there is at maximum one  
// measurement per counter (due to the deadtime  
// of the discriminator of 160ns) so we just sum  
// up and calculate the mean from everything
```

- Cut on Hit time :

```
if (time < hitTMin_-extra || hitTMax_+extra < time)
    use = false;
```

- Generate Digit entry

```
if (use) {
mD_.push_back(new CsDigit(*this, it->first, &time, 1));
}
```

```
// assuming hardware LAST had a time gate of
// 15ns < 2*(8+2)=20ns
```

```
HG01Y1__ HitTime [0-1] -8. 8.
```

```
HG02Y1__ HitTime [0-1] -8. 8.
```

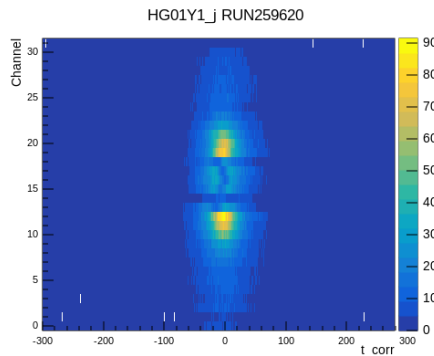
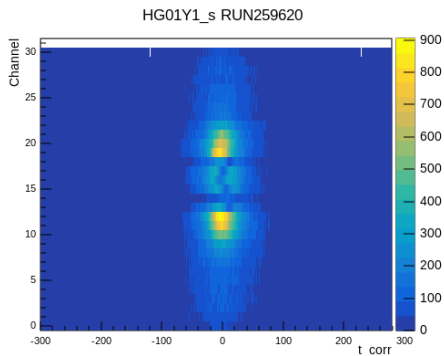
```
HG02Y2__ HitTime [0-1] -8. 8.
```

Gruppenmeeting 19.04.2017

LAST Timing Issue

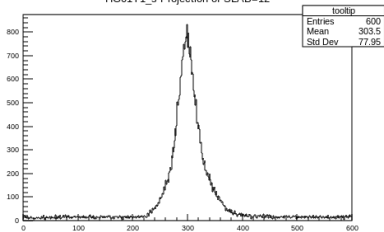
- Hardware ISSUES:
HG01Y1 : 2 Channels low countrates (15+19)
HG02Y2 : 1 Channel low countrates (21)
- Check meantimer calculation in CORAL and T0 fit (Fit function not suitable for no meantimer channels.)
- Check if issue is Magnet related (SM1 On/Off test)
- Check if mu-metall is still sufficient. (Hall probe from Didier ...)

HG01Y1

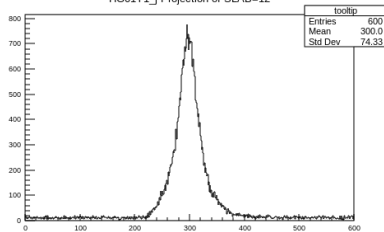


HG01Y1

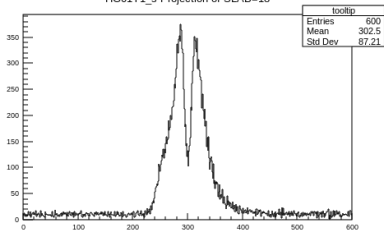
HG01Y1_s Projection of SLAB=12



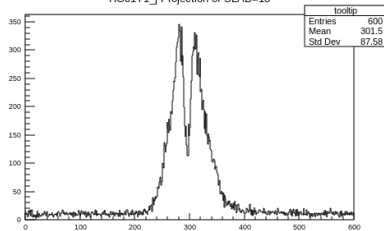
HG01Y1_j Projection of SLAB=12



HG01Y1_s Projection of SLAB=18



HG01Y1_j Projection of SLAB=18



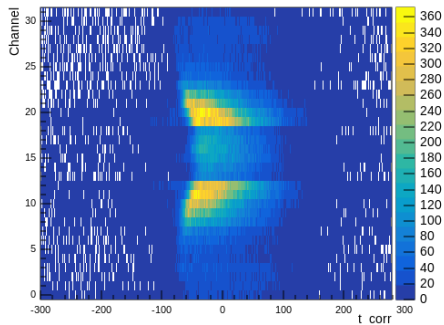
HG01Y1 Channel 12

HG01Y1 Channel 18

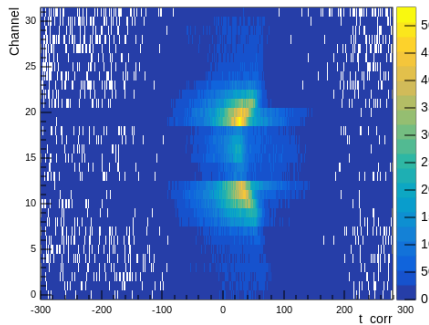
HG01Y1 Channel 22

HG02Y1

HG02Y1_s RUN259620

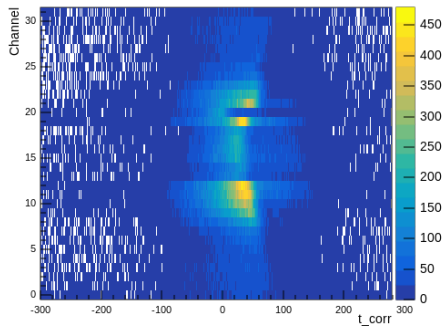


HG02Y1_j RUN259620

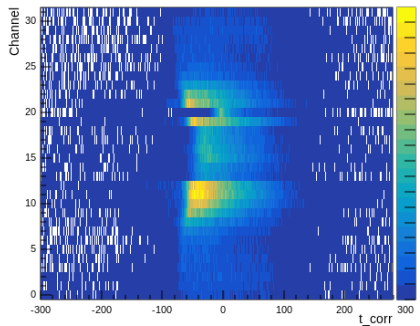


HG02Y2

HG02Y2_s RUN259620

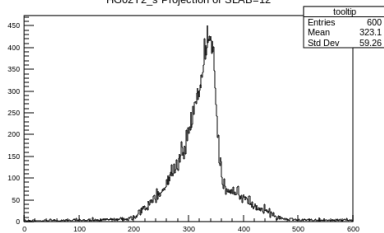


HG02Y2_j RUN259620

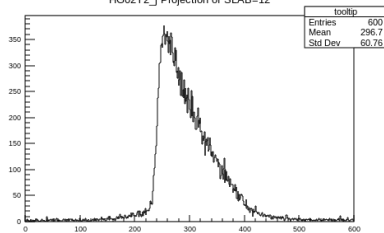


HG02Y2

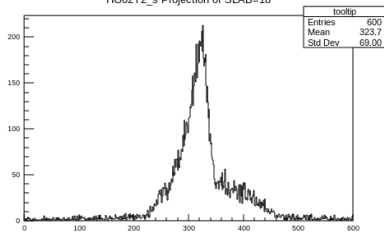
HG02Y2_s Projection of SLAB=12



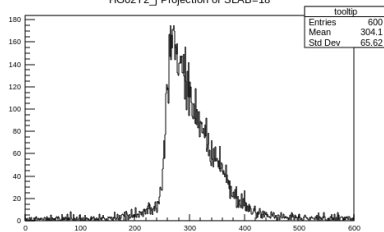
HG02Y2_j Projection of SLAB=12



HG02Y2_s Projection of SLAB=18



HG02Y2_j Projection of SLAB=18



QUALLE aka. COMPASSonline

Online quality assurance system based on django and jsroot.

