

22/Oct/2003.

23:03 RUN # 5797 DAQ test run for pedestal stability check.

Trigger ... clock 10 Hz.

RUN # 5798 unplugged All ADC cable.

RUN # 5799 unplugged paddle card @ ADC input.

Several trials have been performed to stabilize ADC pedestal.

in this RUN. Shutting the doors of this arrak,

putting plates in FASTBUS crate to change cooling air flow,

placing 19 inch cooling fan behind the FASTBUS crate, moving

some cables for discriminator input to open the front of the

crate. During these trials we found that the pedestal @ S099

has strong dependence on room temperature. For example

when the compressor of the air conditioner is on (cooling)

the QSUM decreases while it ~~increases~~ increases when the compressor is off.

So it is quite important to keep ADC temperature cool

to stabilize the pedestal of ADCs.

It was also found that the paddle cards could be a source

of noise. Because same scheme is now implemented in the fan-out

input we no longer need them.  $\Rightarrow$  remove the paddle cards.

Plug the ADC cables again!

2:27 RUN # 5800 DAQ test RUN (pedestal) to see

the stability of the pedestals

See next page and compare them to those of yesterday

Now contribution to energy resolution  $\frac{40}{20000} \sim 0.2\%$

Refrigerator Setting was modified to achieve stable pressure/temperature

Target temperature was set to be 465K, but the cold head temp was around 170K, so even after switching to temperature control mode pressure in the chamber <sup>was</sup> continuously decreasing. For avoiding this

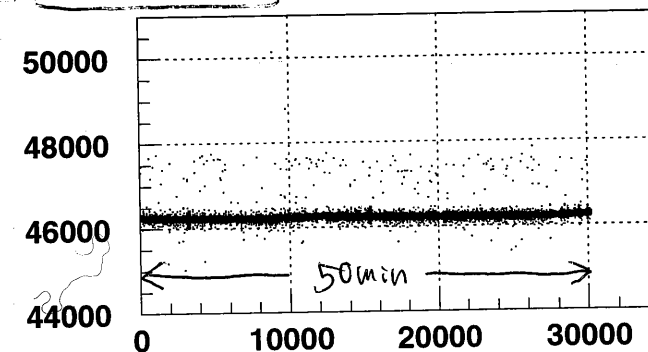
continuous decrease, the target temperature was set to be 170K.

When the pressure is stabilized in 0.122~0.123 MPa

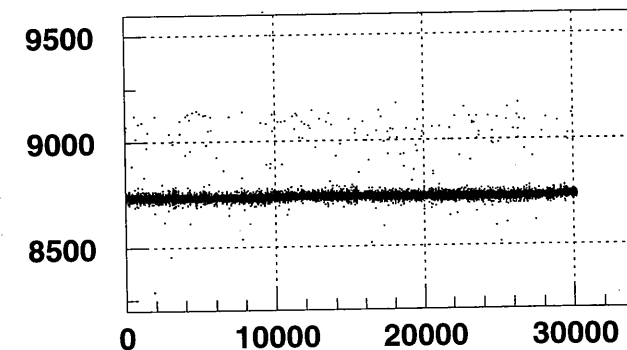
and cold head temperature is  $170.0 \pm 0.1$  K

All temperature sensor outputs are now fluctuating  $\approx \pm 0.1$  K.

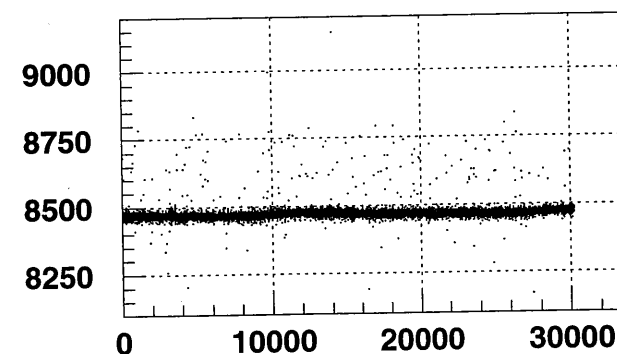
RUN 5800



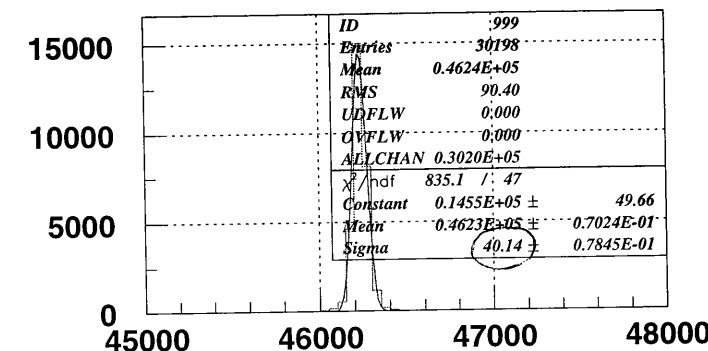
qsum VS. number



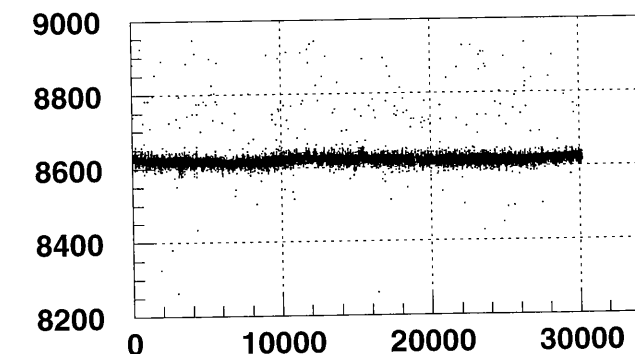
q\_front VS. number



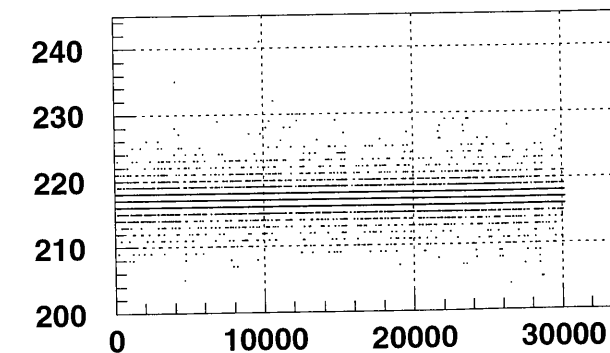
q\_top VS. number



qsum



q\_right VS. number



adc0(10) VS. number

30/09/03

NO BEAM TODAY

#5801 Pedestal 100 Hz  
#5802 & RUN

We cannot start LEA run now, TAKE cosmic data until the PAA program is ready for taking pedestals. LEA data

4:34  
#5803 Cosmic w/o circulation

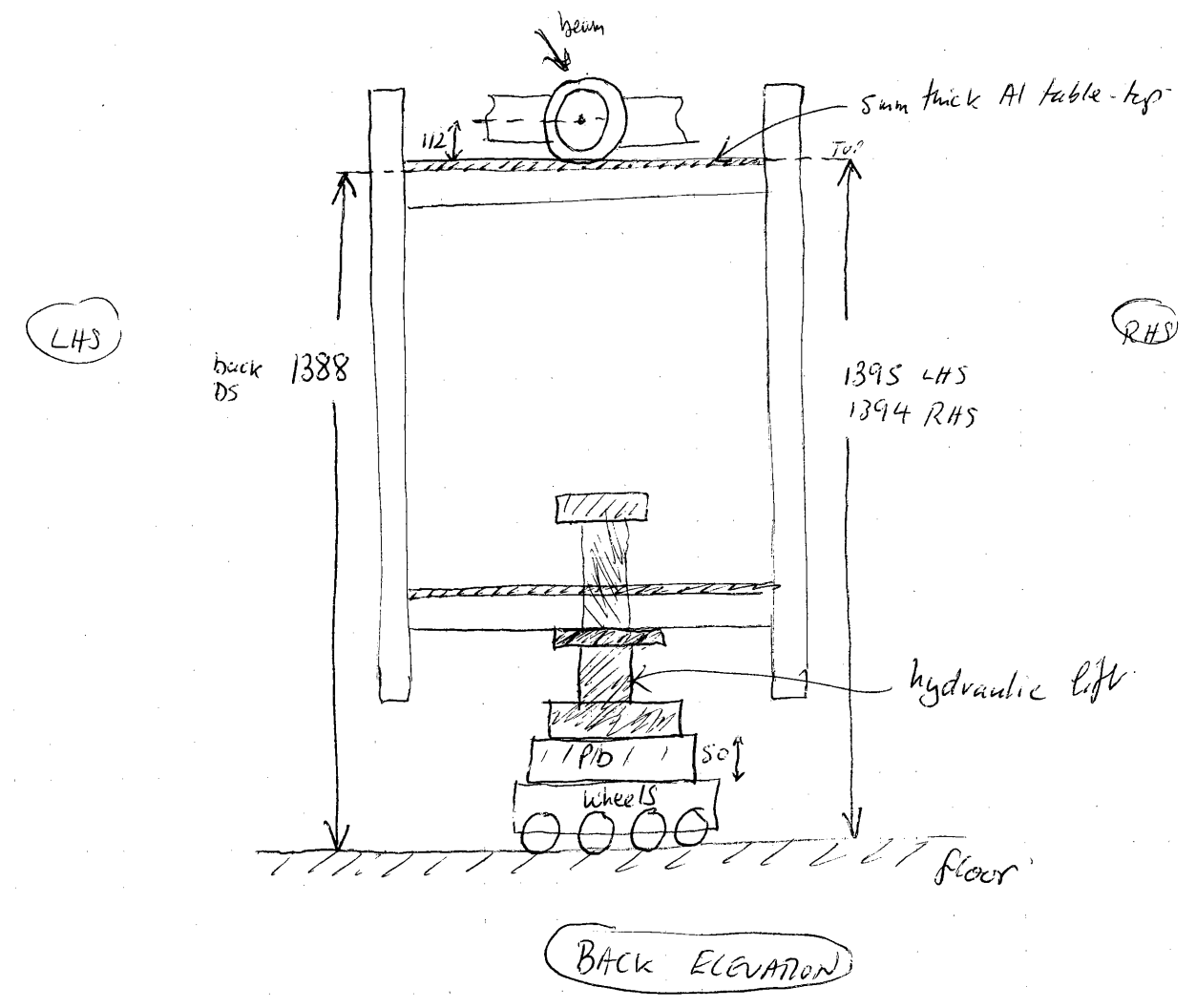
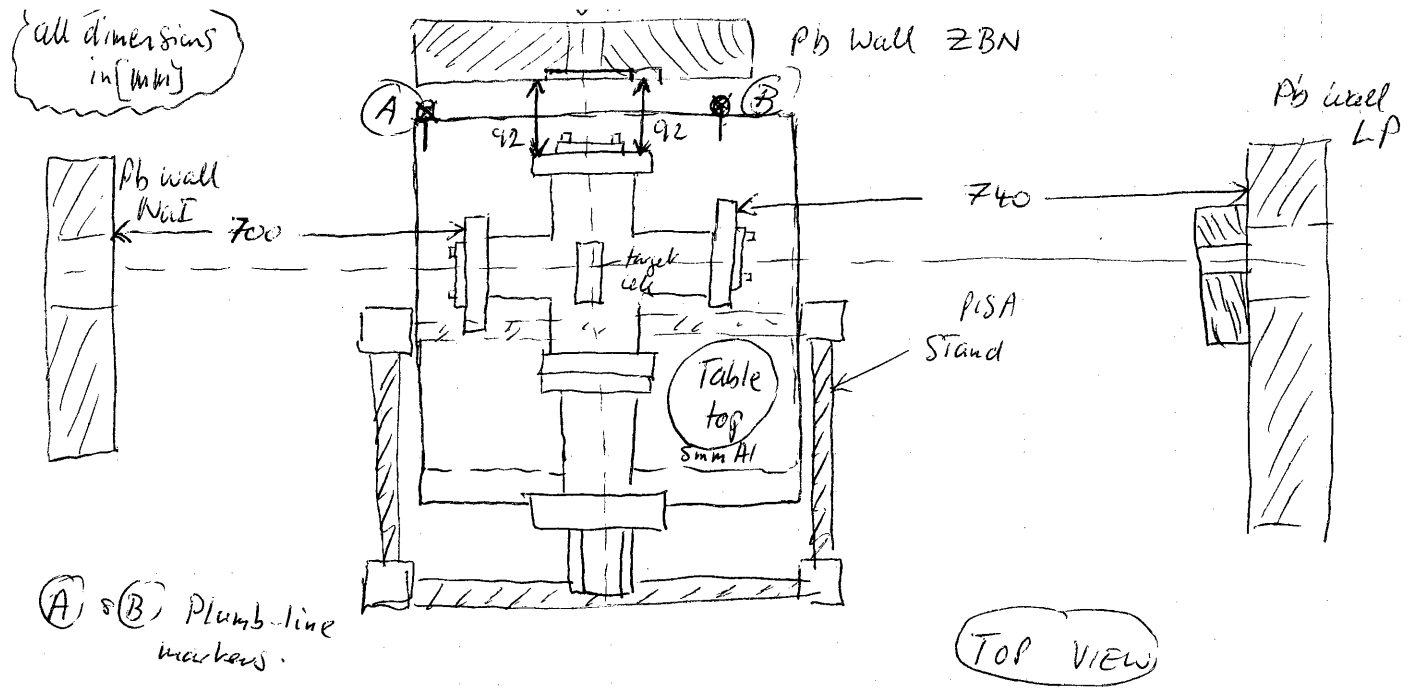
Hydrogen target fill is in progress

5:49 Hydrogen target fill completed

9:14 #5803 stopped  
9:17 #5804 cosmic w/o circulation  
9:28 #5805 pedestal run to see the stability at 100 Hz  
8x10<sup>4</sup>  
9:54 #5806 pedestal ~~run~~ stability run at 1 Hz  
11:12 #5807 CR run w/o circulation  
→ stopped 12:36

12:20 Fabrizio + P-R finish checking detector alignment using laser:  
Conclusion with laser aligned on centre line & on LP detector centre the Pb collimator on the NaI side is centred within 2mm  
also target reasonably aligned within ± mm front flange and axially less than 4 mm (front → back)  
So alignment OK

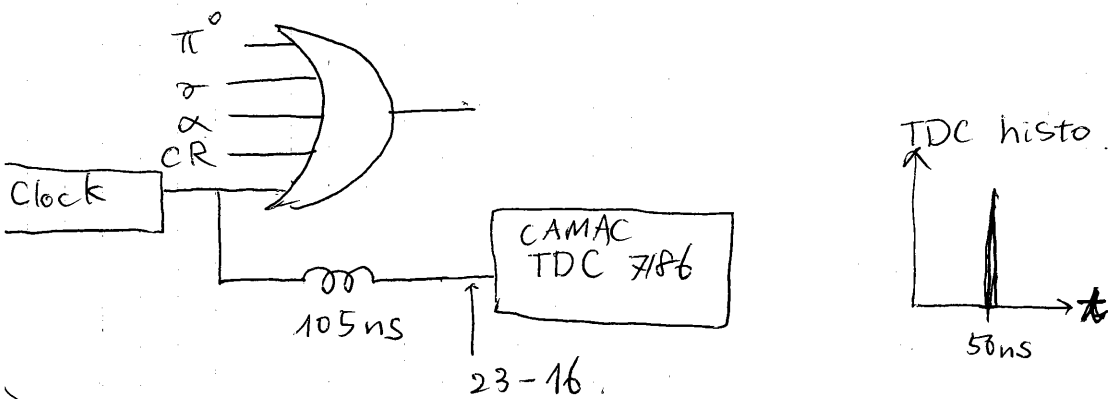
We have also placed some alignment markers on the LH<sub>2</sub> table-top & floor so that we can re-position the target after we remove it on Monday.



Target centre is 1507 mm above floor (expected 1505)  
OK

14:10 Trouble in frontend.exe  
 we cannot restart analyzer.exe  
 => fixed by Stefan

Pedestal trigger generated by clock is added into all trigger modes. clock 1Hz WO



~~Not yet~~ **DONE**

17:12  
 # 5815 pedestal w/ beam off and circulation off  
 # 5816 pedestal "  
 # 5817 LED ~~is~~ failure.

LED calibration part is modified by KO for new frontend and analyzer.

18:35  
 # 5818 pedestal w/ beam off and circulation off  
 # 5819 LED "  
 # 5820 pedestal test } => maybe ok.  
 # 5821 LED test }

23:43

Refrigerator status.

• Temperature Control mode, target Temp 170 K  
 Measured 170.8 K

Heater Power ~ 15%

• Yesterday after regeneration it was around 20 ~ 21%  
 Vessel inner pressure is 0.1215 MPa (very stable)

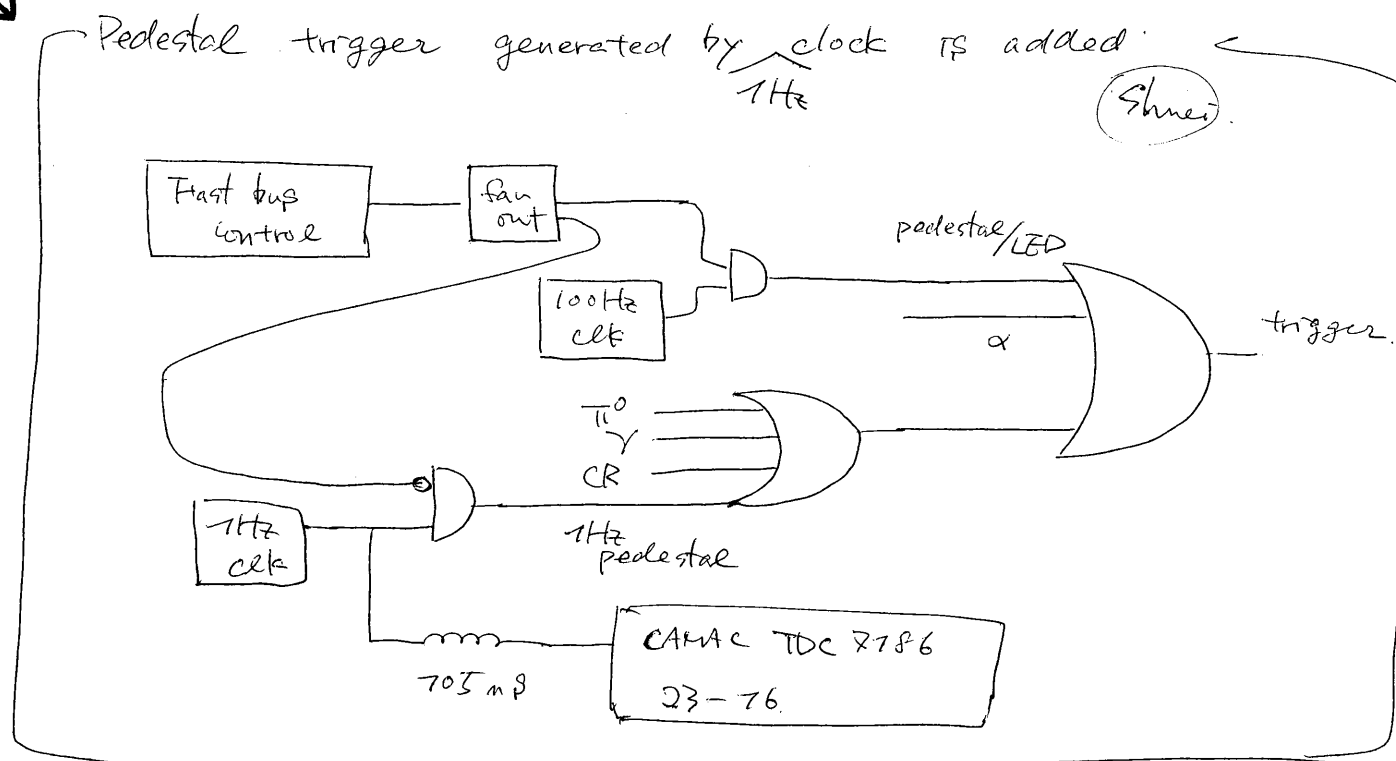
37-0kt-2003  
 # 5823 pedestal test w/ beam off circulation off  
 # 5824 LED test "

• LED calibration ~~seems~~ seems work properly (~~if analyzer is stopped during the calibration run~~)

• We have to ~~stop LED run MANUALLY~~ ~~or set~~ set Equipment / Trigger / Common / Event limit to 30000 MANUALLY by WO

-> FRONTEND.C is modified so that in LED run event limit (trigger) can be set automatically to be LED\_NEUTS \* LED\_N-STEPS in BOR and to be the value before change in EOR, SM, ST & TI.