Rewrite of the 2012 system because there are no CINDERELA filter option.

First step: Gathering data from (b)coool for live analysis of Parameter.

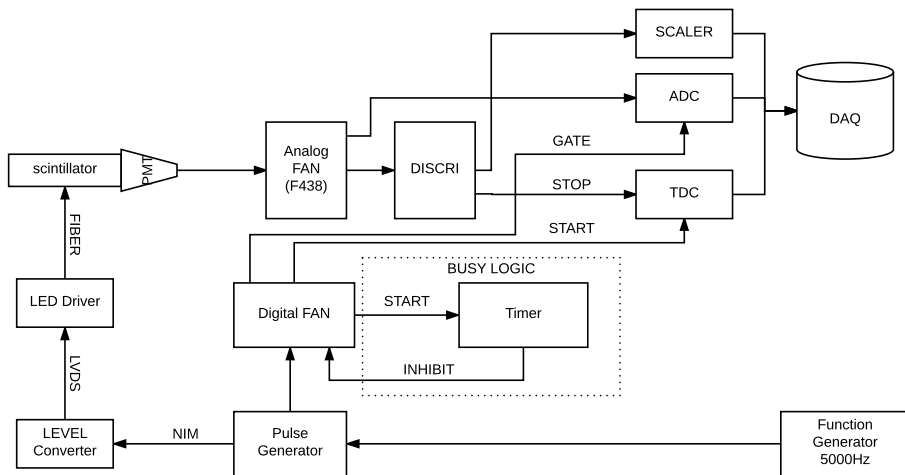
Second step: Dumping raw data via DATE stream (DAQ) and reconstruct it through CORAL.

Inside COMPASSonline

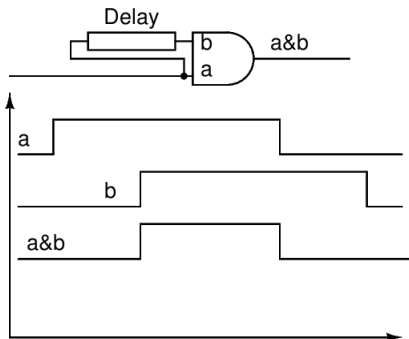
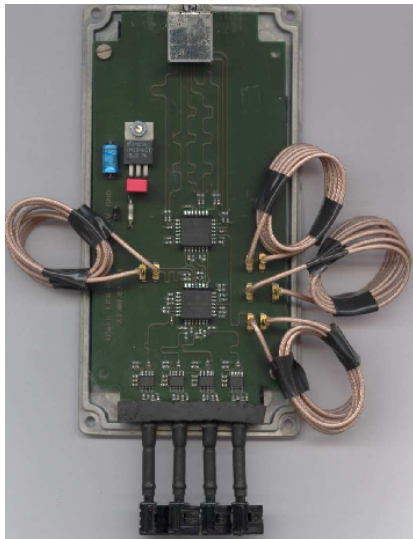
- continues production of decoded data
- Easy to use webinterface from inside and outside cern.
- Modular design to add more analysis scripts



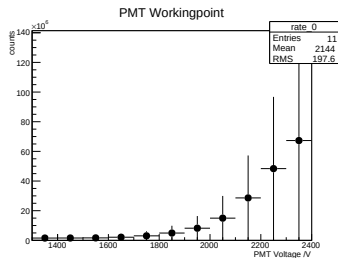
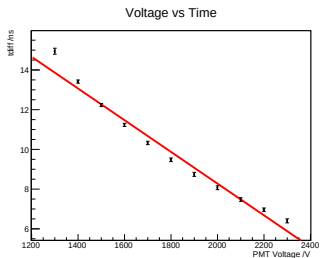
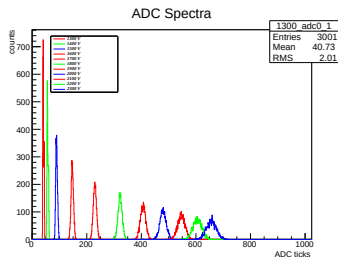
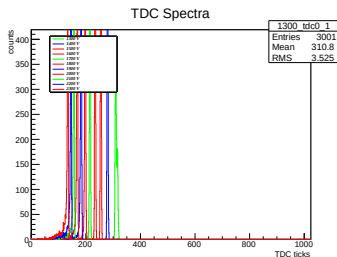
PMT Parametrization



Delay in LED Pulser

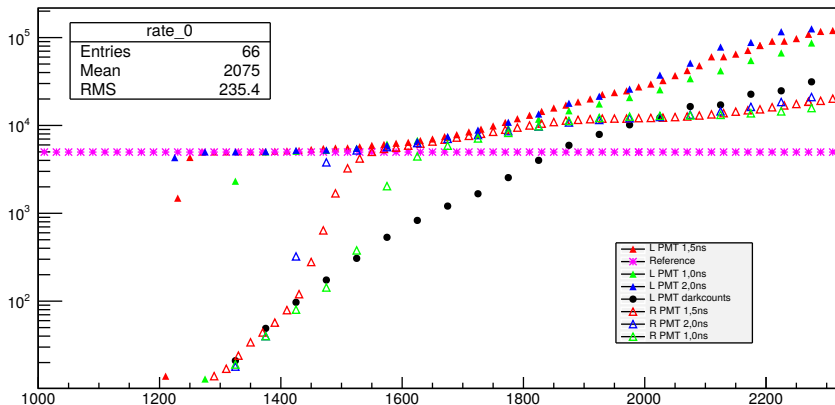


PMT Parametrization



EMI 9813KB Parametrisation

Voltage vs Counts



Plans For Changeover 2016/2017 I

- Finding Lightleaks (MY, MX, LX, OY, VETOS, LAST)
- Proper isolation of PMTs and shieldings. OY, Vetos)
 - Kapton foil between μ -metall shielding and softirone-shielding.