By Default Event limits both for Logger and TRIGGER are set to be 0 (no limit)



31-0kt-2003

#5825  
#5828 } Test runs

3:20 #5829 LED (#1 & #5)  
#5830 LED (#7 only) test.

Polarity of LED #7 fixed by SM

The connection polarity of LED #7 was opposite. now it is fixed.

~~Removal~~  
Removing the inverter to flash LED #7 is no longer needed.

3:51 #5831 LED (#3 & #7)  
4:08 #5832 LED (#2 & #6)

With SAME setting for LED driver and attenuators

Looks too small light yield.

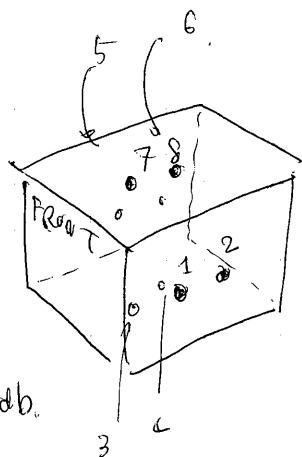
Attenuator for providing pulse to LED : 8db.

The attenuation is changed from 8db → 6db.

$0.79 \times 0.63 = 0.39$

4:17 #5833 LED (#2 & #6)  
attenuation 6dB

Several PMTs are also overflow 6dB → 7dB



4:24 #5834 LED (#2 & #6)  
attenuation 7dB

... even in "STEP 5" (out of 6) in LED RUN most of PMT ADC values are less than 1000

7dB → 6.5dB

4:30 #5835 LED (#2 & #6)  
attenuation 6.5dB

4:44 #5836 LED (#4 & #8) attenuation 6.5dB

Stopped intermediate. too much light even in the 1st steps.

attenuation 6.5dB → 8dB

4:48 #5837 LED (#4 & #8)  
attenuation 8dB OK Good RUN

LED #2 or #6 does not flash? Broken or opposite polarity because only this combination needs different attenuator setting from others.

→ Both #2 and #6 are OK, checked by flashing only one of them and Qsum increased as LED driver setting (output pulse height) was changed.

Recommended set of LED calibration for systematic study.

#5829	(#1 & #5)	8dB
#5831	(#3 & #7)	"
#5835	(#2 & #6)	6.5dB
#5837	(#4 & #8)	8dB

Same set was taken as shown in next page.

No data in histo, where ID# 1467 ~ 1172  
R34, T33, L33, BT33  
R33, L24

Now OK after replacing minicoils shown in next page. Probably unstable connection was fixed when moving/inserting the module.

31/10/03

Plug LED #3 & #7 for data use with 8dB attenuator.

5:08 #5838 Pedestal.

<del>Very</del> PMTs	PMTs	Slot	ID	NOTE
Broad Pedestal Peaks.	T24	S9-M10	C173	SAME mini-card same mini-card S9-M13 + C176
	B724	S9-M12	C175	
	B729	S9-M15	C178	

5:15 #5839 & Run

Replace the minicards for four channels with broad pedestal listed above. => Fixed. They are quiet now.

Take full set of calibration data again after replacing mini-cards.

5:50 #5840 Pedestal Beam off.

5:53 #5841 LED 387

6:00 #5842 LED 185

6:06 #5843 LED 488

Attenuation 8db -> 6.5db

6:13 #5844 LED 286 with 6.5db attenuation

During these LED runs OSUM had been rather unstable. check the pedestal again

6:24 #5845 Pedestal -> OK Stable

6:28 #5846 LED 387 (8db) -> 37.08 ch

-> NG not quite stable

6:36 #5847 LED 387 (8db) -> quite unstable

- LED driver output channels were checked and tested, but still unstable...

- unplug & plug all cables between LED driver, inverter & attenuators. Now looks stable.

7:01 #5848 LED 387 (8db). OK. stable enough.

Beam is back (~40pm)

7:30 #5850 (S1 \* Xe front 8 back 4 \* NaI 4)

w/ same condition before this shutdown. (#5769)

proton 1685 uA => failure only pedestal

8:20 Beam is UNSTABLE

current source codes ~~are~~ are saved at c:\online\src\_scripts-backup\031031/

#5851 JUNK

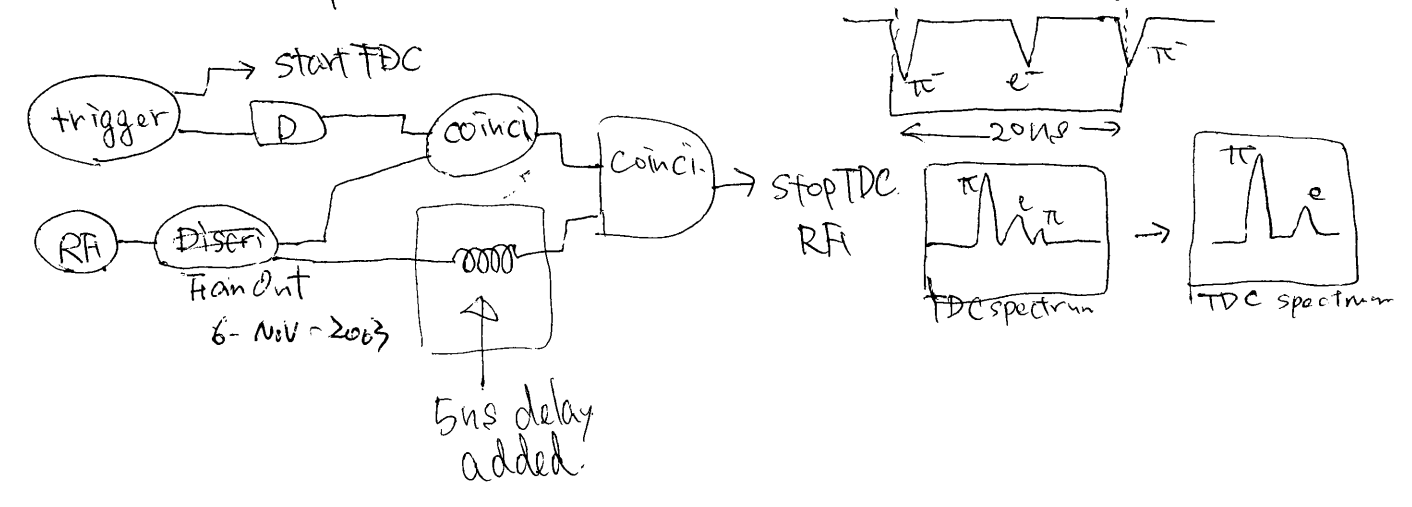
Beam is STABLE now

10:20 #5852 (S1) \* (Xe front 8 back 4) \* (NaI 4)

w/ same condition of collimator setup in #5769

- proton 1.809 mA
- trigger 1.6 Hz including pedestal

RF TDC input line modified. because the  $\pi^+$  timing was just optimized



16:46 #5852 stopped to change the RF timing.  
 ↳ the trigger rate  $\sim 0.6$  Hz is consistent with the rate in #5769

RF TDC timing spectrum was not clearly separated between  $e^+$  and  $\pi$ . At first, coincidence timing was suspicious <sup>not</sup> to be optimized, but at S1 only trigger mode, clear separation was demonstrated.

So, the trigger timing was not sometimes determined I think by S1. but ~~NaI~~ NaI on Xe. Now, it is impossible to be faster for NaI trigger timing.

I will prepare  $3 \times 64$  ns cables from electronics pool. → then, I will tune trigger timing again. T.I.

11:23 #5853 started same as #5852  
 proton 1767  $\mu$ A  
 stopped @ 12:15 for modification of DAQ software done by Stefan

12:22 #5854 started same as #5853 ⇒ failure  
 12:25 #5855 started same as #5854

- I put to-do-list over weekend to next wednesday shutdown in a meeting summary posted to meg Elog - large prototype status - (Be careful! not online ELOG). This was made by Marco.

Please take DATA and check the setup by using the list as a reference over weekend.

SPM

# Plans for weekend and beginning of next week 3PM

FC

Saturday  
 - data collection with 3 cm collimator at front face center and with an absorber equivalent to 8 mm of LXe

Sunday  
 - data collection with the 3 cm collimator centered on a front face PMT,  
 - data collection with the 3 cm (or smaller) collimator in front of the NaI and full 10x10 cm<sup>2</sup> aperture on the LP

Monday  
 - removal of the target  
 - start of the beam profile measurement with pill counter (?)

Tuesday  
 - end of beam measurement / tuning / resetting

Wednesday  
 - positioning and refilling of the target  
 - preparation of the counter for the timing measurement  
 - check of TDC for timing measurement  
 - preparation of the VME crate

15:20 Refrigerator status T = 170.0K  
 Heater power = 10.7%

15:48 Stop the RUN #5855. 20K events taken.

15:50 RUN #5856. pedestal run.

15:52 RUN #5857. LED calibration RUN. LED #3 & #2.

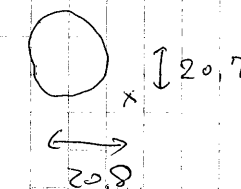
15:59 RUN #5858.  $\alpha$  run.

16:04 RUN #5859.  $\pi$ -trigger RUN.

• Same as previous (#5855) setting.

- Proton Beam current:  $\sim 1.2$   $\mu$ A (still unstable).

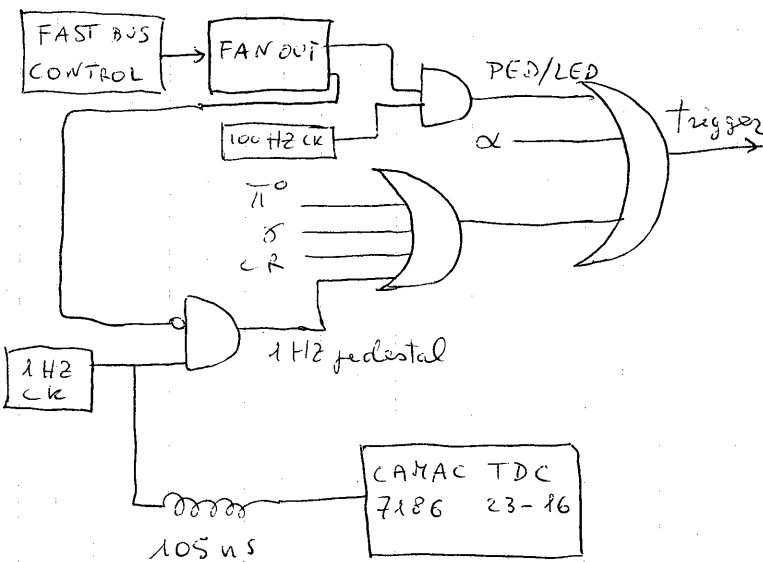
ADC20x dead @ BEAM ON.



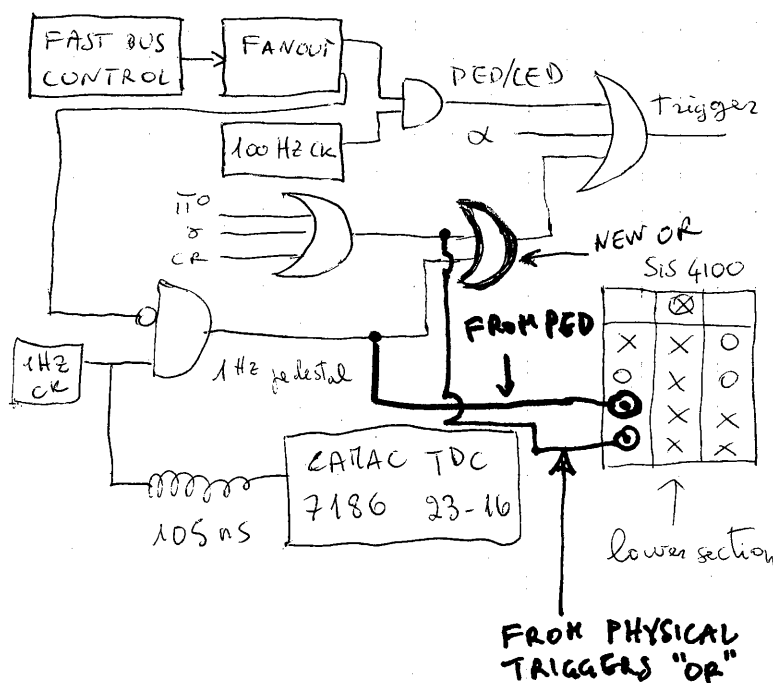
16:45 FC A possible scheme to have a pedestal event "flag"  
 We can use SIS 4100; first column of LEMO INPUTS from left. Three inputs are free, then there is enough space to insert an input coming from the pedestal trigger and a second one coming from the "OR" of the physical trigger. This is a possible sketch of the hardware scheme. On the left part the present situation, on the right the proposed new one.

PRESENT

(see Shuei scheme seven pages before)



PROPOSED



I changed off line calibration computer from "pc4466" to "11c3 or 11c4".  
 Please see the instruction page  
[http://meg.psi.ch/subprojects/calorimeter/instructions/offline\\_calib](http://meg.psi.ch/subprojects/calorimeter/instructions/offline_calib)

27 Refrigerator Status } T<sub>0</sub> = 120 K.  
 Heater power = 9.74% IN RUN  
 5772 was ok

- 5:20 - 2003
  - ~~5:24~~ #5859 Stopped.
  - ~~5:27~~ #5860 pedestal ~ 5700 events.
  - 5:32 #5861 LED (#3 & #7) ← HORRIBLE! (almost unusable)
  - 5:38 #5862 LED (#7 & #5) ← HORRIBLE! (almost unusable)
  - 5:44 #5863 alpha ~ 40000 events.
  - 5:57 #5864 T<sub>0</sub> trigger (NaI 4 \* LXe front 8 back 4 \* S1) WHY?
- side 204 off?? from when?? since
- please LOOK at the data after taking and if bad understand!

radiation length

Lead	0.56 cm	8 mm	=	1.6 mm	=	2.54 cm
Aluminum	8.9 cm	of	=	of	=	of
Xenon	2.8 cm	LXe	=	Lead	=	Aluminum

13:24 stop 5864 49128 events ⇒ Trigger rate pedestal  
 heater power = 6.8 %  
 start refrigerator regeneration 49128 / 27180 sec - 1  
 = 0.81 Hz

13:26 set cold head temp = 270 K  
 compressor off

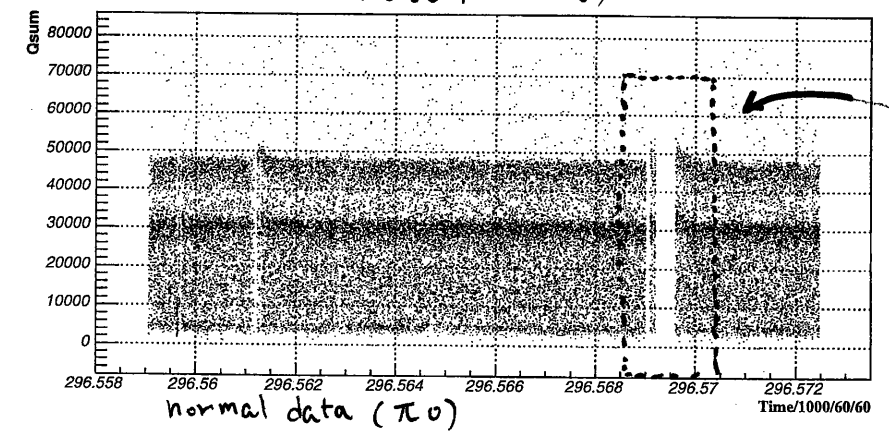
13:40 cold head temperature reach 270 K.

14:10 compressor on  
 cold head set point = 170 K

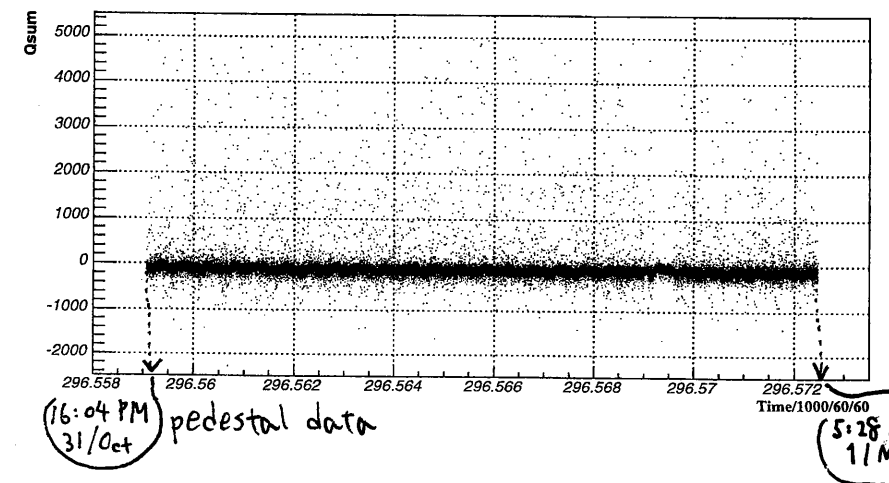


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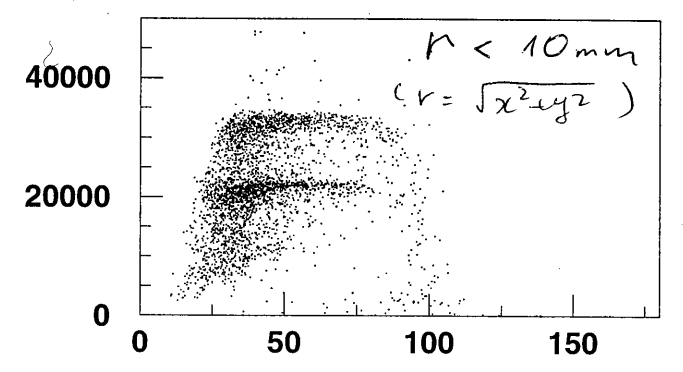
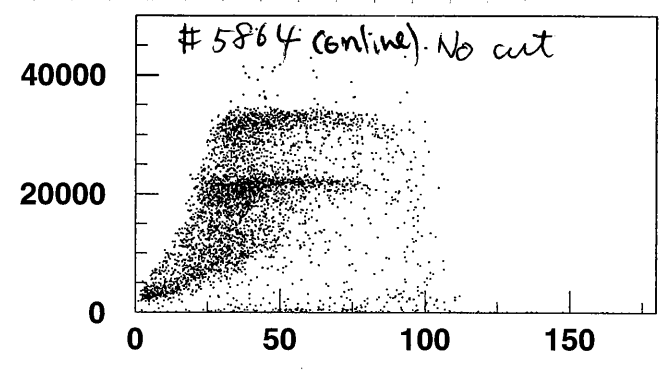
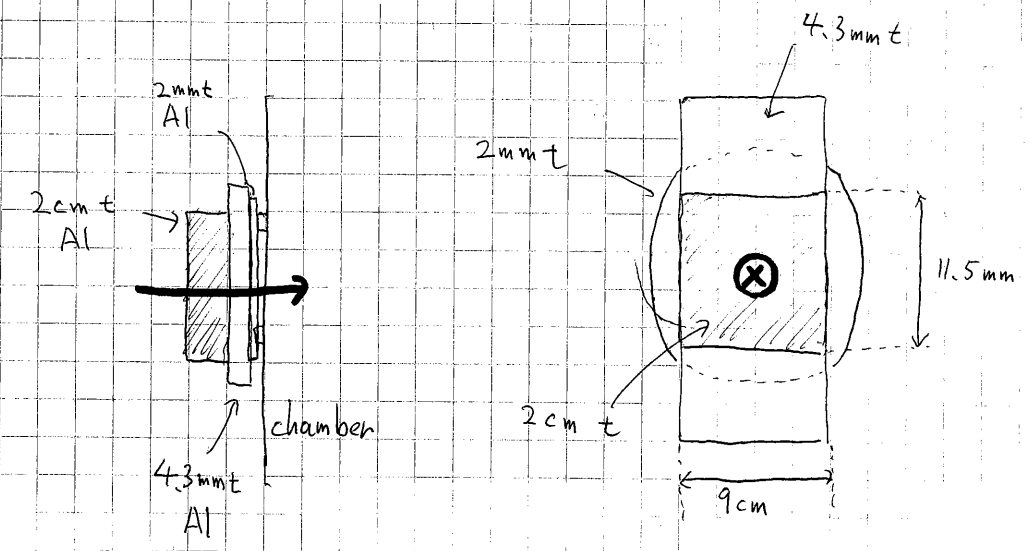
#5859 (off line)



gain is depending on beam current?

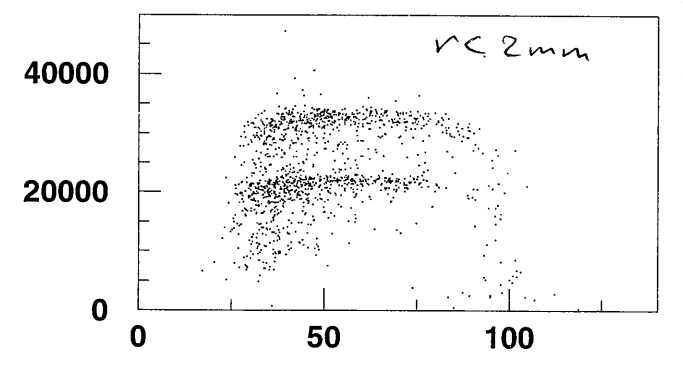
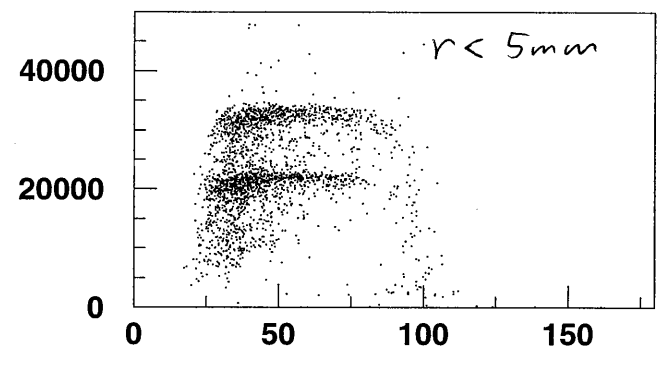


15:00 #5865 pedestal w/ beam ON circulation OFF  
 #5866 LED  
 #5867 alpha



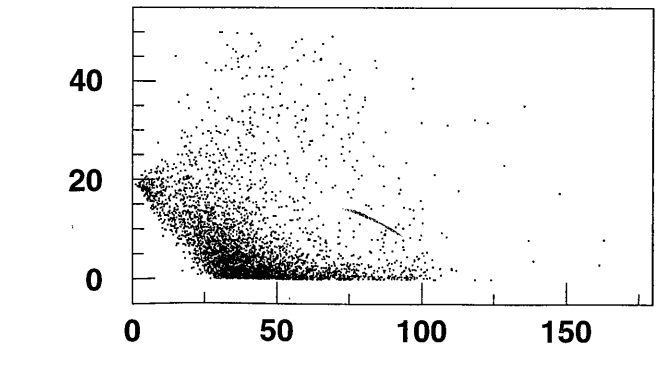
QSUM VS. SIGMA

QSUM VS. SIGMA



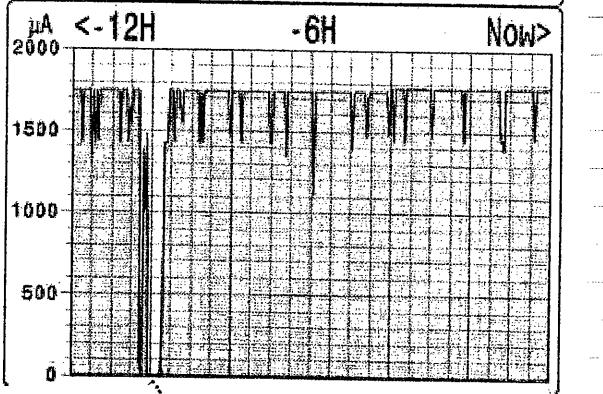
QSUM VS. SIGMA

QSUM VS. SIGMA



(X\_AVERA\*\*2 + Y\_AVERA\*\*2) VS. SIGMA

Sat 1.Nov.2003 12:20:01



14:30 Al plate is placed in front of LXe detector (26.3 mm thick) behind the collimator and VC to see the material effect.



# 5868 (S1) \* (NaI 4) \* (Xe front & back 4)  
 beam ON circulation OFF  
 30mm  $\phi$  collimator for Xe + 26.3mm Al absorber  
~~450mm  $\phi$~~  " for NaI

proton 1899  $\mu$ A

15:23 # 5869 same as # 5868

17:35 Coldhead temp 170 K  
 heater power 23.4 %

18:30 data files as of Oct 31 moved to E:\031031-PSI1  
 21:57 # 5869 stopped @ 41098 evts  $\Rightarrow$  ~~17700  $\pi^0$  evts~~ 17700  $\pi^0$  evts 0.76 Hz  
 # 5870 started same condition as # 5869  
 proton 1852  $\mu$ A

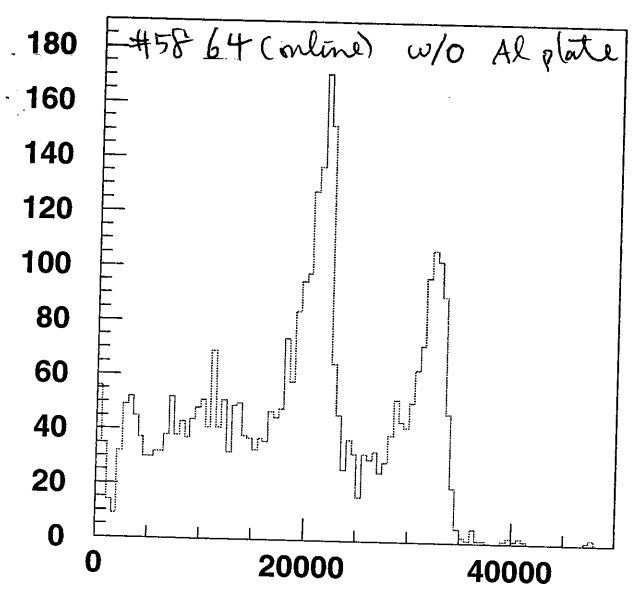
2/Nov/2003

1:00. Sometimes PHS #5882 received SMS alarms from postimp/3.  
 The inner vessel pressure was under limit which is 0.12 MPa.  
 Now the operation mode is temperature control mode, and  
 the pressure is always near the operation limit, and is stable.  
 So, the item of "Send Email Pressure lower limit 0.12  $\rightarrow$  0.119  
 and "Pressure alarms ON lower level 2 0.12  $\rightarrow$  0.11  
 changed.

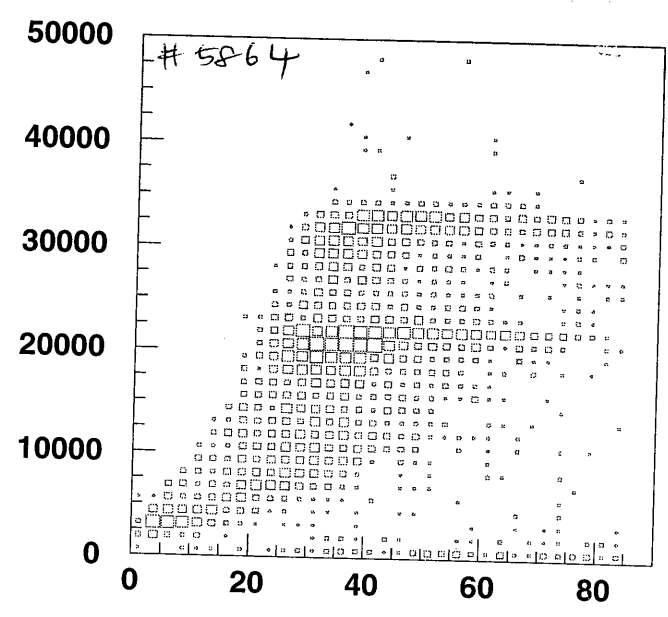
6:35 #5870 stopped ~ 54000 events  
 6:36 #5871 pedestal  
 6:37 #5872 LED (185)  
 6:43 #5873 LED (387)  
 6:49 #5874 alpha

beam stopped to move collimeter.

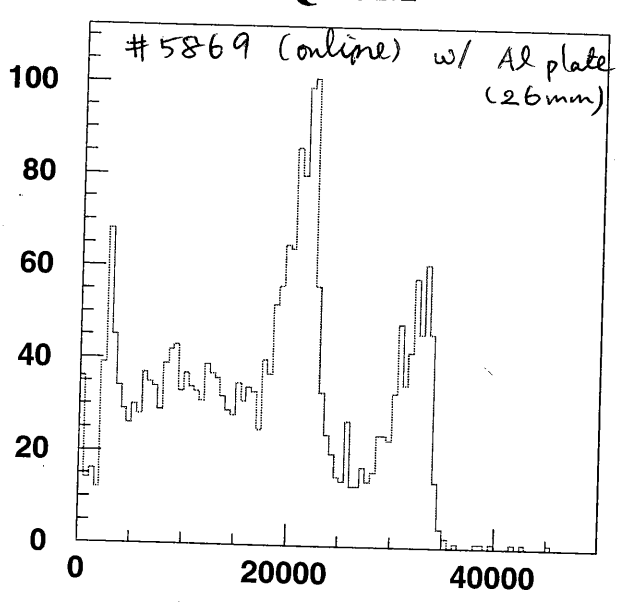
o removed  $\left. \begin{matrix} 26.3 \text{ mm} \\ 2 \text{ mm} \end{matrix} \right\}$  Al absorber



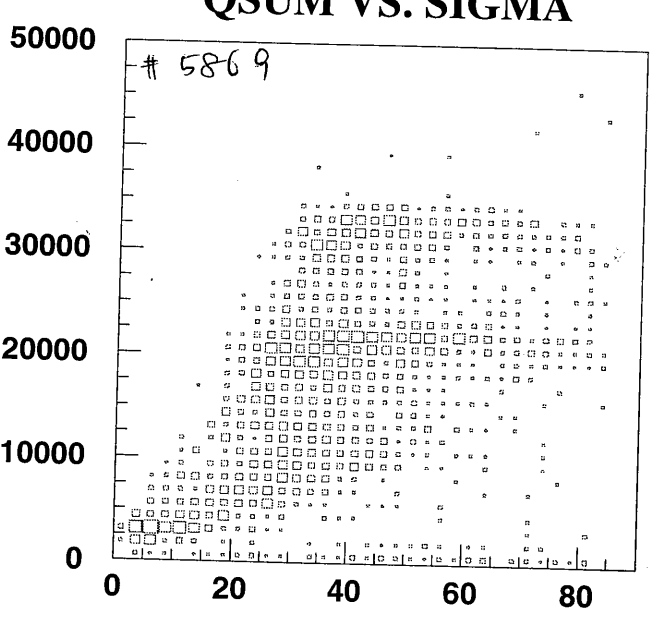
QSUM



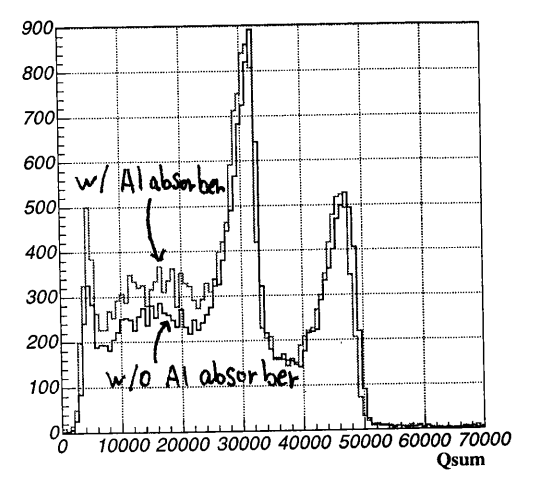
QSUM VS. SIGMA



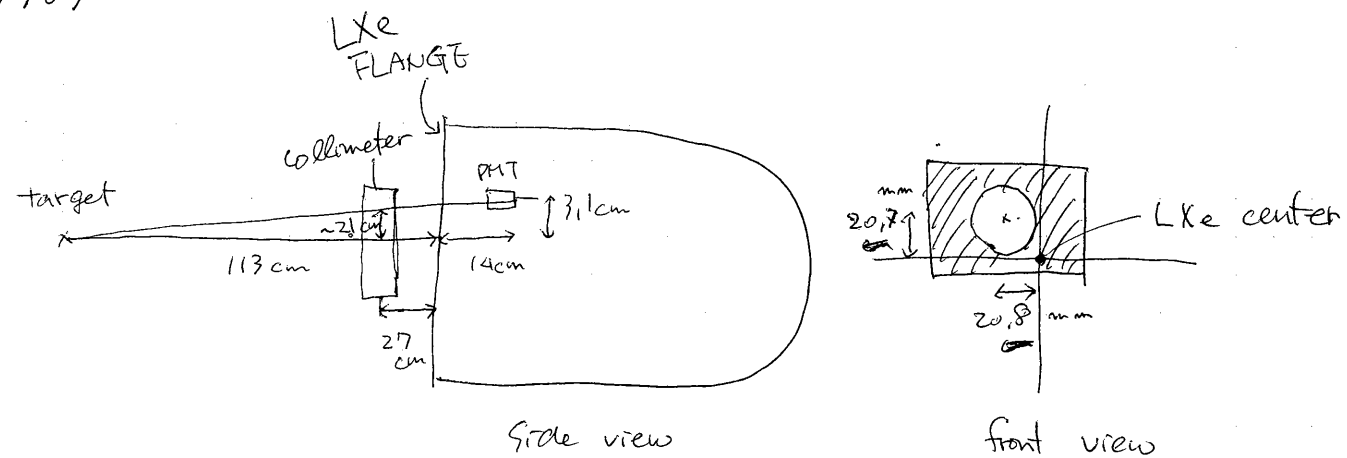
QSUM



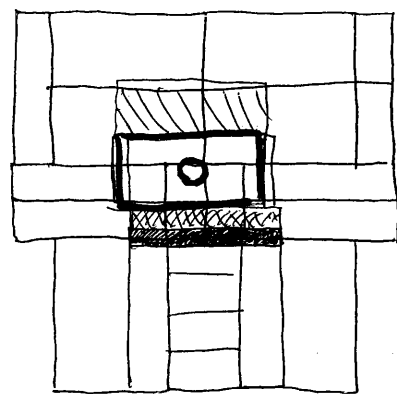
QSUM VS. SIGMA



2/Nov/03



collimator on LXe moved to center of PMT (F14)



- 8mm Iron spacer
- existing Pb blocks
- 18mm ~~Pb~~ Pb  
(2mm x 4 + 3mm x 3)
- Pb block w/  $\phi 30$ mm hole
- further Pb block to cover  $\frac{10}{cm} \times \frac{10}{cm}$  window.

8:17 #5875 pedestal

8:18 #5876 LED 3 & 7

8:27 #5877 LED 1 & 5

8:33 #5878 2

8:39 #5879  $\pi^0$  (S1 \* Junk)

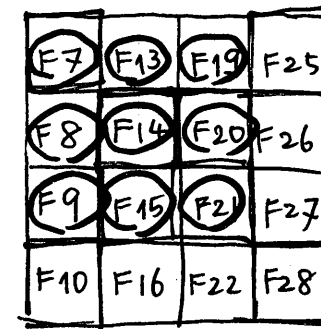
8:40 #5879  $\pi^0$  (S1 \* NaI 4 \* LXe front 8 back 4).  $\phi 30$ mm collimator @ PMT center

14:35 HV error found HV 1458 slot 6 CH 1 (BT21) paused  $\rightarrow$  resumed.

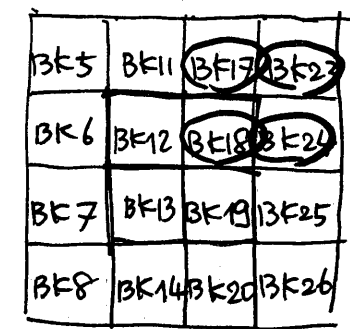
15:30 # 5880 stopped to change the trigger layout

~~Trigger layout~~ Trigger layout changed for the current collimator setup WO RS

Front ~~view~~



Back



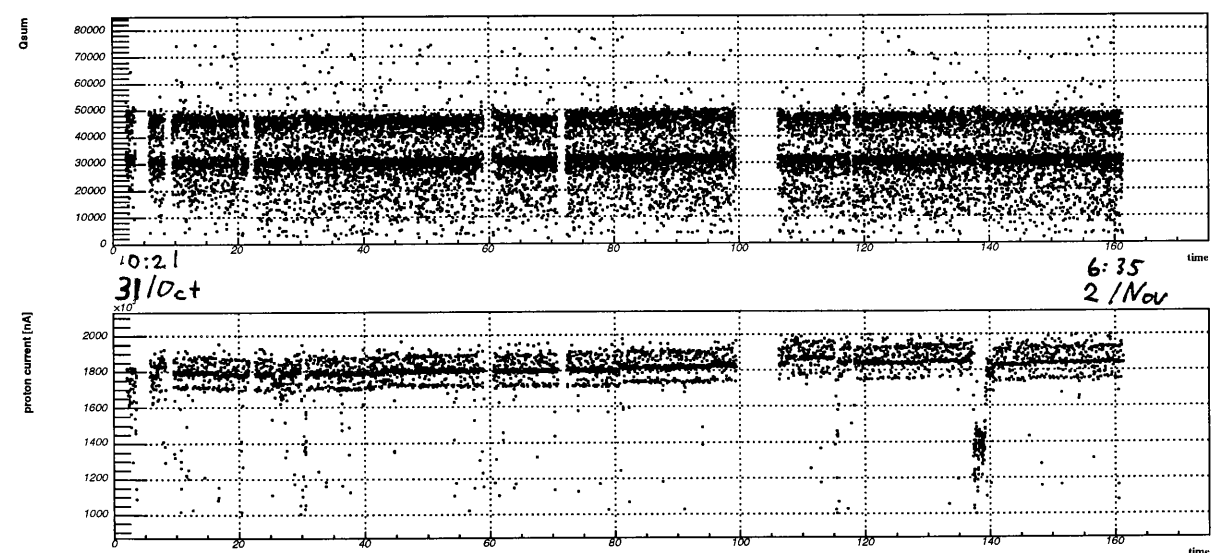
previous current

16:14 #5881 (S1) \* (NaI 4) \* (Xe off-center Front 9 back 4)

w/ beam ON circulation OFF

proton 1852  $\mu$ A

trigger rate 0.91 Hz  
(pedestal not included)



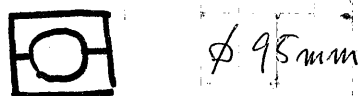
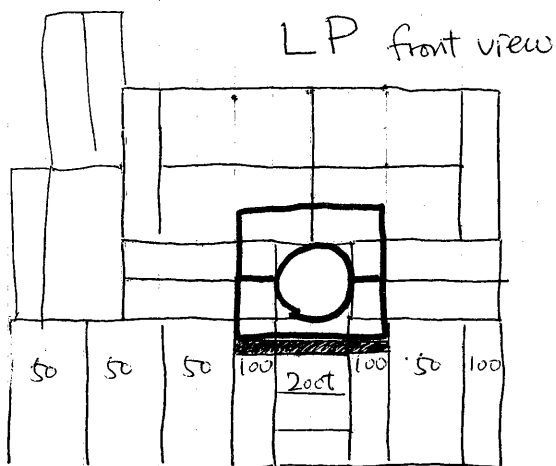
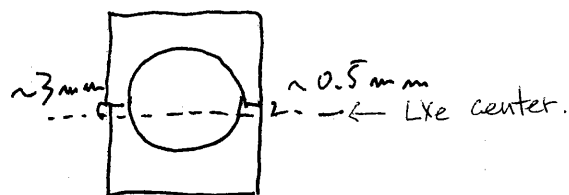
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23:24 #5881 stopped

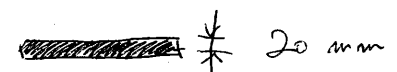
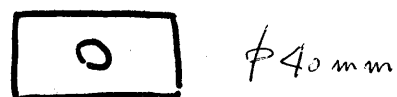
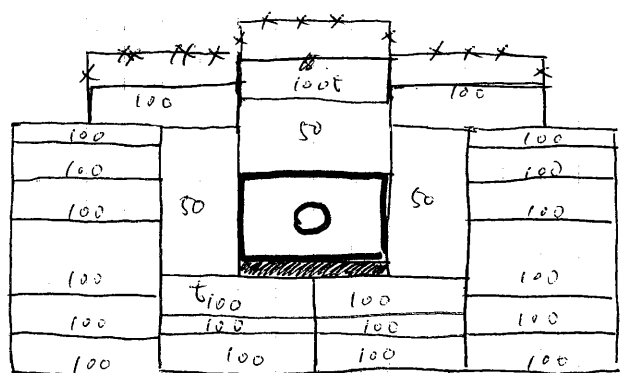
Rearrangement of Pb bricks

LXe :  $\phi$  95 mm

NaI :  $\phi$  40 mm



NaI front view



trigger PMT layout changed to normal condition.

front.