 - Kapton tape between softirone shielding and frame holder.
 - investigation of signal ripple/reflections on long cables
- HV-Scan of all Hodoscope channels to find the right working point. (IX, MX, MY, LX, OY, LAST, Vetos)
- Include old Lecroy HV (256 channels) in DCS via DIM.
- Scan of discriminator thresholds and matrix gate length.
- Split signals of all discriminator to equip each channel with a scaler (At least Outer, LADDER, LAST)
- Repair bases for Ladder + Middle

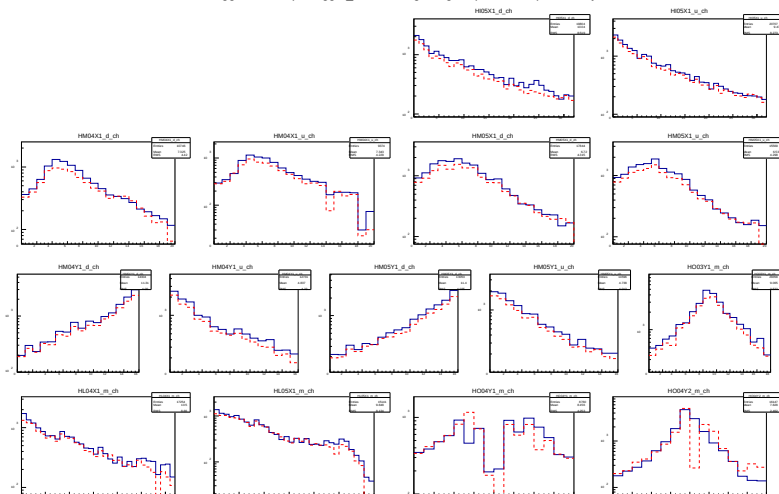
Plans For Changeover 2016/2017 II

- Finding the right values for the Meantimer delay (LX,OY).
- make Calo Trigger great again
- Use Qualle for live analysis again (work in progress)
- Bonus: Make the LED calibration System working again. Use of Gandalf delay instead of Matrix Boards.

Gruppenmeeting 23.05.2017

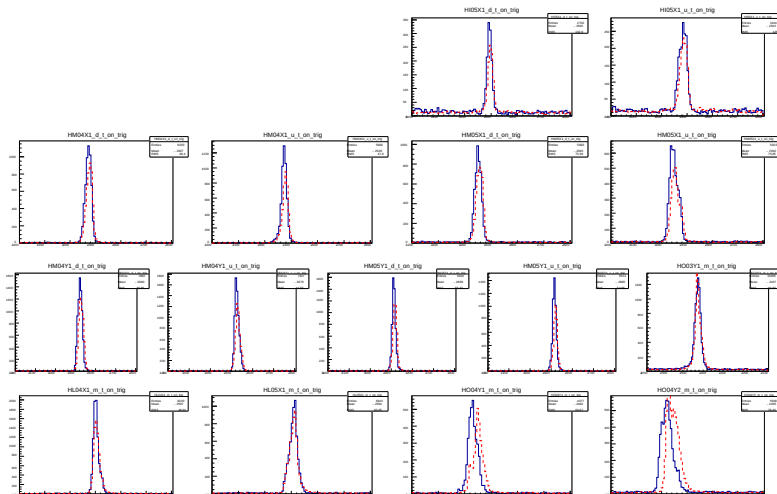
Status May 2017

Run 278141 Trigger-Wiremaps: trigger_standard.cfg - Page 1 (19483 evts) Mon May 22 22:55:43 2017



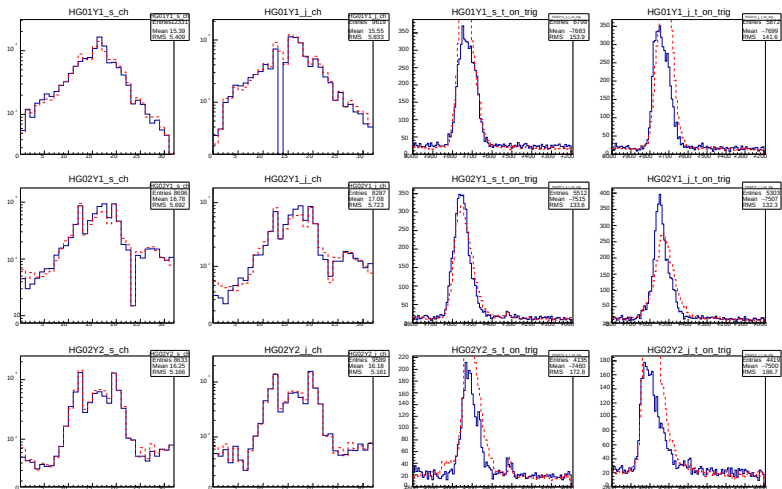
Status May 2017

Run 278141 Trigger-Timings: trigger_standard.cfg - Page 2 (19483 evts) Mon May 22 22:55:43 2017



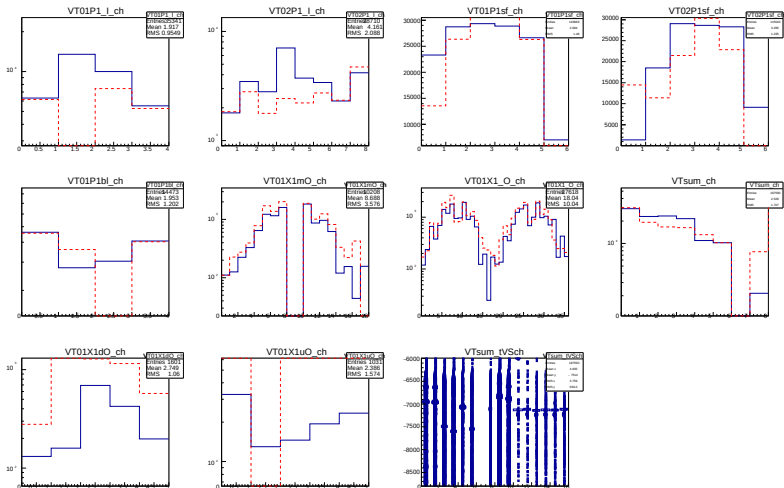
Status May 2017

Run 278141 Trigger-LAS-Wiremap: trigger_standard.cfg - Page 3 (19483 evts) Mon May 22 22:55:43 2017



Status May 2017

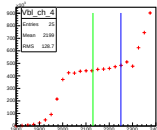
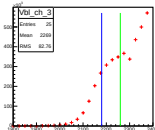
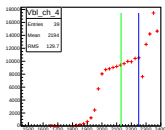
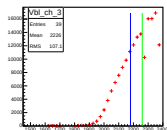