F17		F25
	F14 F20	
	F15 F21	
F10		F28

back.

BK12	BK18	
BK13	BK19	

3 - Nov - 2003

0:36 #5882 pedestal

0:37 #5883 LED (1&5)

0:42 #5884 LED (3&7)

0:48 #5885 alpha ~30000 events

#5886  $\pi^0$  (S1 \* NaI  $\phi$  \* LXe front 8 back 4) : Junk.  
 $\phi$  40 mm  $\phi$  90 mm

0:55 #5887  $\pi^0$  trigger (S1 \* NaI 4 \* LXe front 8 back 4)

col. NaI 40 mm, LXe 95 mm.

trigger rate:  $\frac{667}{300 \text{ sec}} - 1.0 = 1.22 \text{ Hz}$   
 ↑  
 pedestal

8:07 stop 5887

8:08 #5888 pedestal

8:09 #5889 LED 3&7

8:16 #5890 LED 1&5

8:24 #5891  $\alpha$

8:29 #5892 same as 5887

11:29 stop 5892

emptied LHz target (4 Hz is remaining)  
 Moved target away.

- New CAMAC TDC installed to read discriminator output of station 6 (Phillips) - frontend.c, analyzer.h, tdcutil.c are modified. Odb structure also, followed by experiment.h modification. Modified files are copied to C:\online\src-src.pd-backup.

3/Nov/03

- In this modification it was found that online histogram IDs for TDCs had been wrong. These are now fixed.
- Because of new TDC was inserted in earlier station than that for S1 & RF. TDC, S1 & RF TDC lists ID are changed together with their position in the Trigger bank.

Please Be careful in gun analysis.

Now online lists IDs for

S1 → 2140  
 RF → 2142, CR TRIGGER counter TDC, too.

Pedestal Flag Bank position is also shifted by 16 ch.

17:40 SM

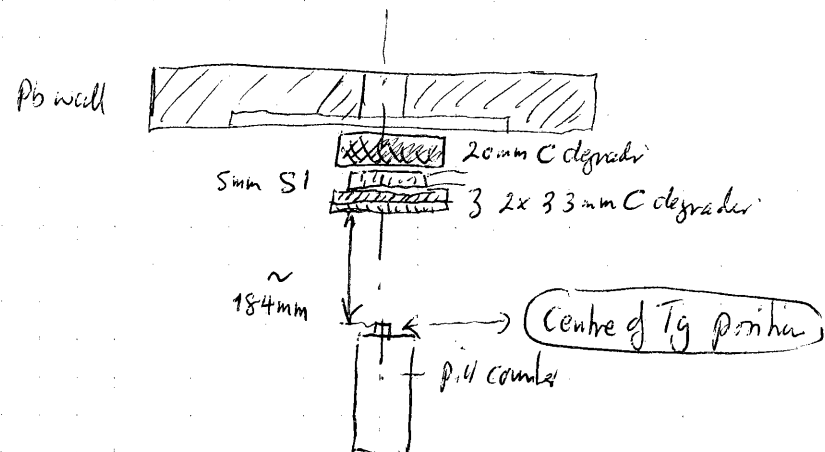
#5893 ~ 5894 LED Test Run for new TDC.

~~Beam is unstable because of INJ2~~ problem in

~ 18:30 No beam because of problem in INJ2

19:00 Beam starting to come back again 450 pA

Waham & P-R have setup the Scanner + pill and aligned the Setup & positioned the pill @ ~ correct loc 1508mm



Pill placed 184mm DS of end of (2x33mm) thick degrader

Position equivalent to CENTRE OF TARGET CECC LH<sub>2</sub>

Scanner position	H: 179.7 mm
BEAM AXIS	V: 191.3 mm

Because have full degrader + S1 in front of pill the  $\pi^-$  are close to end of range  $\therefore$  pulse-ht larger than before

$\Rightarrow$  reduce HV<sub>pill</sub> from -600V  $\Rightarrow$  -570V

New HV<sub>pill</sub>  
With full degrader = -570V

Threshold D<sub>pill</sub> = 500mV pA

New profile scan with pill  
+ full degrader + S1  
Still in situ

Same optics as previously file Meg #1 pi S1g. Set

New profile scan 3/11/2003

(28)

Pill counter position ~ 184 mm DS of end of 6.6mm thick degrader plate.

Scanner positioned ~ Centre-line + ht-150S ~

H: 179.7 mm  
V: 191.3 mm

Old settings:

HV pill = -600V

DS1 threshold = 620mV

Now we have full degrader + S1 in front of pill =  $\tau_c^+$  line too high

@ HV = -600V

new HV = -570V  $D_{pill} = 500 \text{ mV (pA)}$

problem with AC-coupling  
pulse-hb collapses when  
Rate > ??  
didn't b/c

S1-RF re-timed OK

Rate /  $10^6 \text{ p} @ \sim 490 \mu\text{A}$   
S1  $12.56 \text{ k}/10^6 \text{ p}$   
S1-RF  $12.22 \text{ k}/10^6 \text{ p}$   
Time 20.64 Sec.  
constant @ 260 pA

Set Hor: 179.7 mm

Vertical Scan: @  $\sim 1600 \mu\text{A}$

VERTICAL SCAN  
Full Degraded  
+ S1

$\bar{X} = 189.7 \text{ mm}$   
 $\sigma = 24.512 \text{ mm}$   
 $\Sigma = 151.408 \text{ k}/10^6 \text{ p}$

Pos. (mm)	Pill-RF / $10^6 \text{ p}$	Position (mm)	Pill-RF / $10^6 \text{ p}$
190	12.415 k	185	11.898 k
195	12.172 k	180	11.278 k
200	11.251 k	175	10.488 k
205	10.051 k	170	8.863 k
210	8.66 k	165	7.23 k
215	7.10 k	160	5.67 k
220	5.58 k	155	4.42 k
225	4.09 k	150	3.30 k
230	3.18 k	145	2.44 k
235	2.33 k	140	1.71 k
240	1.60 k	135	1.16 k
245	1.16 k	130	0.744 k
250	0.78 k	125	0.518 k
255	0.54 k	120	0.38 k
260	0.40 k		

29 pA

Set V: 189.7

$\sim 1720 \mu\text{A}$

Horizontal Scan:

Pos. (mm)	Pill-RF / $10^6 \text{ p}$	Position (mm)	Pill-RF / $10^6 \text{ p}$
180.0	12.462 k	175.0	11.498 k
185.0	12.946 k	170.0	10.014 k
190.0	12.583 k	165.0	8.388 k
195.0	12.176 k	160.0	6.714 k
200.0	10.828 k	155.0	5.304 k
205.0	9.107 k	150.0	3.971 k
210.0	7.129 k	145.0	2.922 k
215.0	5.532 k	140.0	1.955 k
220.0	4.148 k	135.0	1.317 k
225.0	2.79 k	130.0	0.866 k
230.0	1.83 k	125.0	0.569 k
235.0	1.24 k	120.0	0.361 k
240.0	0.772 k		
245.0	0.516 k		

26 pA

$\bar{X} = 185.65$

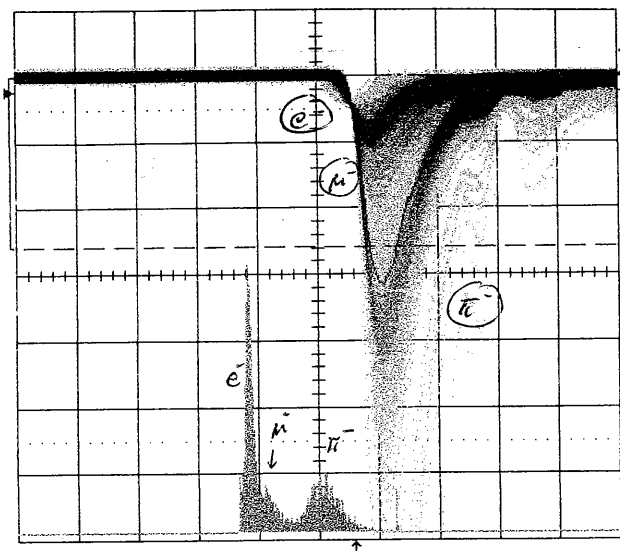
$\sigma = 22.913$

$\Sigma = 147.938 \text{ k}/10^6 \text{ p}$

Rate @  
H: 185.7  
V: 189.7  
 $Pill-RF / 10^6 \text{ p} = 13.133 \text{ k}$   
5.89 Sec @ 1720 pA

3-Nov-03  
18:44:03

5 ns  
200mV  
-515mV  
6479 sups  
Hamp1(1)  
5 V  
100 #  
-258 #  
inside 6479  
HV = -570V  
Threshold Sum  
500mV pA



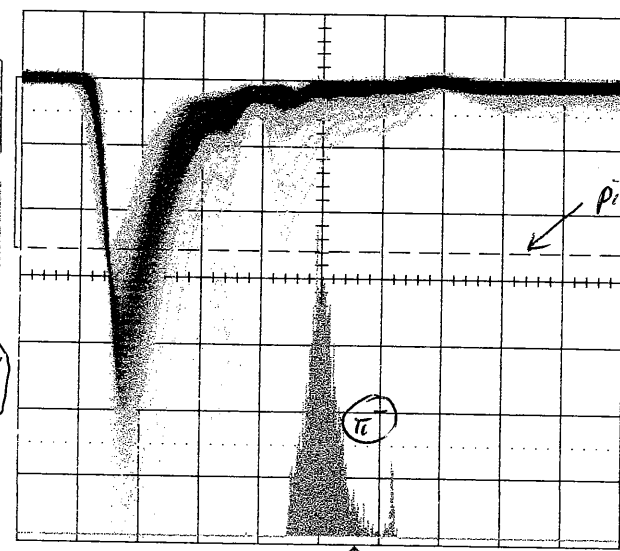
TRIGGER SETUP  
Edge SMART  
trigger on 1 2 3 4 Ext Ext5 Line  
coupling 1 DC AC LFREJ HFREJ HF  
slope 1 Pos Neg Window  
holdoff  
OFF Time Evts

Pill  
Analogue

Pulse-hr  
Spectrum

3-Nov-03  
18:42:30

5 ns  
200mV  
-515mV  
2406 sups  
Hamp1(1)  
5 V  
20.0 #  
-51.5 #  
inside 2406  
500 pA  
 $D_{pill} = 500 \text{ mV pA}$   
HV = -570V

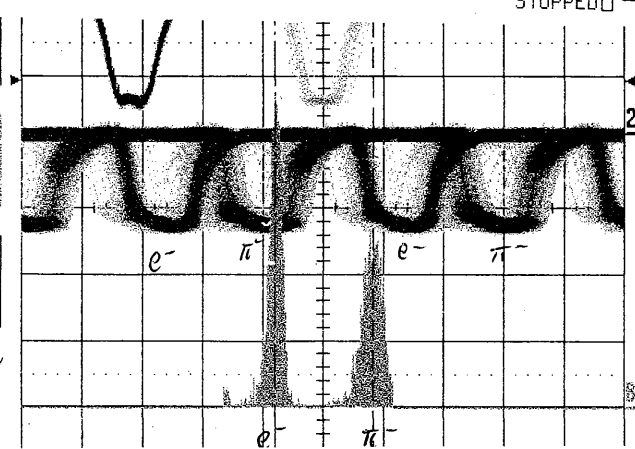


TRIGGER SETUP  
Edge SMART  
trigger on 1 2 3 4 Ext Ext5 Line  
coupling 2 DC AC LFREJ HFREJ HF  
slope 2 Pos Neg Window  
holdoff  
OFF Time Evts

Triggered  
on  
 $D_{pill} \text{ of } 500 \text{ mV (pA)}$

Pulse-hr  
Spectrum

Pill  
0.50 V  
8.1 ns  
12188 sups  
Delay(2)  
5 ns  
20.0 #  
inside 4369  
RF  
5 ns  
0.50 V  
8.1 ns  
4369 sups  
 $D_{pill} = 500 \text{ mV}$



Coupling  
ZOOM  
FIND  
Gain Fixed variable  
Offsets in Volts

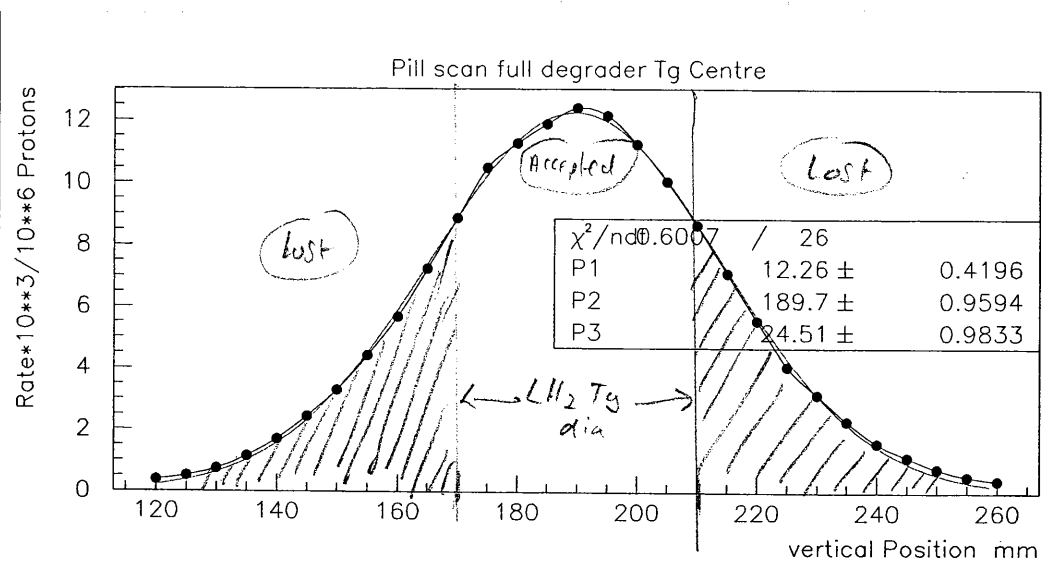
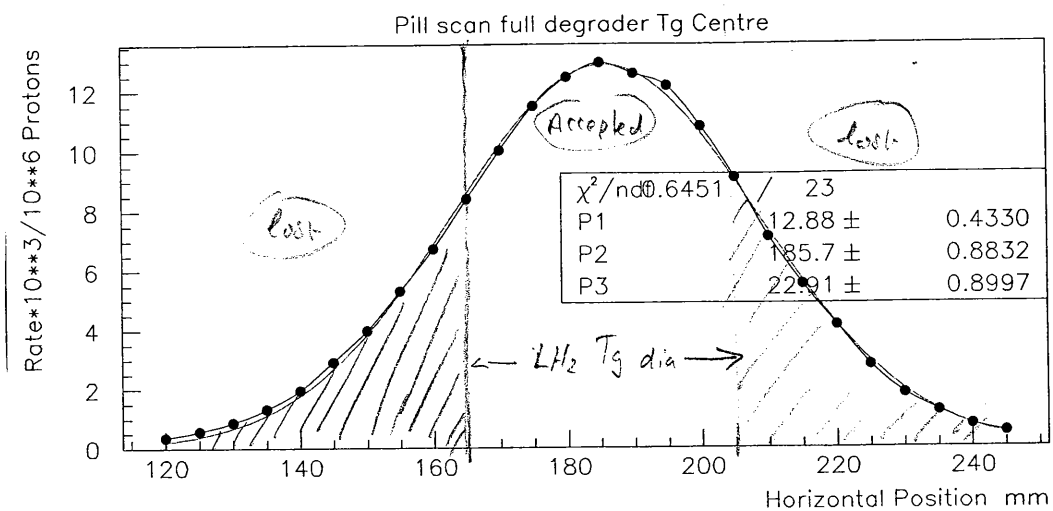
Pill

RF

TDC equiv.  
Spectrum

Separation  
 $\sim 8.1 \text{ ns}$

Measured Profiles @ Centre of Tg-Cell Position:



This shows that we ~ factor 2 @ the target (Wakam calculates acceptance to be ~ 40%)

Estimated Rates:

Gaussian Method:  $R = \frac{20 \times \sigma_y}{r_{pill}^2} R_{pill} = 2 \times \frac{24.512 \times 22.913 \times 13.133 \text{ k}/10^6 \text{ p}}{1^2}$

$R_{\pi} = 1.48 \cdot 10^7 \pi \cdot RF / 10^6 \text{ p}$

$R_{\pi} = 1.5 \cdot 10^6 \pi \cdot RF / \text{MAS}$  for 6cm Tg  
 $R_{\pi} = 2.7 \cdot 10^6 \pi \cdot RF / \text{s}$  @ 1800 μA & 6cm Tg

Simulation Method:

$R = \frac{1}{R_{p.u}} \cdot \frac{\Delta x \Delta y}{\pi \sigma_x \sigma_y} S_x S_y = \frac{1}{13.133 \text{ k}/10^6 \text{ p}} \times 5 \times 5 \times \frac{147.938 \text{ k}/10^6 \text{ p} \times 151.408 \text{ k}/10^6 \text{ p}}{\pi \cdot 1^2}$

$R \sim 1.4 \cdot 10^7 \pi \cdot RF / 10^6 \text{ p} = 1.4 \cdot 10^7 \pi \cdot RF / \text{MAS}$

$R_{\pi} = 1.4 \cdot 10^6 \pi \cdot RF / \text{MAS}$   
 $R_{\pi} = 2.5 \cdot 10^6 \pi \cdot RF / \text{s}$  @ 1800 μA & 6cm Tg

This is a factor ~ 1.44 more than previous pill scan with 4cm Tg.