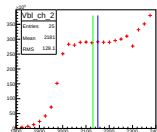
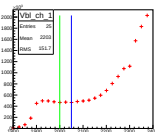
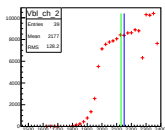
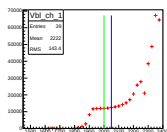
Run 278141 VETO: VETO.cfg - Page 1 (19483 evts) Mon May 22 22:55:43 2017



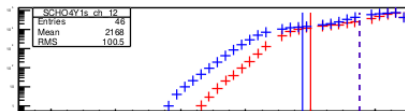
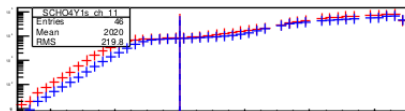
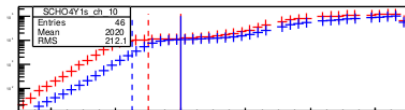
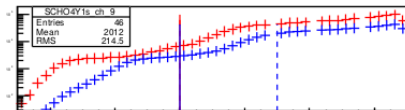
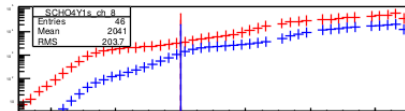
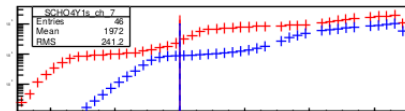
State of HV-Scan:

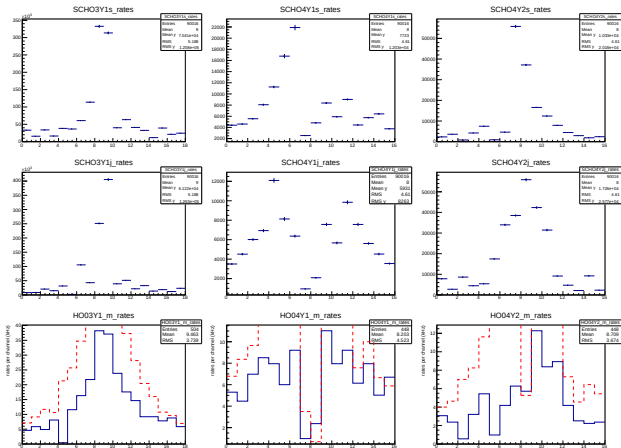
Hodoscope	PMT	Done	# Channels	Comment
HI5	XP2900	X	64	w/o target
HM4H	XP2900		64	
HM4V	XP2072B	X	40	w/o target
HM5H	XP2900		64	
HM5V	EMI9954B	X	40	w/o target
HL4	XP2900/XP2090/XP2020		32/16/16	
HL5	XP2900/XP2090/XP2020		32/16/16	
HO3	EMI9813KB	X	36	
HO4	EMI9813KB/XP2900	X	68	
H1	XP2900	X	64	scaler via gandalf
H2	9814KB	X	128	scaler via gandalf
Vbl	XP2020	X	4	
VO	XP2020	X	32	only meantimer in db
VI1	XP2020	X	4	
VI2	XP2900	X	8	

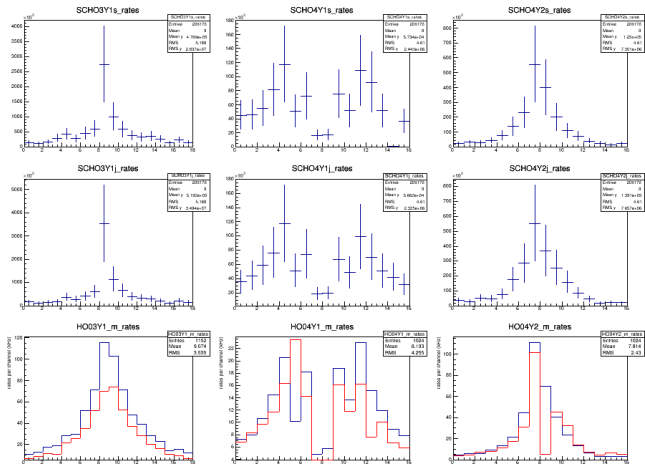
Veto Beamline

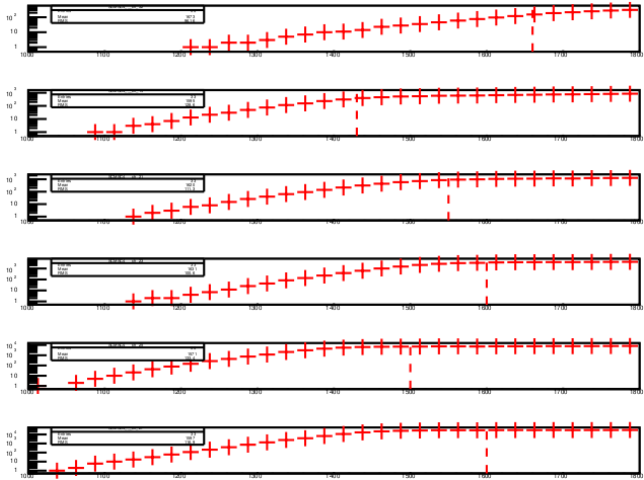


HV-Scan outer









Plans For Changeover 2016/2017 I

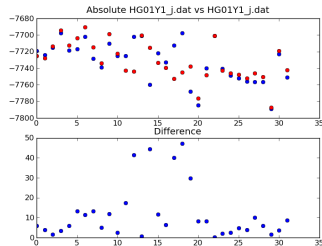
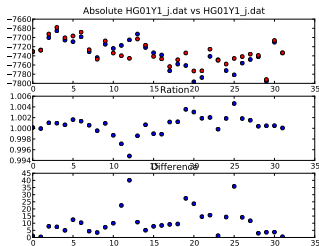
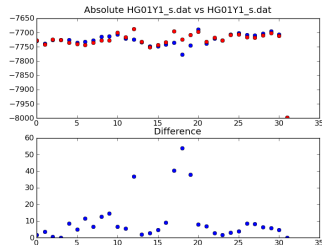
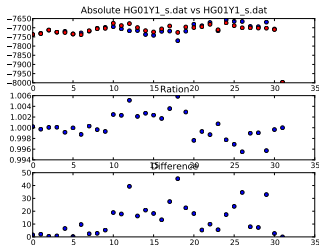
- Finding Lightleaks (MY, MX, LX, OY, VETOS, LAST) DONE
- Proper isolation of PMTs and shieldings. OY, Vetos
 - Kapton foil between μ -metall shielding and softirone-shielding.