This is the factor that was measured after the change from 4cm → 6cm Tg

Conclusion Rates consistent with previous profile measurements

but distribution broader —

Now measurement of profile without degrader & without S1

⇒ Now Remove S1 + all degrader  
 HV pill shell = -570V

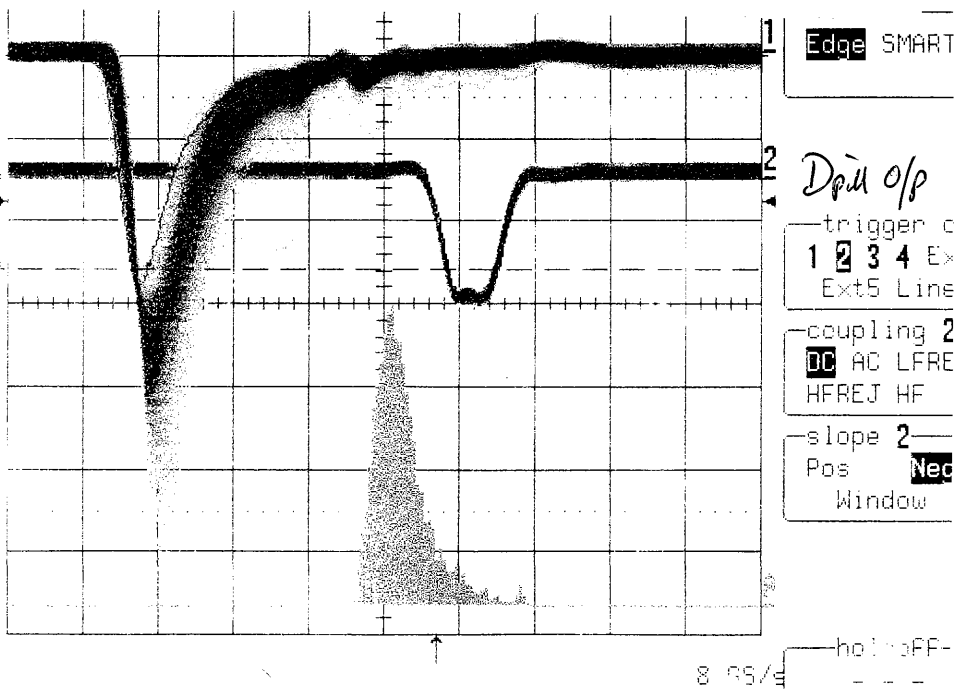
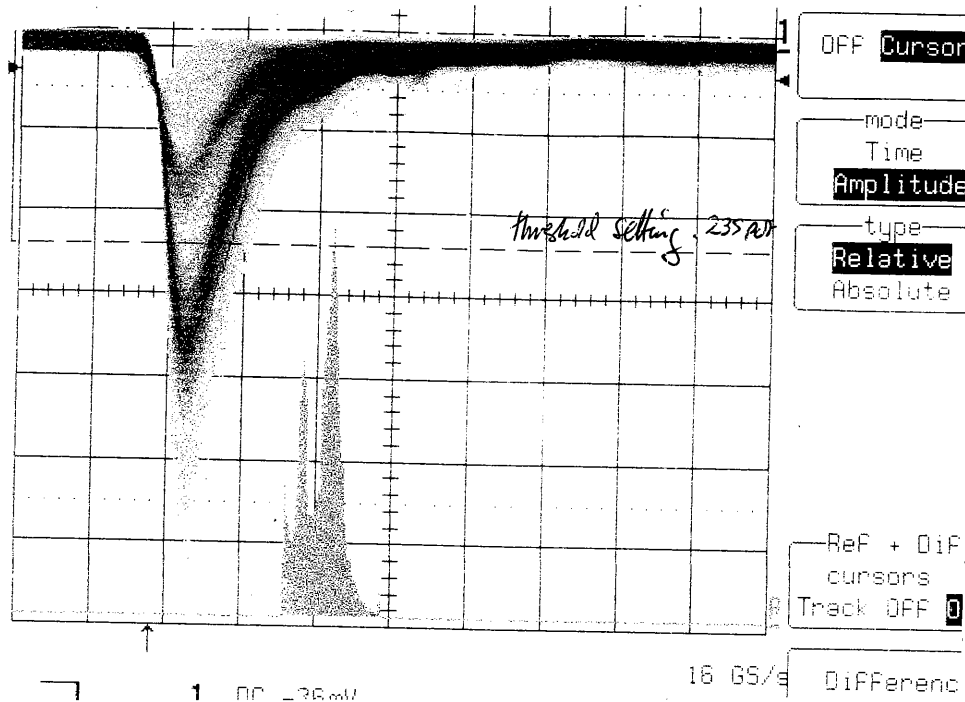
3-Nov-03  
13:01:23

5 ns  
100mV  
-260mV  
-22723 swps

HV = -570V  
Still

S1 + degrader removed

1  
-520 #  
1 V 500  
5 V 500  
1 V 500



Dip threshold with NOS1 + NO degrader = 235mV p/p

Now check S1<sub>ii</sub> RF Coincidence needs 1ns less delay

Rate @ H: 185.8  
V: 189.7 ⇒ 52.94 k/10<sup>6</sup>p in 5.49 sec. @ 1837 μA

Now Vertical Scan:

Position	P.H. RF/10 <sup>6</sup> p
190.0	52.124 k
195.0	47.09 k
200.0	37.78 k
205.0	26.87 k
210.0	15.26 k
215.0	7.45 k
220.0	3.12 k
225.0	1.21 k
185.0	49.46 k
180.0	41.18 k
175.0	30.46 k
170.0	18.28 k
165.0	8.50 k
160.0	3.56 k
155.0	1.42 k
150.0	0.39 k

$\bar{X} = 189.27$   
 $\sigma = 13.21$   
 $\Sigma = 344.1540 \text{ k}/10^6 \text{ p}$

16 pts

Set V: 189.3

Horizontal Scan

Position	P.H. RF/10 <sup>6</sup> p
185.0	51.87 k
180.0	40.84 k
175.0	27.54 k
170.0	15.54 k
165.0	8.34 k
160.0	2.86 k
155.0	0.54 k
190.0	52.17 k
195.0	40.96 k
200.0	23.88 k
205.0	7.89 k
210.0	0.94 k
215.0	0.24 k

$\bar{X} = 187.5 \text{ mm}$   
 $\sigma = 9.534 \text{ mm}$   
 $\Sigma = 273.61 \text{ k}/10^6 \text{ p}$

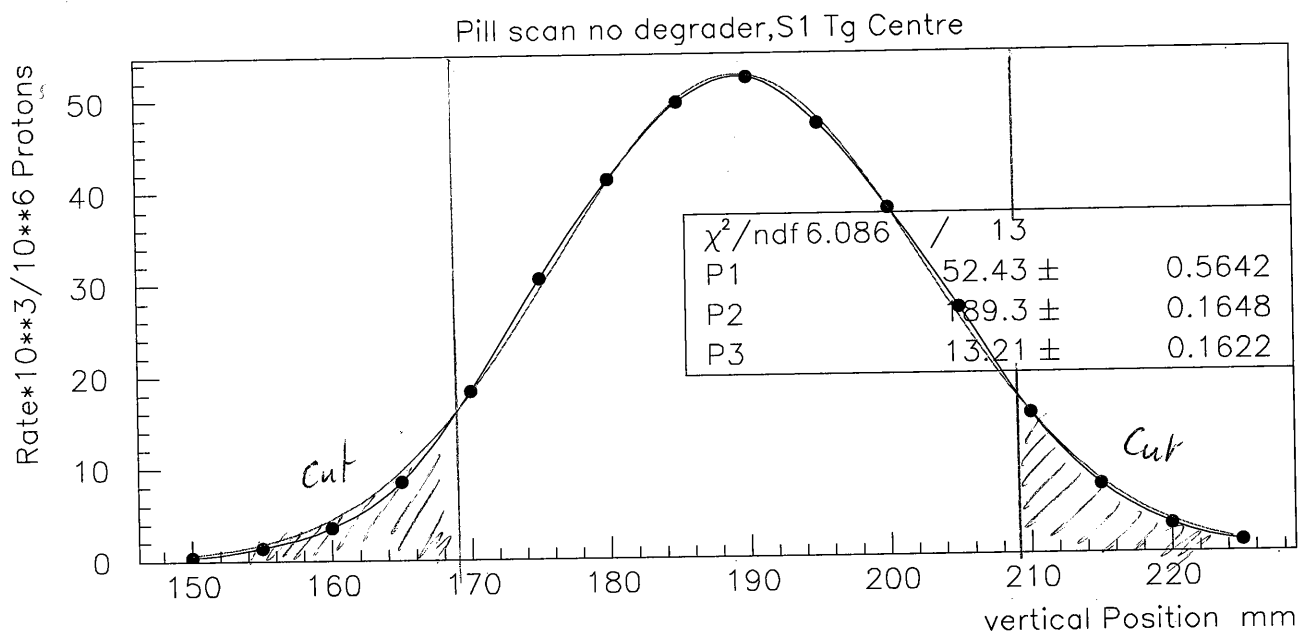
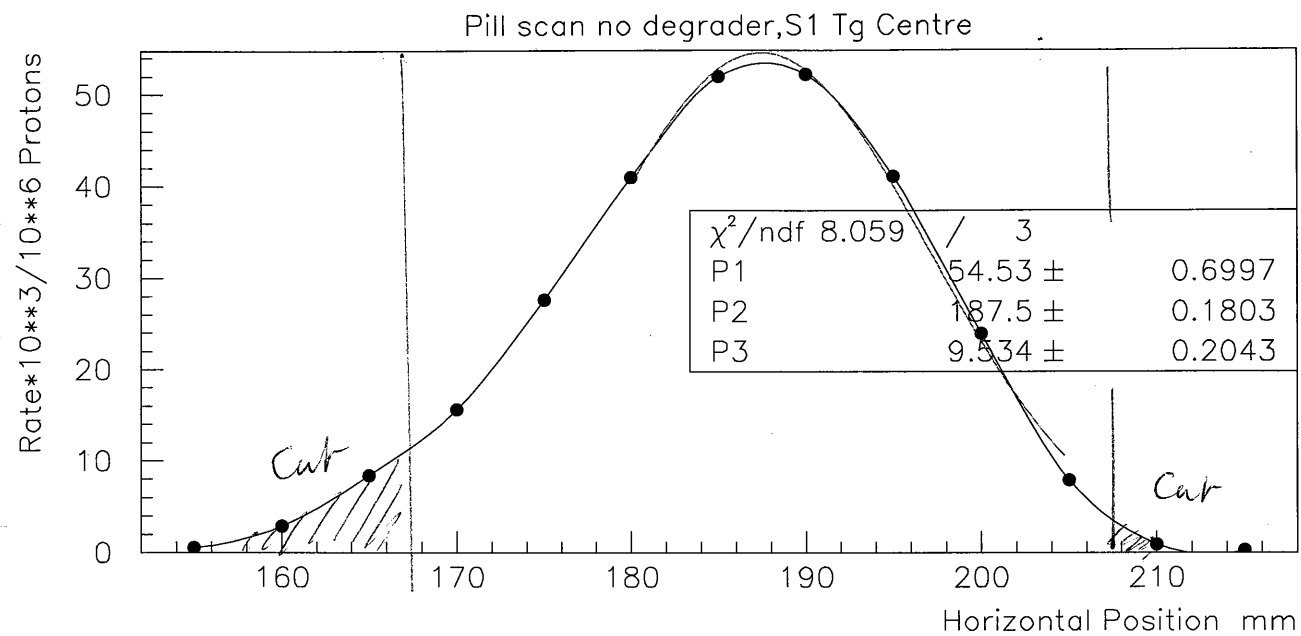
13 pts

Rate @ V: 189.3  
H: 187.5 53.64 k/10<sup>6</sup>p  
thresh 235mV

g.



Measured Profiles No. Degraded ~ S1



Rate check:

Gaussian:  $R \sim 2\sigma \times \sigma_y \times R_{\text{pill}} = 2 \times 9.534 \times 13.21 \times 53.64 \text{ k} / 10^6 \text{ p}$

$R \sim 1.35 \cdot 10^7 / 10^6 \text{ p} \approx 1.35 \cdot 10^6 \pi \cdot \text{RF} / \text{MAS}$

$R_{\pi} \sim 1.4 \cdot 10^6 \pi \cdot \text{RF} / \text{MAS} \text{ @ } 6 \text{ cm Tg}$

OK

So it 23<sup>05</sup> I call it a day & abandon Dip will continue tomorrow

Nov. 4 '03

0:15

Pill counter moved forward by 7cm from LHz target center.

$Z_0 = 70 \text{ mm}$

WO, Shuei, HN

Vertical scan @ Horizontal = 187.5

position	PM-RF / 10 <sup>6</sup> p
190.0	93.876 k
185.0	100.433 k
180.0	58.324 k
175.1	24.146 k
169.9	7.142 k
165.0	2.037 k
160.0	0.409 k
195.0	52.931 k
200.1	20.94 k
205.0	7.07 k
210.0	2.01 k
215.0	0.41 k
192.0	78.2 k
188.0	105.0 k
183.0	84.1

$\bar{x} = 187.1$

$\sigma = 6.97$

$\Sigma =$

horizontal scan @ vertical = 187.1

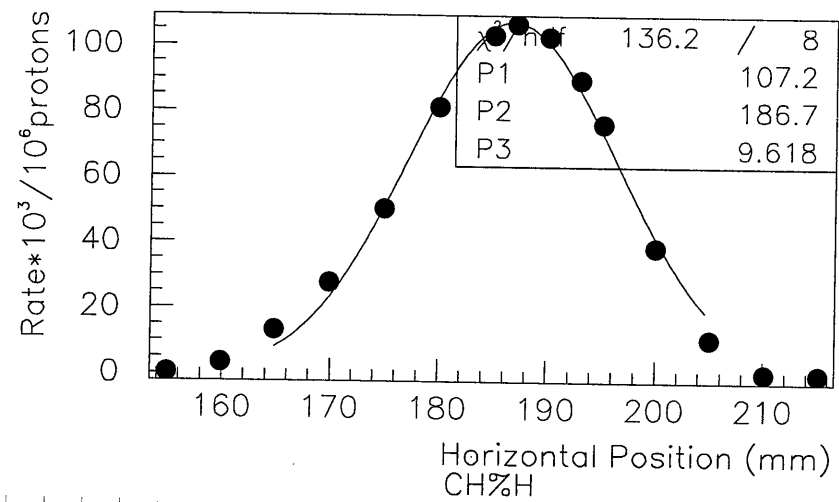
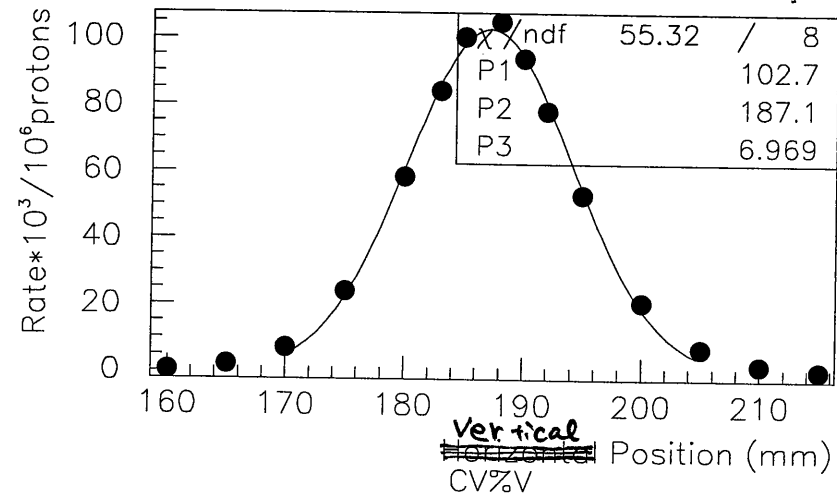
190.1	102.7 k
195.1	76.2 k
200.0	38.6 k
205.0	10.1 k
210.1	0.49 k
215.1	0.25 k
185.0	103.1 k
180.0	81.2 k
174.9	50.2 k
170.0	27.7 k
164.9	13.2 k
159.9	3.34 k
155.0	0.36 k
187.1	106.5 k
193.0	89.6 k

$\bar{x} = 186.7$

$\sigma = 9.62$

3-Nov-2003

Z<sub>0</sub> = 70 mm



Rate check

Gaussian:  $R \sim \frac{2 \cdot \sigma_z \cdot \sigma_y \cdot P_{\text{fill}}}{r_{\text{fill}}^2} = \frac{2 \times 6.969 \times 9.618 \times 107.2 \text{ k}/10^6}{1^2}$   
 $= 1.44 \times 10^7 / 10^6 = 1.44 \cdot 10^6 \text{ RF}/\text{mA}$   
 (OK)

3-Nov-2003

1:00 Pill counter moved backward by 6 cm from LHz target center

vertical scan @ horizontal = 187.5

pos.	P.M. RF/10 <sup>6</sup> p	pos	P.M. RF/10 <sup>6</sup> p
190.0	34.2 k	185.0	33.3 k
194.9	33.1 k	180.1	30.5
200.1	29.4 k	175.1	25.9
205.0	24.9 k	170.0	20.7
209.9	20.0 k	164.9	14.8
214.9	13.5 k	159.9	<del>8.8</del> 8.84
219.9	8.13 k	155.0	4.46
224.9	4.12 k	150.0	2.18
230.0	2.04 k	145.0	1.01
235.1	0.92 k	140.1	0.36
240.1	0.31 k		

(21th)

$\bar{x} = 189.5 \text{ mm}$   
 $\sigma = 18.17$   
 $\quad 18.645 \text{ mm}$   
 $\Sigma = 312.72 \text{ k}/10^6 \text{ p}$

horizontal scan @ vertical = 189.5

pos	P.M. RF/10 <sup>6</sup> p (k)	pos
190.0	33.9	185.0
195.1	27.6	
200.0	17.4	
205.0	7.46	
210.1	1.53	
214.9	0.24	

1:20 ~ beam down.

beam does not back, start to take CR data.

7:32	#5899	pedestal	beam off	beam <del>was</del> not off.
7:34	#5900	LED (1x5)	beam off	
7:42	#5901	LED (3x7)	beam off	
7:53	#5902	α	beam off	
8:02	#5903	CR	beam off	
10:26	#5904	Junk.	30000 events	beam was down and CR data is contaminated by beam events.
10:30		beam shutter closed		
10:37	#5905	CR stopped	beam off. No target. on 10:56 for RASTAUS test.	