 - Kapton tape between softirone shielding and frame holder.
 - investigation of signal ripple/reflections on long cables

DONE

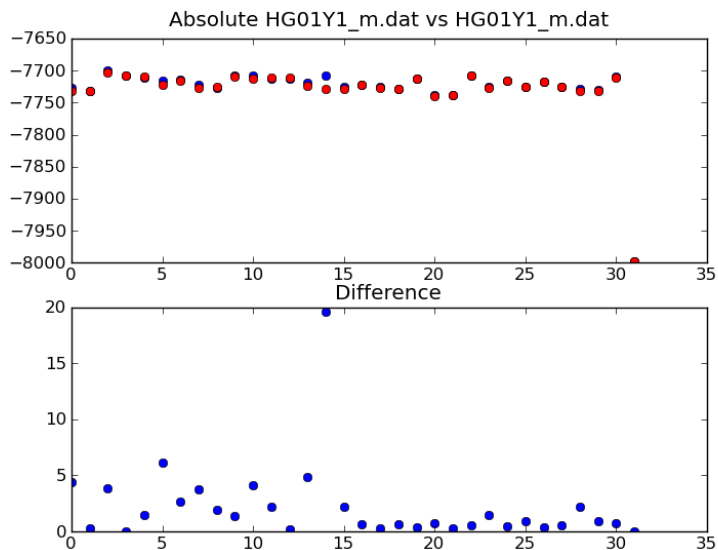
- HV-Scan of all Hodoscope channels to find the right working point. DONE (IX, MX, MY, LX, OY, LAST, Vetos)
- Include old Lecroy HV (256 channels) in DCS via DIM. Only readout
- Scan of discriminator thresholds and matrix gate length.
- Split signals of all discriminator to equip each channel with a scaler (At least Outer, LADDER, LAST) DONE
- Repair bases for Ladder + Middle DONE

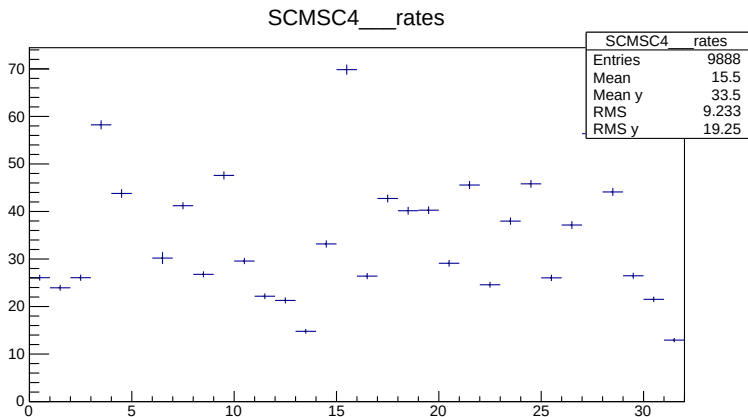
Gruppenmeeting 07.06.2017

t0 vs. polarity HG01Y1

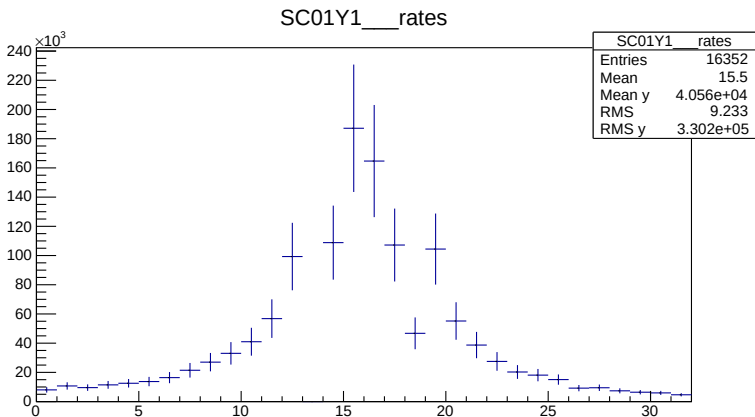


t0 virtual meantimer

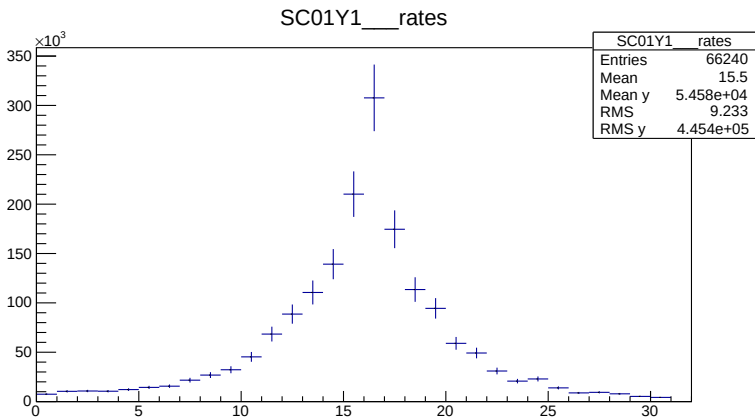




after High Voltage tuning



after High Voltage tuning



Trigger rates MU⁺/MU⁻

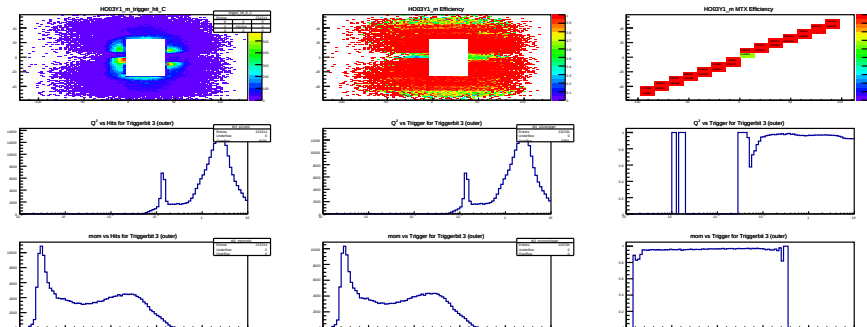
Prescaler setup for run 278514

Trigger element	Short name	Division factor	In rate (1st spill)	Out rate (1st spill)
Tiger BT BKVeto	TigerDT0	0	7627810	0
Middle Trigger	MT	1	13370	13370
Ladder Trigger	LT	1	9900	9900
Outer Trigger	OT	1	8640	8640
Calorimeter Trigger	CT	1	6930	6930
Inner Veto	VI	1000	6852283	6853
Halo Trigger (H2 AND H4Outer)	Halo	50	597107	11943
Beam Trigger	BT	8000	43599958	5451
ECAL0 trigger	ECAL0	0	0	0
LAS Trigger	LAST	1	9852	9852
True Random	TRand	1	13741	13741
Noise Random	NRand	0	759594	0

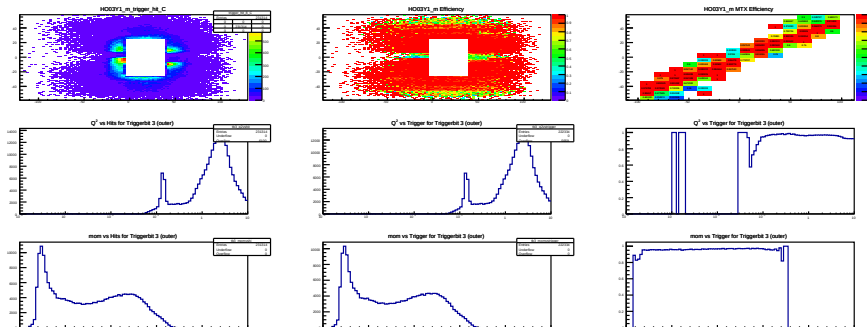
Prescaler setup for run 278571

Trigger element	Short name	Division factor	In rate (1st spill)	Out rate (1st spill)
Tiger BT BKVeto	TigerDT0	0	6311760	0
Middle Trigger	MT	1	11217	11217
Ladder Trigger	LT	1	8021	8021
Outer Trigger	OT	1	8455	8455
Calorimeter Trigger	CT	1	5726	5726
Inner Veto	VI	1000	4443357	4444
Halo Trigger (H2 AND H4Outer)	Halo	50	412609	8253
Beam Trigger	BT	8000	38599453	4825
ECAL0 trigger	ECAL0	0	0	0
LAS Trigger	LAST	1	6175	6175
True Random	TRand	1	14029	14029
Noise Random	NRand	0	1229393	0

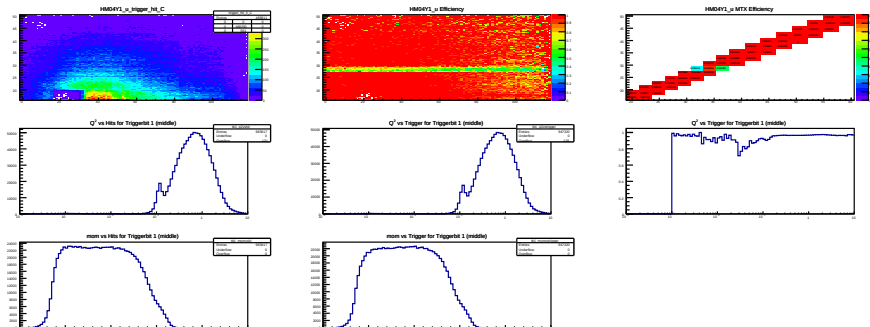
Outer Matrix P9



Outer Matrix P9 [No MTX cut]



Middle Matrix P9

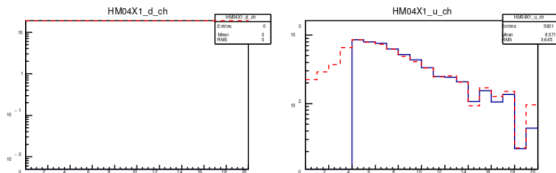


Gruppenmeeting 05.07.2017

Incident on 02.07.2017

Comment nb	Time	Author	Domain	Title
57505	08:31	Ph. Hoffmeister	Trigger	Channel tripped.
Hodo_HV_H1_J_Ch051 tripped and could not be reset. We informed the expert and as per his advice leave it off for now.				
57506	09:23	Jens Barth	Trigger	Missing channels: all of HM04X1_d and 4 of HM04X1_u.

since tonight. Reloading discriminator does not help. Has to be investigated further. **Luckily these hodoscopes are NOT part of the trigger this year.**



57548 09:38 Jens Barth **Trigger** [24 channels of HM04X1_d and HM04X1_u working again.](#)

Removing and reinserting the 24 ch HV board in the HOD_CCR7 seems to have solved the problem.

Followup to comment [57513](#)

LAST Observations

CH22 - 2016:1750V 2017:1750V - (CCR3/B23/CH11):

- Ausfall: 17.06. 10:02
- Transienten seit Beginn des RUNS
- Transienten kamen auch vor, seit dem der Kanal ausgefallen ist !?
- Gleiche Spannung wie 2016

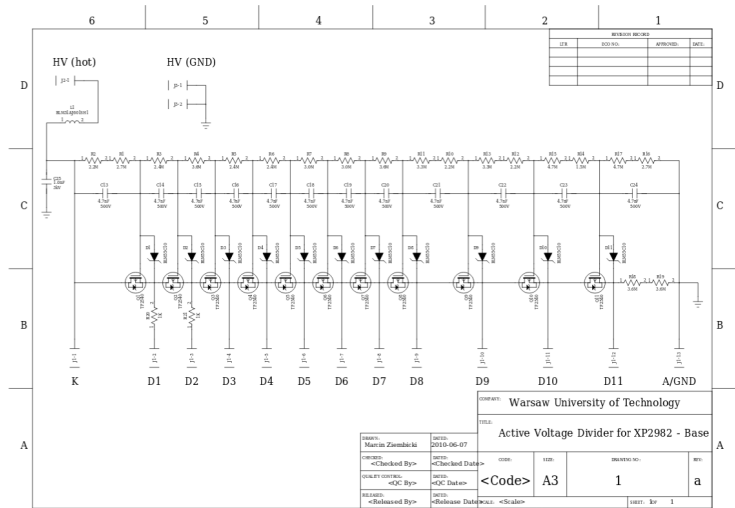
CH51 - 2016:1500V 2017:1700V - (CCR3/B15/CH8):

- Ausfall: 02.07. 08:07
- Vermehrt Transienten seit 22.06 02:50 vorher nur 2stk diese jedoch mit der alten HV von 1500V. Ist 2016 mit gleicher Spannung das gesamte Jahr nicht aufgetreten.