14:50 Area closed again beam intensity reduced ~ 800 pA because of unstable operation - though beam still unstable

⇒ Continue divergence scan of last night position = 60 mm downstream of beam of Tg. cell centre  $Z_0 + 60$  mm

Horizontal Scan (V: 189.5)

threshold checked 235 mV (pp)

Position	Rate * RF / 10 <sup>6</sup> p
190.0	34.57 k
195.0	29.48 k
200.0	19.68 k
205.0	8.76 k
210.0	1.89 k
215.0	0.28 k
185.0	32.61 k
180.0	25.16 k
175.0	16.32 k
170.0	9.61 k
165.0	4.90 k
160.0	1.87 k
155.0	0.50 k

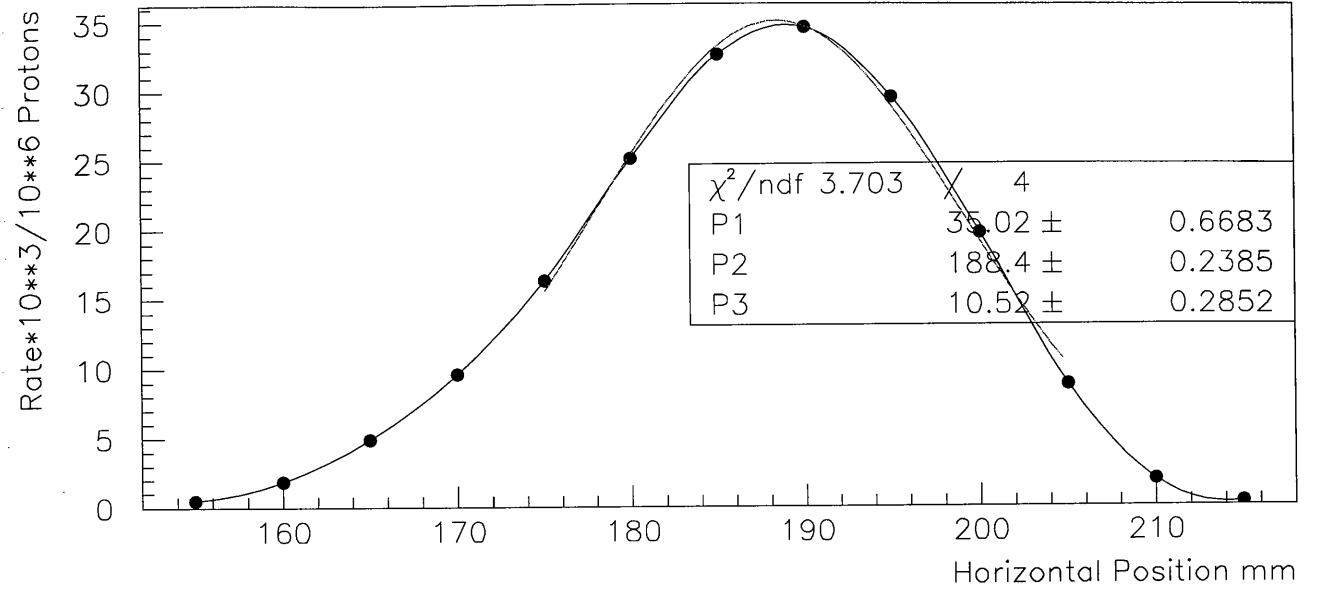
beam ~ 1220 pA

60 mm DS Tg Centre  
 $Z_0 + 60$  mm

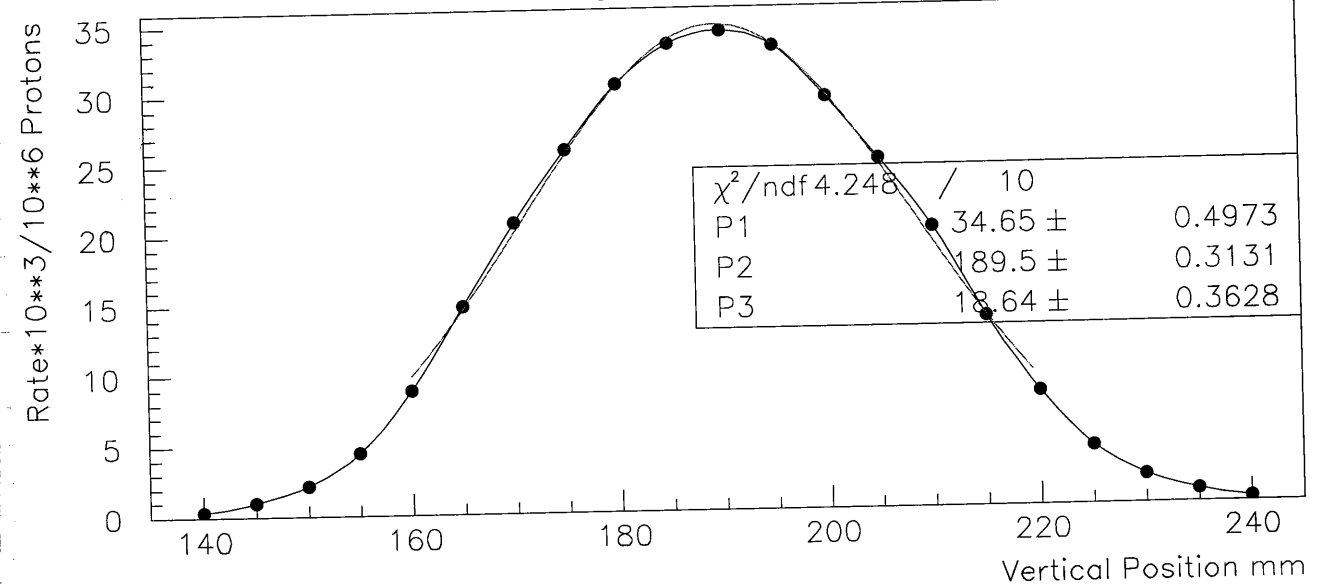
$\bar{X} = 188.4$  mm  
 $\sigma = 10.525$  mm  
 $\bar{I} = 185.63$  k / 10<sup>6</sup> p

Rate @ H: 188.4  
V: 189.5  
33.68 k / 10<sup>6</sup> p  
in 5.79 sec  
1750 pA

Divergence Test  $Z_0 + 60$  mm



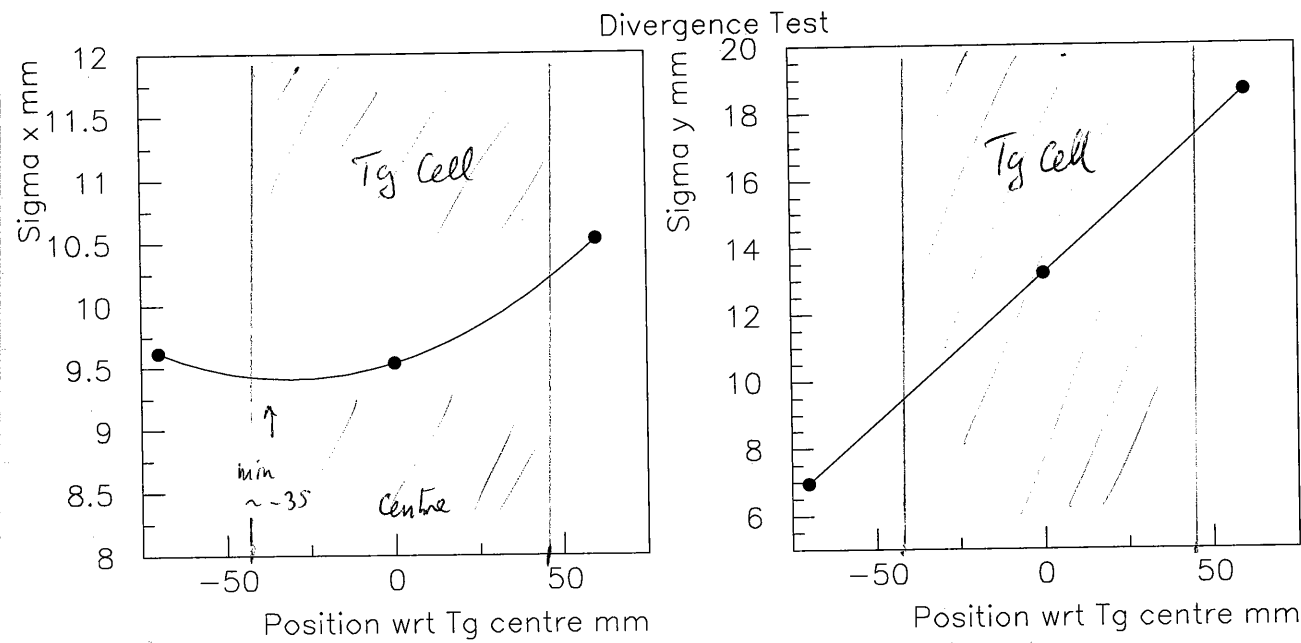
Divergence Test  $Z_0 + 60$  mm



Divergencies:

$Z_0 = \text{Target Cell Centre}$

Position	$\sigma_x$	$\sigma_y$	$\bar{x}$	$\bar{y}$
$Z_0 - 70$ mm	9.62	6.97	186.7	187.1
$Z_0$	9.53	13.21	187.5	189.3
$Z_0 + 60$ mm	10.52	18.64	188.4	189.5



Conclusion: X & Y foci not @ same Z-position i.e. Not a true "Waist"  
 Horizontal focus ~ 35 mm US of Tg Centre which is OK  
 Vertical focus > 70 mm US of Tg Centre → Could improve ???

Next Move Pill to Centre target position Re-optimize

Pill move to "Z<sub>0</sub>" Centre of target Cell position

Meg 111 p/s/g. Set — Magnet Settings

QSL53 = -558

QSL54 = 847

Pill moved to Scanner position

V: 189.3

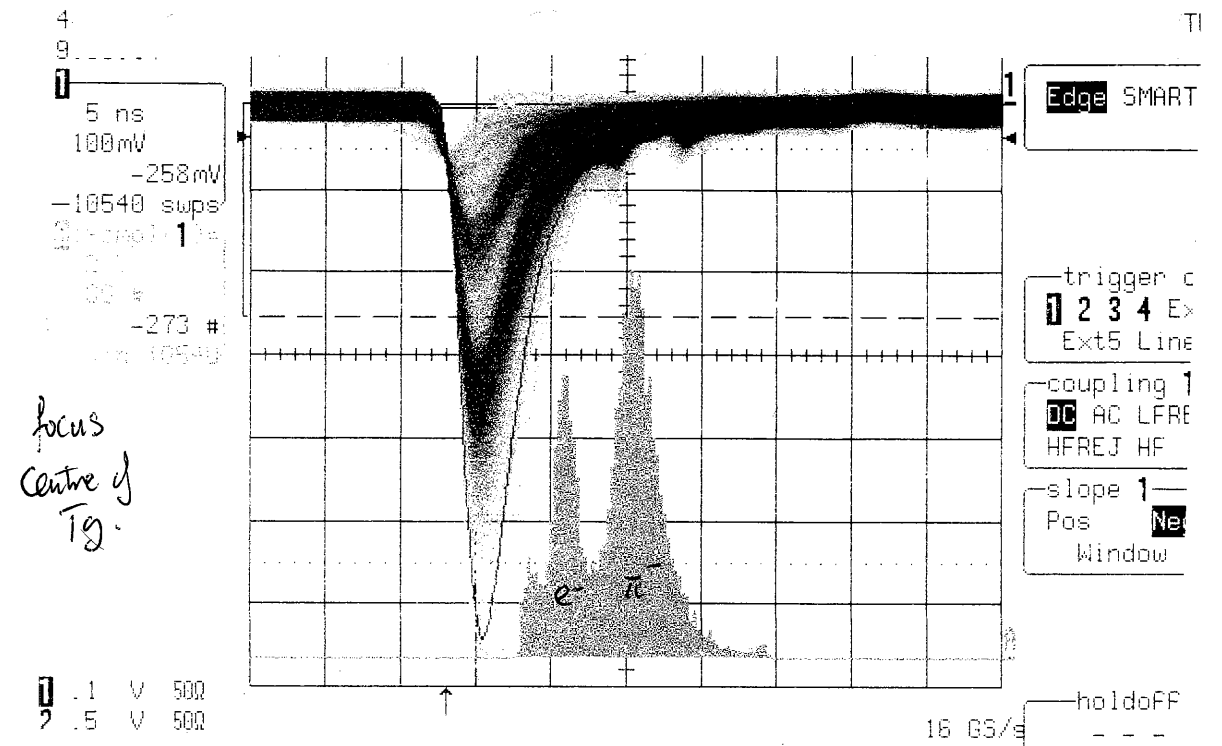
H: 187.5

initial Rate ~ 5150 / 10<sup>5</sup> p S1<sub>π</sub> · RF

Rate after optimization 15.7 k / 10<sup>5</sup> p S1<sub>π</sub> · RF

New Values <sup>new jvc</sup> QSL 53 = 543  
 QSL 54 = 778 } focus Centre Tg

ASL Value re-confirmed



Now Scan without Degradation S1

H: 187.5

Vertical Scan:

Position	Pill · RF / 10 <sup>6</sup> p
190.0	134.7 k
192.0	77.15 k
194.0	32.38 k
196.0	9.69 k
198.0	2.98 k
200.0	1.15 k
202.0	0.62 k
188.0	151.58 k
186.0	108.04 k
184.0	47.01 k
182.0	16.68 k
180.0	4.81 k
178.0	1.50 k
176.0	0.77 k

$\bar{X} = 188.5$   
 $\sigma = 3.034$   
 $\sum 589.0601 \text{ k} / 10^6 \text{ p}$

Set V = 188.5

Horizontal Scan:

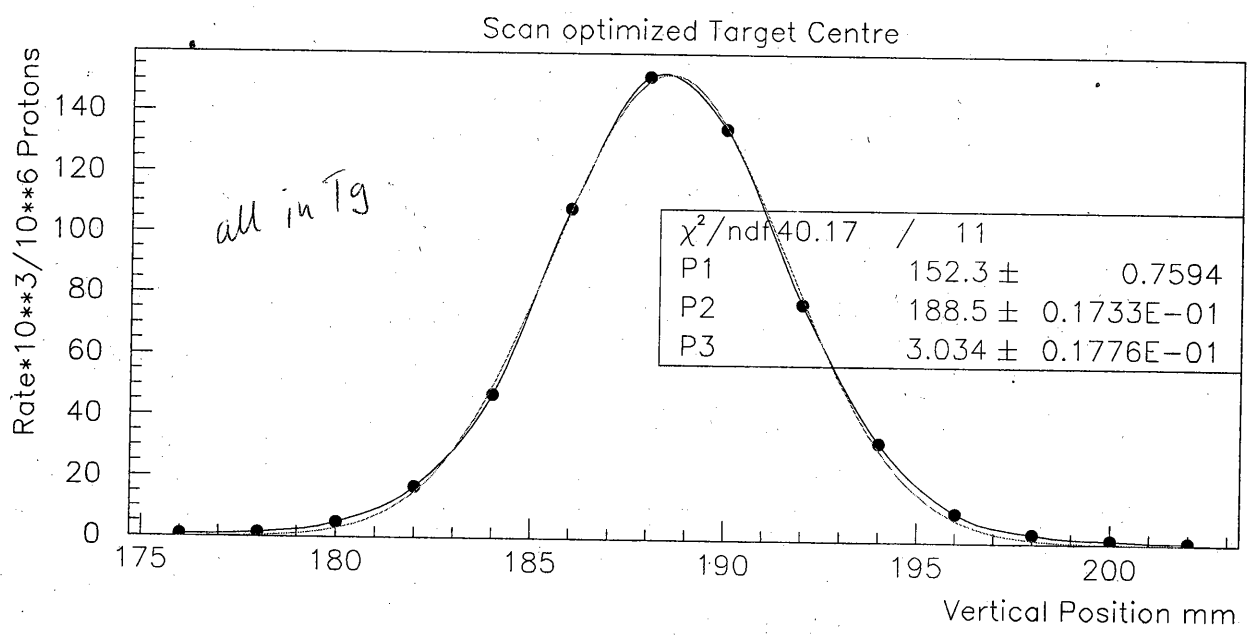
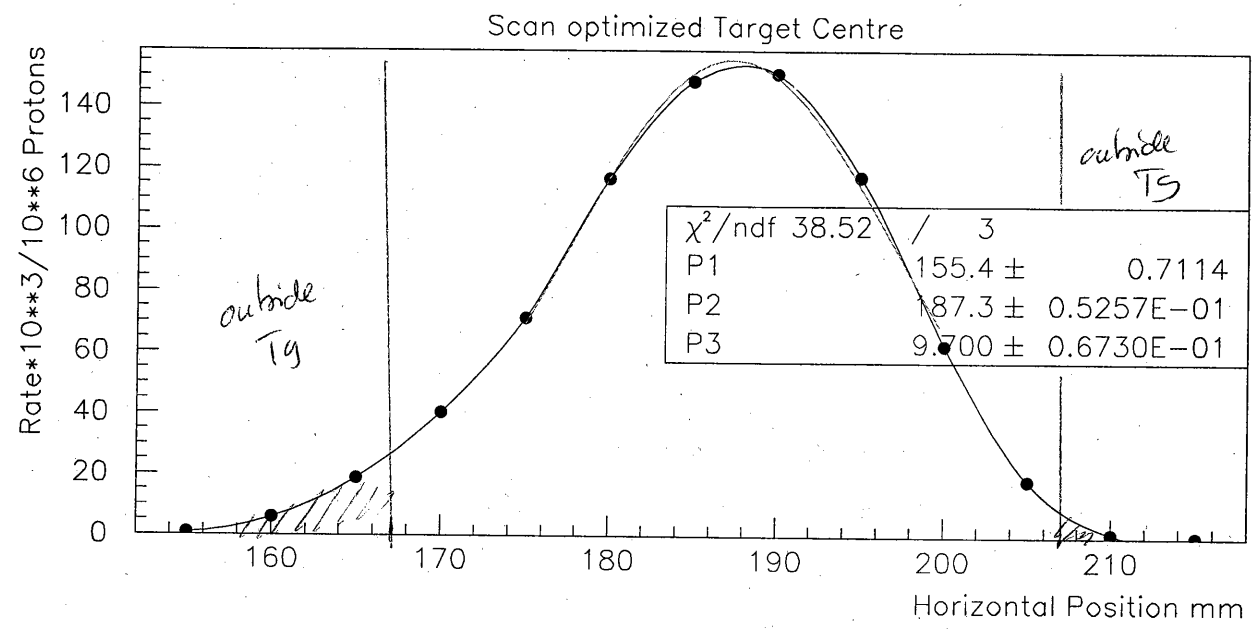
Position	Pill · RF / 10 <sup>6</sup> p
185.0	148.16 k
180.0	116.40 k
175.0	71.09 k
170.0	40.37 k
165.0	18.70 k
160.0	5.79 k
155.0	0.83 k
190.0	150.84 k
195.0	117.14 k
200.0	62.52 k
205.0	18.30 k
210.0	1.26 k
215.0	0.22 k

$\bar{X} = 187.3$   
 $\sigma = 9.70$   
 $\sum 751.62 \text{ k} / 10^6 \text{ p}$

13 pb

Rate @ Optimum V: 188.5  
 H: 187.3, Z<sub>0</sub> 154.43 k/10<sup>6</sup>p  
 in 5.65 Secs ~ 1800 μm

Profiles @ Z<sub>0</sub> No Degraders



S1 RF Coinc adjusted 0.5us taken out 18 → 17.5

Vertical Scan Deg+S1 Z<sub>0</sub>

HORIZONTAL Scan Deg+S1 Z<sub>0</sub>

H: 187.3

position	Pin RF/10 <sup>6</sup> p
190.0	9.83k
195.0	9.38k
200.0	8.52k
205.0	7.02k
210.0	5.49k
215.0	4.12k
220.0	2.98k
225.0	1.95k
230.0	1.33k
235.0	0.89k
240.0	0.53k
245.0	0.32k

Set V = 188.8

position	Pin RF/10 <sup>6</sup> p
185.0	9.96k
190.0	9.77k
195.0	9.19k
200.0	8.24k
205.0	6.88k
210.0	5.36k
215.0	4.11k
220.0	3.00k
225.0	2.10k
230.0	1.35k
235.0	0.86k
240.0	0.61k

23pts

185.0	9.86k
180.0	8.92k
175.0	7.66k
170.0	6.22k
165.0	4.74k
160.0	3.49k
155.0	2.43k
150.0	1.61k
145.0	1.04k
140.0	0.68k
135.0	0.43k

23pts

180.0	9.52k
175.0	8.77k
170.0	7.75k
165.0	6.14k
160.0	5.04k
155.0	3.77k
150.0	2.70k
145.0	1.97k
140.0	1.35k
135.0	0.89k
130.0	0.55k

$\bar{x} = 188.8$   
 $\sigma = 20.14$   
 $\Sigma 99.43999 \text{ k}/10^6 \text{ p}$

$\bar{x} = 185.9$   
 $\sigma = 22.24$   
 $\Sigma 109.88 \text{ k}/10^6 \text{ p}$