CH06 2016:1500V 2017:1500V : (CCR3/B14/CH16):

- Ist scheinbar waerend der MD am 21.06 2x getrippt beim einschalten hat sich dann aber gefangen nachdem die Spannung 200V runtergeregelt wurde 1500V- $\rightarrow$ 1300V
- Gleiche Spannung wie 2016

H1 Base



2982 Specs

Characteristics with voltage divider ⑤ :

	B	A	
For a supply voltage of :	1800	1500	V
Gain :	6.5×10^6	6.6×10^6	
Linearity (2%) of anode current up to :	80	30	mA
Anode pulse ⑥ :			
Rise time :	1.9	2.2	ns
Duration at half height :	3.3	3.7	ns
Transit Time :	25	25	ns
Transit Time Difference between centre of PK and 11mm from it :	0.8		ns
Capacitance anode to all dynodes :		5	pF

PAGE 1/3

03/06/2005



photomultiplier tubes product specification

XP2982

Recommended voltage divider

Type A for maximum gain

K	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	A	
2	1	1.5	1	1	1	1	1	1	1	1	1	1	(total : 13.5)

Type B for best timing / linearity compromise

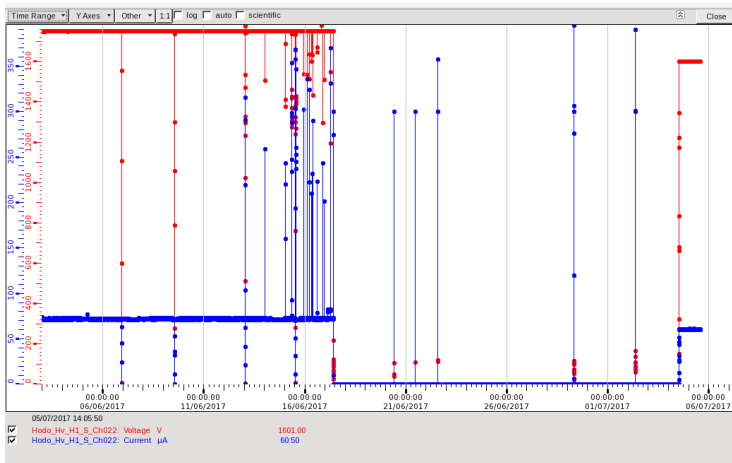
K	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	A	
2	1	1.5	1	1	1.25	1.25	1.5	2.25	2.25	2.5	3		(total : 20.5)

K: photocathode Dn: dynode A: anode

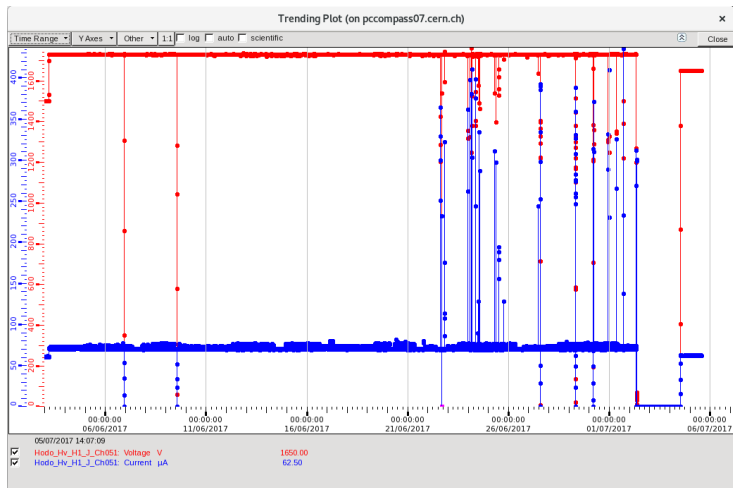
Limiting value

Anode luminous sensitivity :	max.: 500	A/ImF
Supply voltage :	max.: 1900	V
Continuous anode current :	max.: 0.2	mA

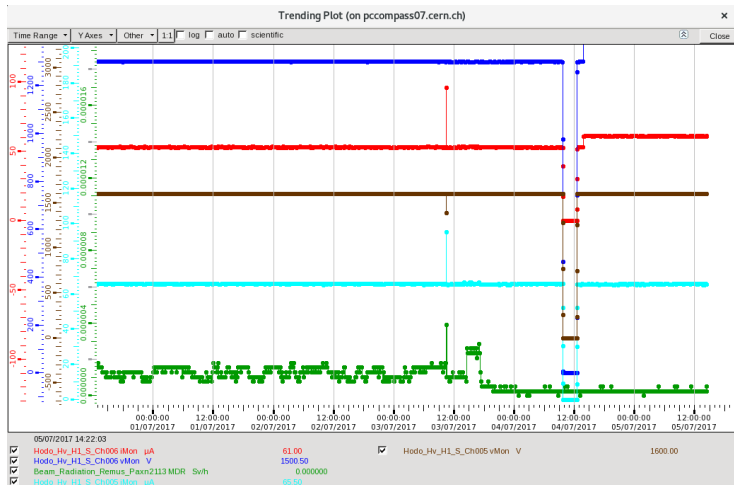
DCS Channel 22



DCS Channel 51



DCS Channel 5/6



Changes during MD 03. - 05.07.2017

- exchange PMT+Base 32/22 and 64/51 (XP2900!)
- change I_{max} in DCS from 300μA to 100μA → Tripping when powering on
- change HV on following channels -50 V :
 - Ch019;v0;1700;1650;
 - Ch020;v0;1720;1670;
 - Ch021;v0;1700;1650;
 - Ch035;v0;1700;1650;
 - Ch001;v0;1750;1650;
 - Ch006;v0;1500;1300;
 - Ch010;v0;1680;1650;
 - Ch047;v0;1700;1650;
 - Ch050;v0;1750;1650;
 - Ch051;v0;1730;1200;
 - Ch052;v0;1720;1670;
 - Ch057;v0;1720;1670;
- New LAST delays with PION beam taken → new timing

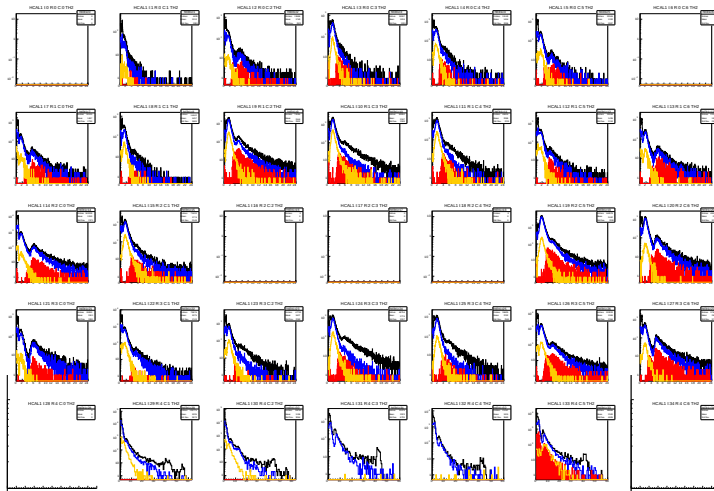
Status CALO Trigger

- Missing SADCs for HCAL1 layer 1 and HCAL2
- Missing TDC for layer SUM
- CALO only RUN is taken(279159)
- HCAL1 layer 3 - 5 SUM TDC spectra missing
- HCAL1 layer 3 TH1 not applied Discriminator threshold on one channel

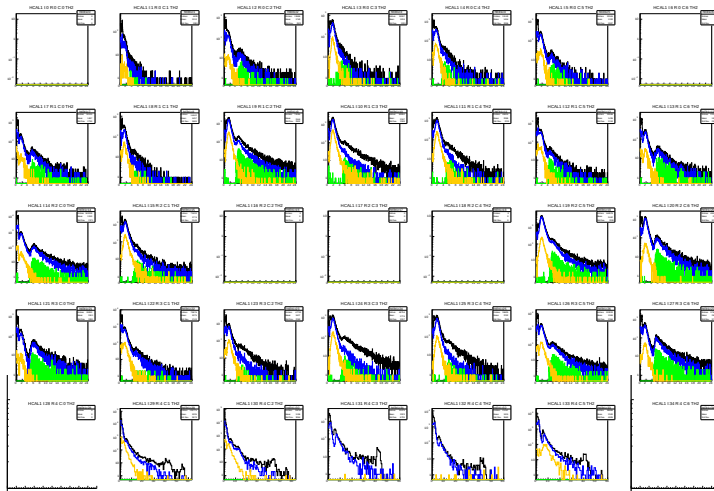
CALO Trigger components:

- Layer 3 + 4 with 3mips for HCAL1
- Layer 3 + 4 with 4mips for HCAL2
- Thresholds deviated from Muon peak calibration from 2011

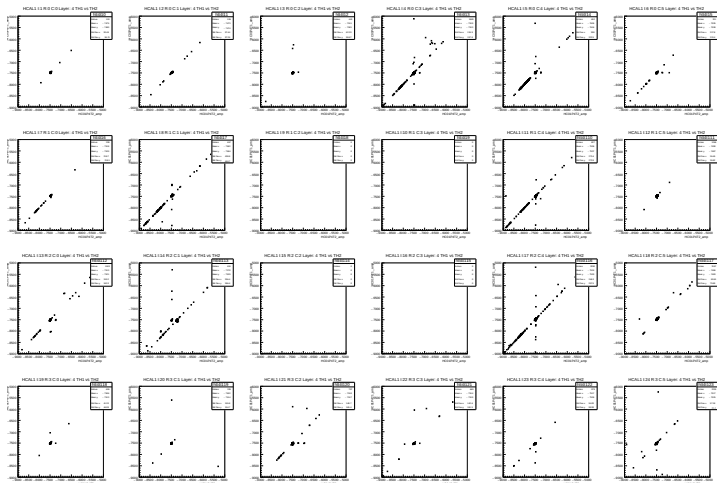
HCAL1 Layer3 ADC Spectra TH1



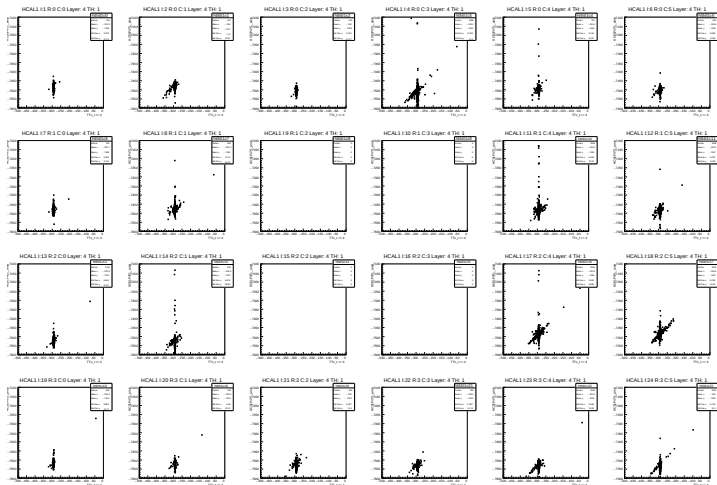
HCAL1 Layer3 ADC Spectra TH2



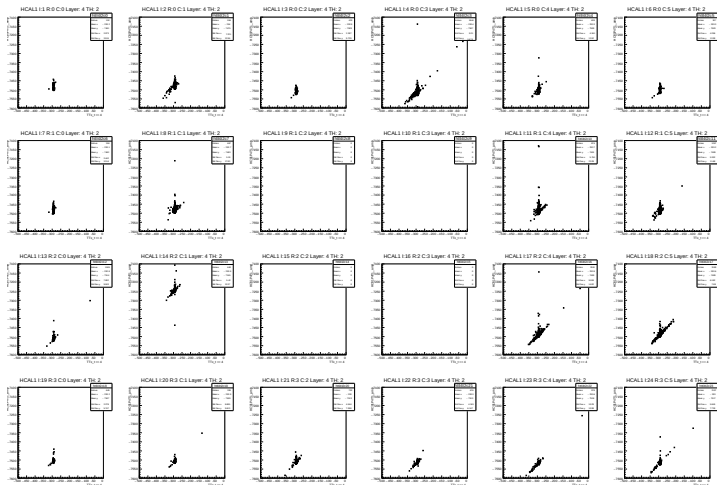
HCAL1 Layer4 TH1 vs. TH2



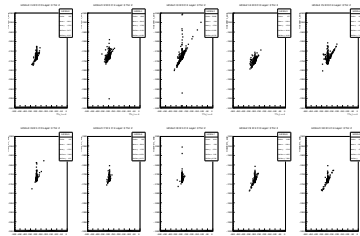
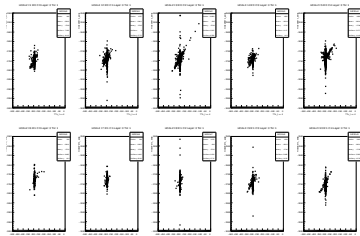
HCAL1 Layer4 TH1 TDC vs. CALO Trigger



HCAL1 Layer4 TH2 TDC vs. CALO Trigger



HCAL2 Layer3 TDC vs. CALO Trigger



HCAL2 Layer4 TDC vs. CALO Trigger