Rate @ optimum H: 185.9  
 V: 188.8  
 10.01 k/10<sup>6</sup>p

Replace degrader + S1

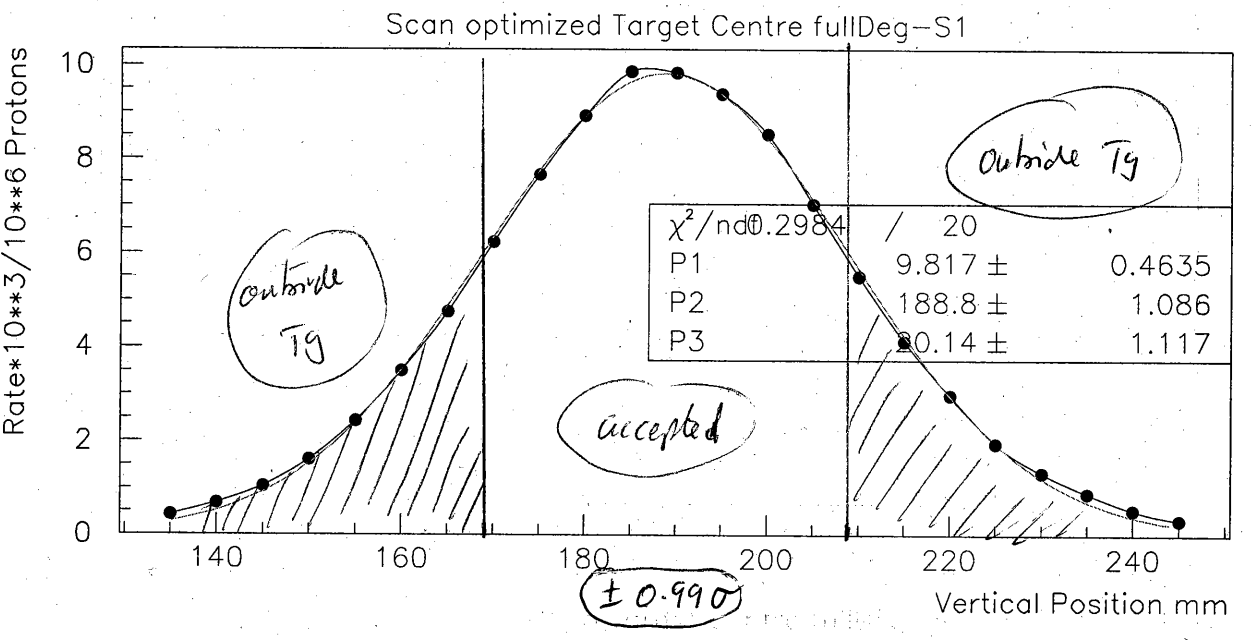
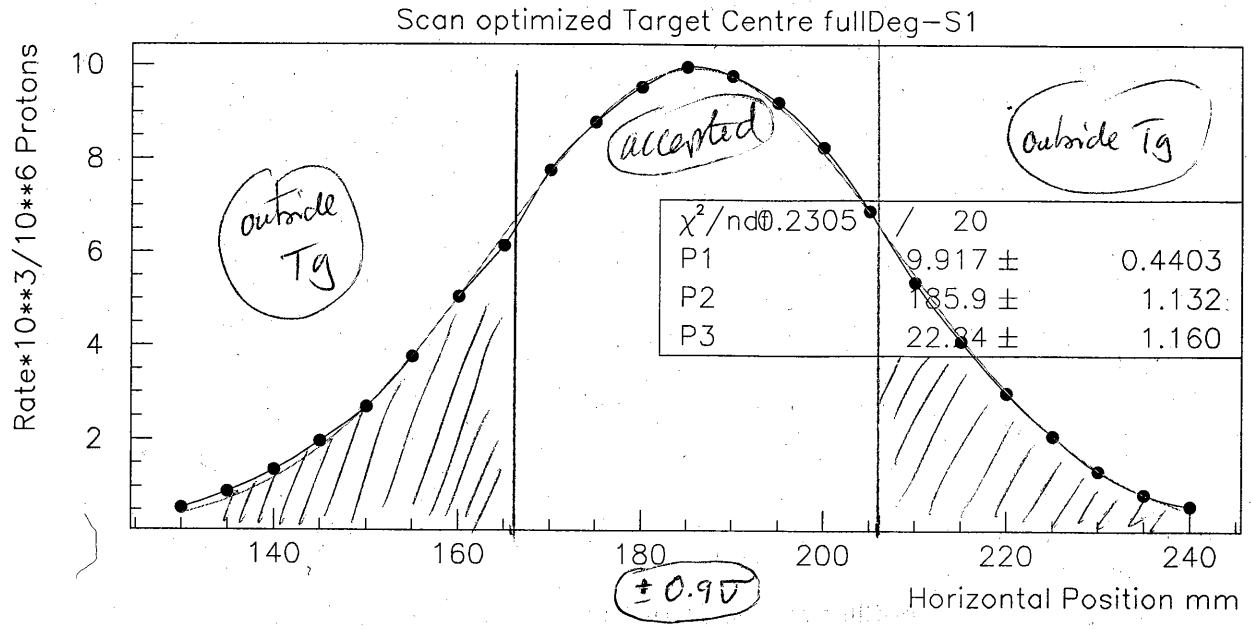
Drift time = 500 mV (out) with Degraders + S1

$R_{\pi} \sim 9.1 \cdot 10^5 / \text{m/s}$

Gaussian

$$R_{\pi} \sim \frac{2 \times \sigma_x \times \sigma_y \times R_{pin}}{r_{pin}^2} = \frac{2 \times 9.7 \times 3.034 \times 154.43 \text{ k}/10^6 \text{ p}}{1^2} = 9.1 \cdot 10^6 / 10^6 \text{ p} \quad \text{LOW!!!}$$

Zo profiles with full Degrador + S1



Gaussian:  $R = \frac{2\sigma \times \sigma_y R_{p11}}{r_{p11}} = \frac{2 \times 22.24 \times 20.14 \times 10^{-01} k / 10^6 p}{12} = 9.0 \cdot 10^6 / 10^6 p$

$R_T \sim 9 \cdot 10^5 / MAS$  Low !!!

but consistent with No degrader measurement

- (A)  $\gamma$ -focus: Focus close upstream End of Tg Cell  
dominating effect ~~multiple scattering~~ MULTIPLE SCATTERING
- (B) Zo-focus: Qsc S3/S4 weaker focus pushed forwards Tg Cell Centre  
dominating effect VERTICAL DIVERGENCE

Conclusion: Zo-focus absolute Rates lower ~ factor 1.4  
Tg acceptance ~ same (slightly better but ...)

Now try if optimizing with degrader + S1 in place alters Spot size:

Result of this optimization  $pill \cdot RF / 10^6 p = 17.70 k$

file May 111 pi2 phi deg. set

VERSION B

Now see if profile smaller & rate OK

Vertical Scan H: 185.9

HORIZONTAL SCAN v = 189.0

pos	pill RF / 10 <sup>6</sup> p
190.0	17.34 k
195.0	16.65 k
200.0	15.18 k
205.0	12.99 k
210.0	10.41 k
215.0	8.05 k
220.0	6.00 k
225.0	4.23 k
230.0	2.88 k
235.0	1.93 k
240.0	1.24 k
245.0	0.84 k
250.0	0.56 k
255.0	0.35 k
185.0	17.16 k
180.0	15.96 k
175.0	13.87 k
170.0	11.17 k
165.0	9.08 k
160.0	6.76 k
155.0	4.96 k
150.0	3.49 k
145.0	2.32 k
140.0	1.59 k
135.0	1.08 k
130.0	0.71 k
125.0	0.46 k

pos	pill RF / 10 <sup>6</sup> p
185.0	17.56 k
190.0	17.14 k
200.0	13.76 k
210.0	8.85 k
220.0	4.85 k
230.0	2.16 k
240.0	0.82 k
250.0	0.40 k
180.0	16.80 k
170.0	13.96 k
160.0	9.33 k
150.0	5.18 k
140.0	2.53 k
130.0	1.03 k
120.0	0.43 k

$\bar{x} = 184.6$   
 $\sigma = 22.256$   
 $\Sigma 97.24 k / 10^6 p$

Rate @ Minimum  $17.20 k / 10^6 p$   
in 5.59 sec @ 1816  $\mu A$

$\bar{x} = 189.0$   
 $\sigma = 21.496$   
 $\Sigma 187.26 k / 10^6 p$

$R = \frac{2\sigma \times \sigma_y R_{p11}}{r_{p11}} = \frac{2 \times 22.256 \times 21.496 \times 17.2 k / 10^6 p}{12}$   
 $R = 1.65 \cdot 10^7 / 10^6 p$   
 $R = 1.65 \cdot 10^6 / MAS$

Have regained Rate for  $Z_0$  optimization with degrades though beam spot @  $T_g$  unaltered in size

Possibility  
B

B Meg 111  $\pi^+ \phi$  deg. set

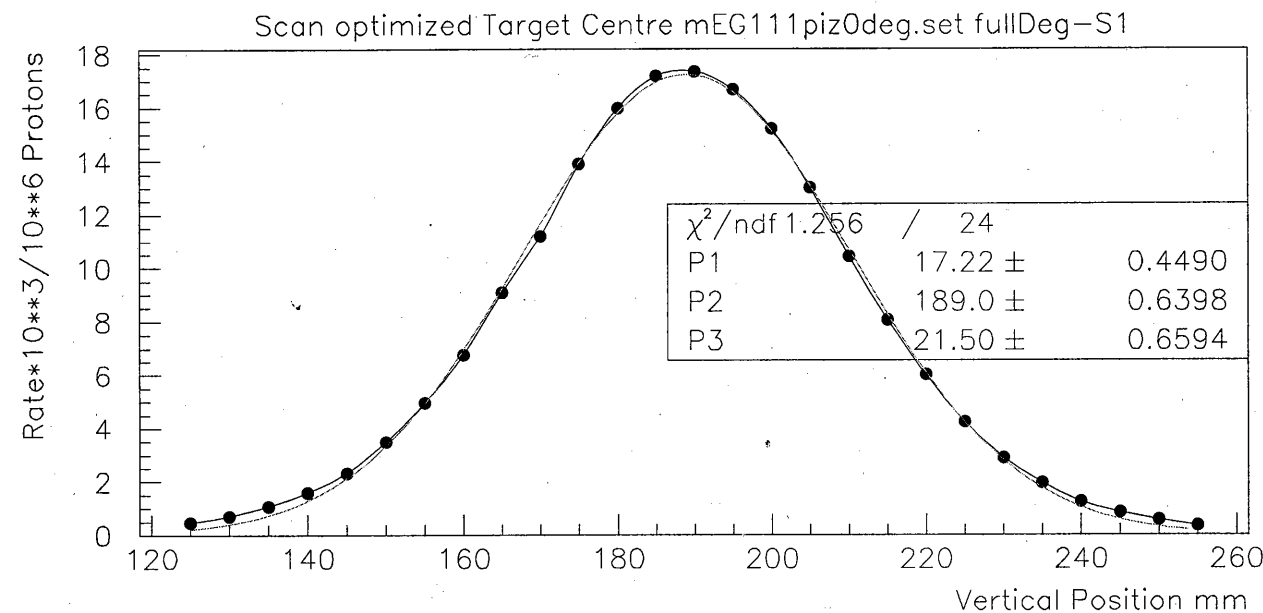
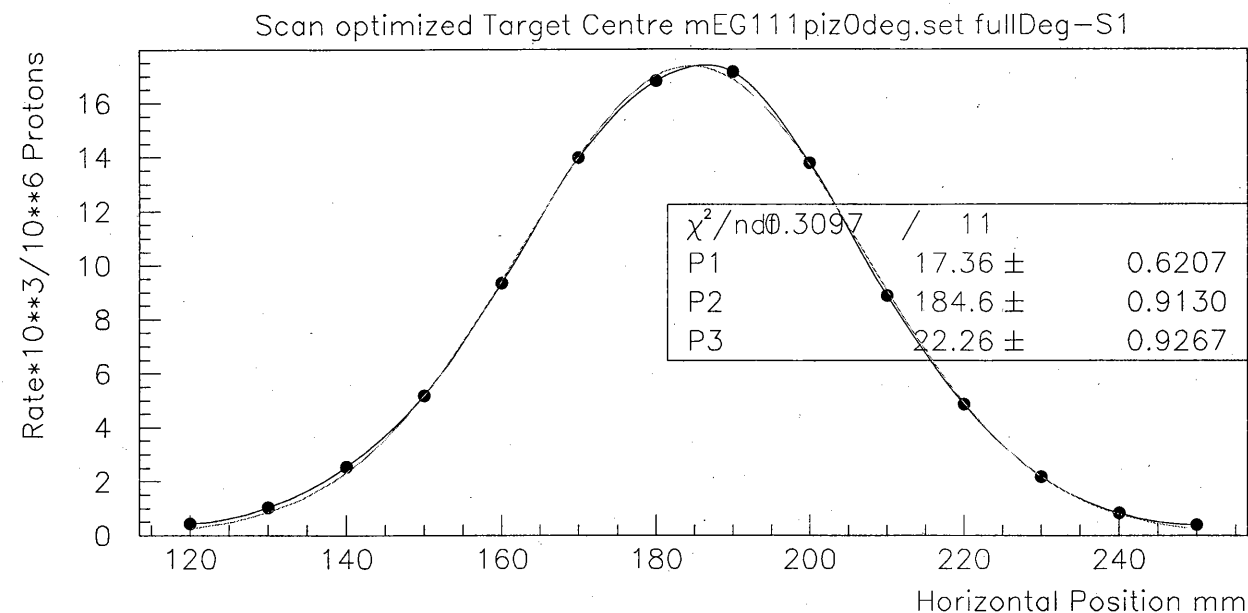
Actual Settings -- Wed Nov 05 00:42:40 2003

Device	DAC	ADC	Scaling
QTH51	1282	0.3099	1.0
QTH52	-652	-0.1563	1.0
QTH53	0	0.0000	1.0
ASZ51	-2755	-0.2020	0.3
QTB51	583	0.1409	1.0
QTB52	-395	-0.0938	1.0
ASY51	-685	-0.1641	1.0
QSL51	-478	-0.1179	1.0
QSL52	922	0.2247	1.0
ASL51	-11478	-0.1731	1.0
QSL53	-536	-0.1302	1.0
QSL54	827	0.1990	1.0
SSL51	0	0.0000	1.0
SSK51	0	0.0000	1.0
FSH51	110	0.2755	4.1
FSH52	350	0.3502	4.1
DSC51	0	0.0574	4.1
DSC52	370	0.3636	4.1
FS53-O	500	0.4989	4.1
FS53-U	500	0.4991	4.1
FS53-L	100	0.1001	4.1
FS53-R	100	0.1001	4.1

ETHER

VERSION B optimized values

Focus  $Z_0$



OR

VERSION A Old Settings Meg 111  $\pi^+ \phi$  deg. set focus US of  $T_g$

connection of some ADC channels are loose

11:27	#5906	FB tac test	have two peaks
17:55	#5907	pedestal	#75, 76, 238 wide DS
17:57	#5908	LED (1&5)	ADC 48-63, 65-74, 77-79, 81, 82, 84, 85, 172, 204 off.
18:04	#5909	LED (3&7)	
18:10	#5910	$\alpha$	
18:16	#5911	CR	

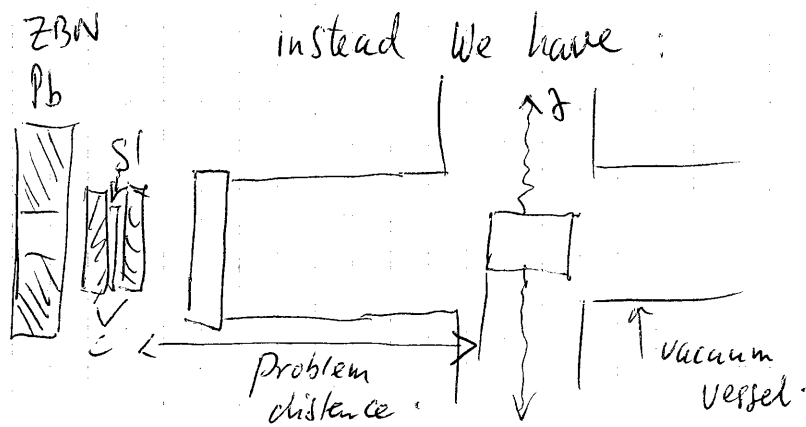
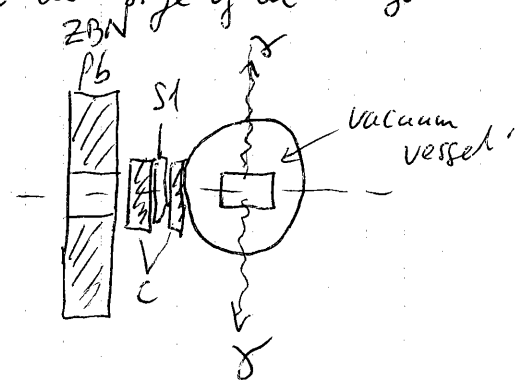


Wed 02<sup>10</sup> Conclusion of today's Studies:

- (i) All optimization attempts produce similar spot-sizes @ the target, although for different reasons  
 either (a) Multiple Scattering dominates  
 or (b) Vertical divergence dominates  
 but both give same final results

So we have to live with that — the reason we cannot simply change the situation is due to the size of the target vacuum vessel ideally we wanted

focus v. close to degrader & target as close as possible to degrader



So suggestion how to go on:

- (i) We have 2 optics solns → (A)  $\delta$ -focus Meg 11 pi Stg. set  
 → (B)  $Z_0$ -focus Meg 11 pi Zpdeg. set

they both give similar size distributions @ Tg.

- (ii) Fill LH<sub>2</sub> target today Wednesday.  
 (iii) Set version (A) and with St<sub>π</sub>-RF- $\delta$  (NaI)

optimize i.e. close Pb-wall slits (ZBN) until 5 Nov 2003

St<sub>π</sub>-RF- $\delta$  rate starts to change → this way we cut away the  $\pi^-$  that miss the target & produce background our good event-rate should stay same until slits cut away good  $\pi^-$  entering LH<sub>2</sub>

- (iv) With same slit settings compare version (B)

Closed Beam block

0230 Abandon Ship

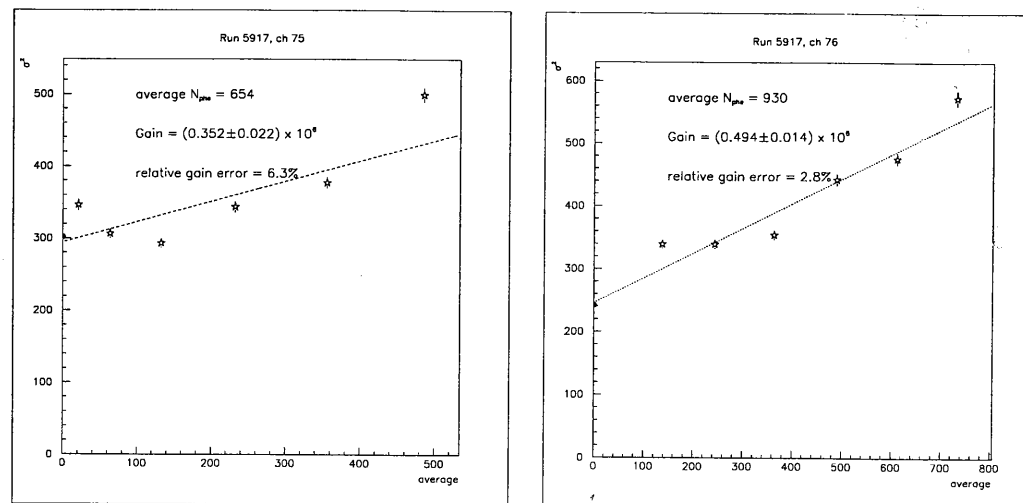
2:38	#5911	stopped (8hrs)	ADC # <del>75</del> 76   15, 14, 9
2:39	#5912	pedestal	
2:41	#5913	LED (3 & 7)	HV error.
2:48	#5914	LED (1 & 5)	do not use.
2:53	#5915	alpha	
3:15	#5916	pedestal	Extremely broad peak.
3:29	#5917	LED (1 & 5)	ADC# 95 17.8 ch
3:40	#5918	LED (3 & 7)	76 15.6 ch
3:56	#5919	$\alpha$	238 8.9 ch
4:14	#5920	CR	ADC ch 204 off?

some ADC channels are unplugged / loose

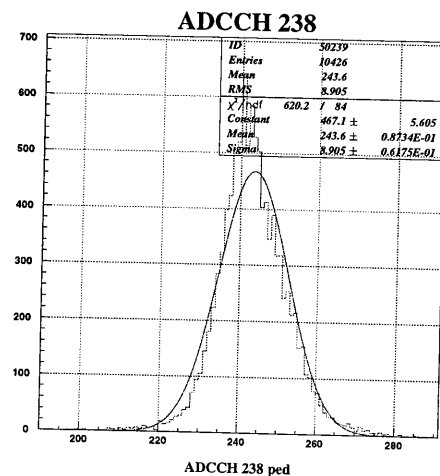
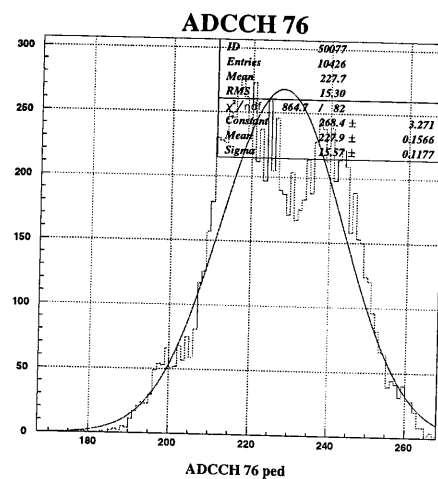
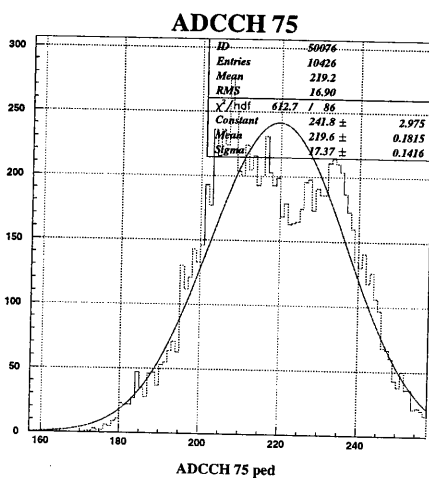
② suggestion from PRK: put degraders inside vacuum chamber, close to the upstream of the target cell, to minimize the beam spot size...

~~17:45 the fo~~

found strange behaviour during LED run:



pedestals



ADC 75 & 76 ARE ON THE SAME MINICARD. → WE HAVE TO REPLACE!

No ~~any~~ signal in ADC # 48-63, 65-74, 77-79, 81, 82, 84, 85  
 61, 172, 204. : switched off.

ADC input connectors was loose → plugged in

Since when? → after #5903

Except 61, 172, 204, all are ok now 8:00. SM

7:10 HV #13-4 tripped.

7:13 #5921 CR. Suppl. at 8:24 14405 events.

Beam will be off today from 8:00 to 22:00. And production starts at 0:00 tomorrow (24:00 Today).

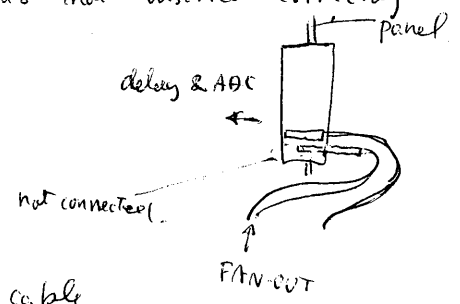
Plan for today.

- ✓ o Fix up noisy ADC channels ADC 75 & 76. (replace mini-card?)
- ✓ o Investigate BK31 ADC (No signal in #5921). F20 TPC reported by BS
- ✓ o Remove the pill counter
- ✓ o Install the target in to the place & alignment.
- ✓ o Fill the target.
- ✓ o Fetch some scotch tapes.
- ✓ o Regenerate the cold head?

Refrigerator  
 Previous regeneration was done 4 days ago at the level of heater power = 6. Current heater power is around 9.0%, while it was recovered to 23.4% after previous regeneration.

- o Fetch VME crate from the cellar under the guest house
- o Fix up noisy ADC channels  
 Now they are quiet, possibly fixed when the unstable connector was plugged in as written in the previous page.

- o BK31  
 Found that bundle pin on the panel was not inserted correctly. The pin was pushed from backside. Now we can see the signal.



- o F20 TPC  
 Fixed by unplugging & plugging the cable on the TPC board.

SM

5/Nov/2003

Beam Off Circulation Off

9:51

RUN # 5922

Pedestal

9:53

RUN # 5923

LED

387

9:59

RUN # 5924

LED

185

10:04

RUN # 5925

d.

10:30

Pill counter is removed

10:35

Cold head regeneration started.

Set temperature = 270K

~~10:45~~

Pressure range 0.132 ~ 0.136 MPa

0.115 ~ 0.120 MPa

for quick stabilization later

10:45

Cold head temperature reached 270K

Liq N2 control is ok. I will leave it for 30 minutes.

11:07

switched off all channels for cabling of Timing Counter

11:05

Compressor on. Set temperature 170K

1

Pressure range restored to 0.132 ~ 0.136 MPa

11:45

Cold head temperature reached 170K

heating power 44.7%!!!!

No !!!!!

We have to wait for several days for PMT stabilization if you switch off all! Anyway all high voltage setting was restored at 14:00. Please monitor

PMT gain carefully after this.

### Target alignment

In principle aligned again to reproduce the setting done on 30/Oct/03

- Chamber is placed on the beam line within an accuracy < 2mm. (aligned by using the laser)
- Z position is set so that distance between Pb wall and the Kapton window can be 92mm. (±0.5mm)
- Target center height is adjusted to be 4505mm (±1mm) at front and back

SM

15:55 Run # 5926 pedestal beam off, circulation off.

15:59 Run # 5927 LED (185)

16:05 Run # 5928 LED (387)

16:11 Run # 5929 alpha

16:16 Run # 5930 CR

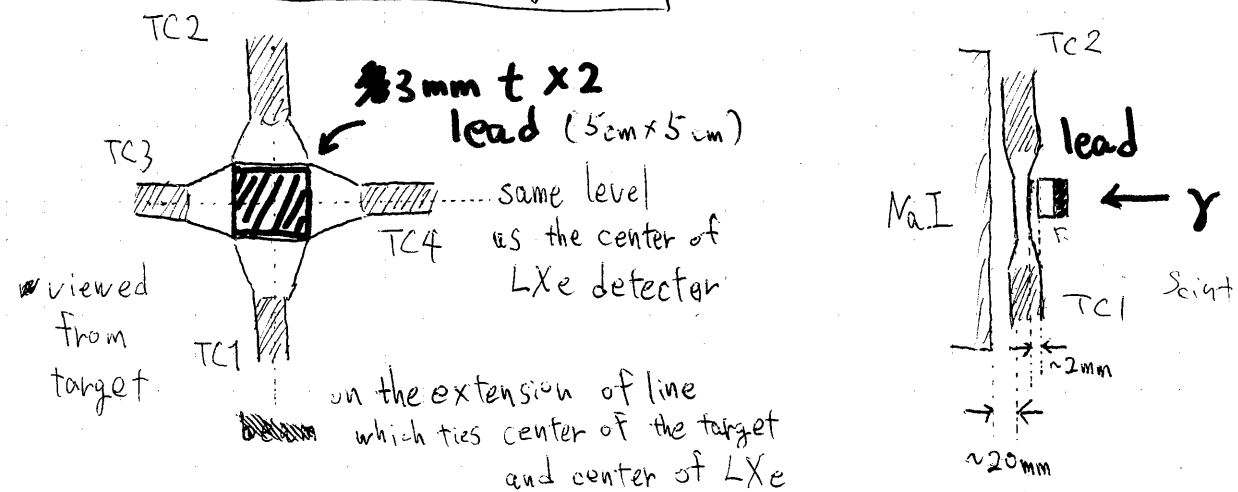
~12:00 Beam comes back.

We are waiting for that Beam current becomes stable.

moved online data to E:/030927\_0312\_PST

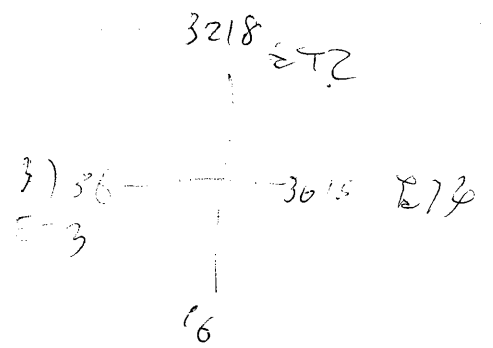
Some files in

### Timing counter alignment

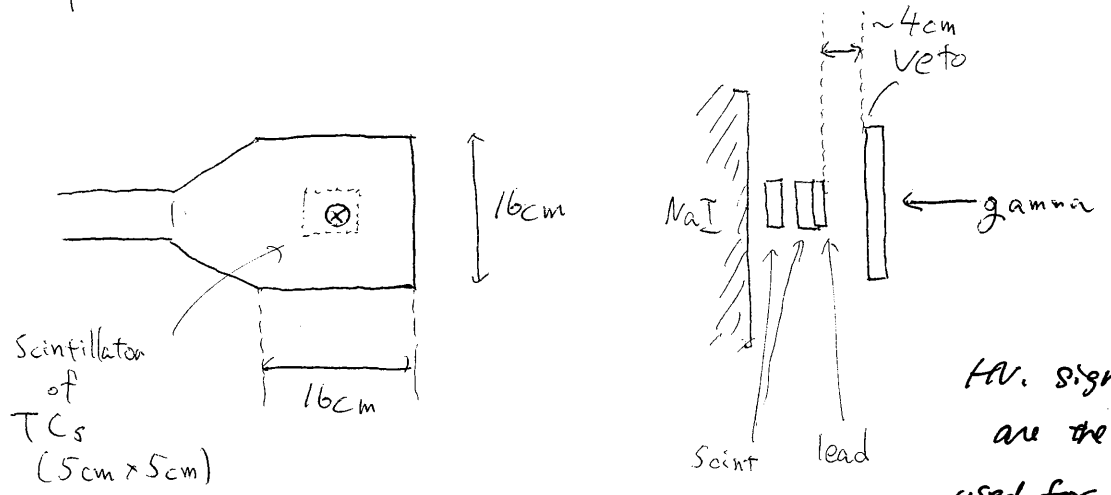


PUT serial No.

CA3116 : TC1  
 CA3218 : TC2  
 CA3015 : TC4  
 CA3136 : TC3



put veto counter before TCs



HV. signal cables  
 are the same ones  
 used for previous  
 veto counters.

back up c:/online/scfe to c:/online/src\_script\_backup/031105.scfe  
 changed channel number of LRS1455 from 180 to 192 in frontend.c of scfe

saved odb as 031105.odb  
 edited 031105.odb with Text Pad  
 saved HV data as hv/031105.hv  
 saved edited ODB as 031105\_2.odb

Inserted entry of timing counters (12ch in total)

/Equipment/HV/Variables	1000V
Measured current	0V
Setting	TC1 ~ TC4 ch4ch11
Threshold measured	2
Threshold current	2
Voltage limit	2/100V 1400V
current limit	2000 200
ramp up speed/down	0

/Equipment/HV/Settings/Channels  
 LRS1455 = 192

05/Nov/2003

22:10 stop 5930 71304 events  
 stop safe all programs  
 compile safe  
 load 031105\_2.odb  
 edit le6\_031105.hv  
 saved as le6\_031105\_2.hv

22:30 Lig H2 target fill finished.

changed channel number of LRS1445a from 70 to 71 in frontend.c of scfe  
 compile safe.exe  
 added to veto entry in odb

23:42 # 5935 pedestal  
 # 5936 ~~TEST run~~ (S1) \* (NaI4) \* Xe (front & back)  
 beam ON circ. OFF  
 Xe 95 mm φ collimator  
 NaI No collimator, TC  
 Beam Setting (A)  
 #5937 LED beam ON circ. OFF ⇒ Bad calibration (3 & 7)  
 #5938 (S1) \* (NaI4) \* Xe (front & back)

S1 HV 900V loaded.  
 This value was taken from Peter's description on the log book on 14/Oct/2003

set HV for timing counters

so that gain is about 1e.6

ET1 (TC1 1876V  
 ET2 (TC2 1873V  
 ET3 (TC3 1793V  
 ET4 (TC4 1786V

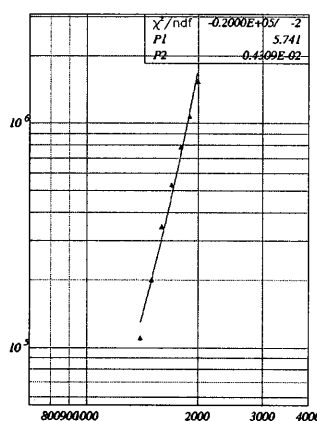
These data are measured by H.V. in 1999.

H6152-BIMOD - Serial No. CA3116

[ H.V. ]	[ Rate ]	[ Gain ]	[ Npe ]
1400.	500.	110479.0	626.404
1500.	500.	200882.0	596.811
1600.	500.	247111.0	558.125
1700.	500.	321559.0	589.097
1800.	500.	782451.0	621.227
1900.	500.	1072390.0	643.879
2000.	500.	1528391.0	640.311

date : 30/Sep./1999

H.V. vs Gain of CA3116



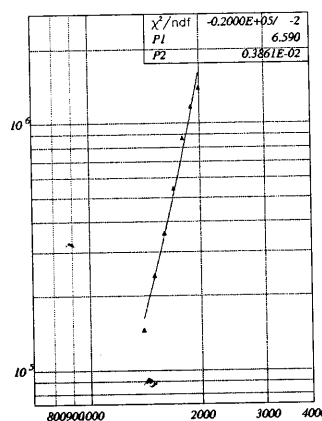
TC1

H6152-BIMOD - Serial No. CA3218

[ H.V. ]	[ Rate ]	[ Gain ]	[ Npe ]
1400.	500.	145585.0	1044.640
1500.	500.	243759.0	1079.590
1600.	500.	348931.0	1176.190
1700.	500.	542783.0	1208.120
1800.	500.	870527.0	1221.640
1900.	500.	1169229.0	1201.240
2000.	500.	1591483.0	1415.910

date : 27/Sep./1999

H.V. vs Gain of CA3218



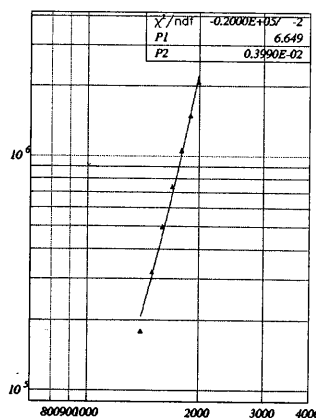
TC2

H6152-BIMOD - Serial No. CA3015

[ H.V. ]	[ Rate ]	[ Gain ]	[ Npe ]
1400.	500.	179650.0	602.736
1500.	500.	219282.0	576.193
1600.	500.	269561.0	609.863
1700.	500.	741245.0	631.974
1800.	500.	1405120.0	650.404
1900.	500.	1493560.0	677.456
2000.	500.	2048960.0	683.490

date : 30/Sep./1999

H.V. vs Gain of CA3015



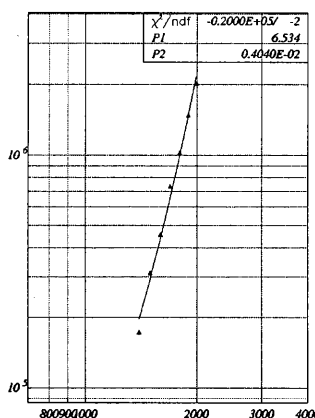
TC3

H6152-BIMOD - Serial No. CA3136

[ H.V. ]	[ Rate ]	[ Gain ]	[ Npe ]
1400.	500.	172929.0	660.571
1500.	500.	311716.0	620.073
1600.	500.	457115.0	687.109
1700.	500.	732742.0	658.468
1800.	500.	1223190.0	701.679
1900.	500.	1478210.0	699.579
2000.	500.	2027180.0	709.610

date : 27/Sep./1999

H.V. vs Gain of CA3136



TC4

06/Nov/2003

1:40 stop 5939

set H.V. of TCs as written in previous page

saved HV data as 1e6\_031106.hv

1:43 # 5940

pedestal

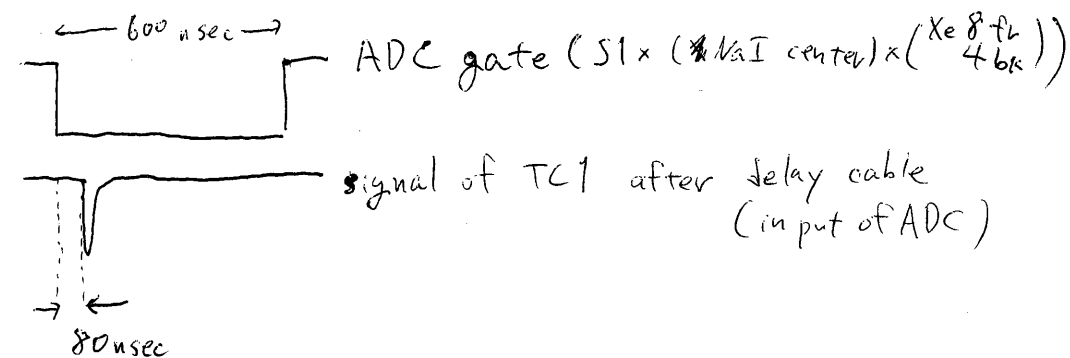
2:03 # 5941

test run for TCs.  
 S1 \* NaI center \* (Xe 4 front + Xe 4 back)  
 trigger rate ~ 9 HZ

adjust H.V. for TCs with the peak of ~~the~~ ADC histogram of ~~the~~ Pi0 trigger run (S1 NaI center, Xe 4 fr 4 bk)

H.V. TC 2 → 1950V  
 TC 4 → 1850V

check of the timing of ADC gate and TC signal



H.V. TC4 → 1900V

3:55

# 5942

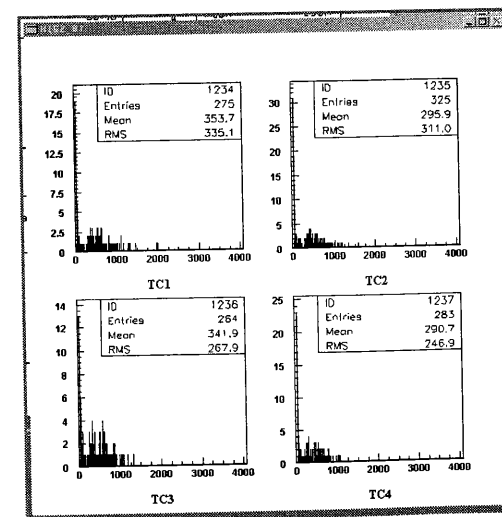
junk

# 5943

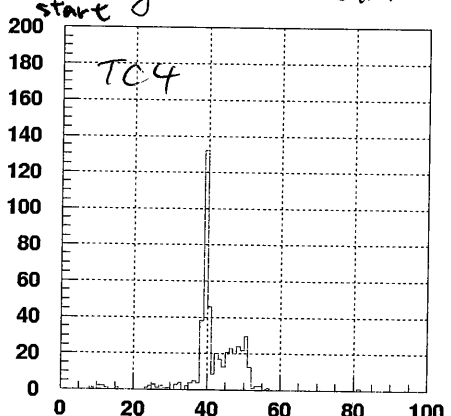
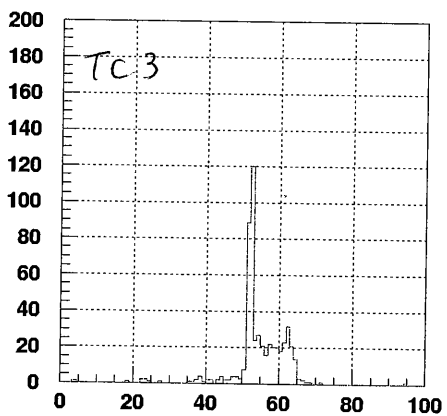
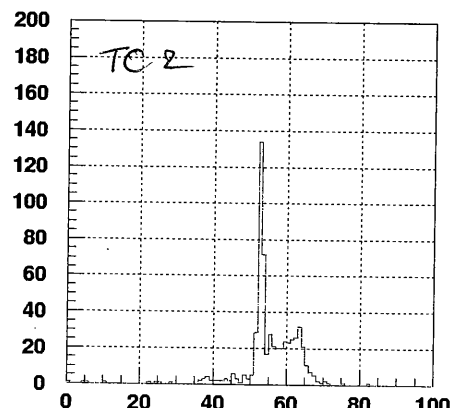
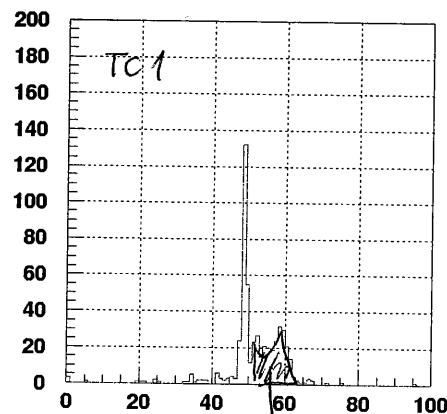
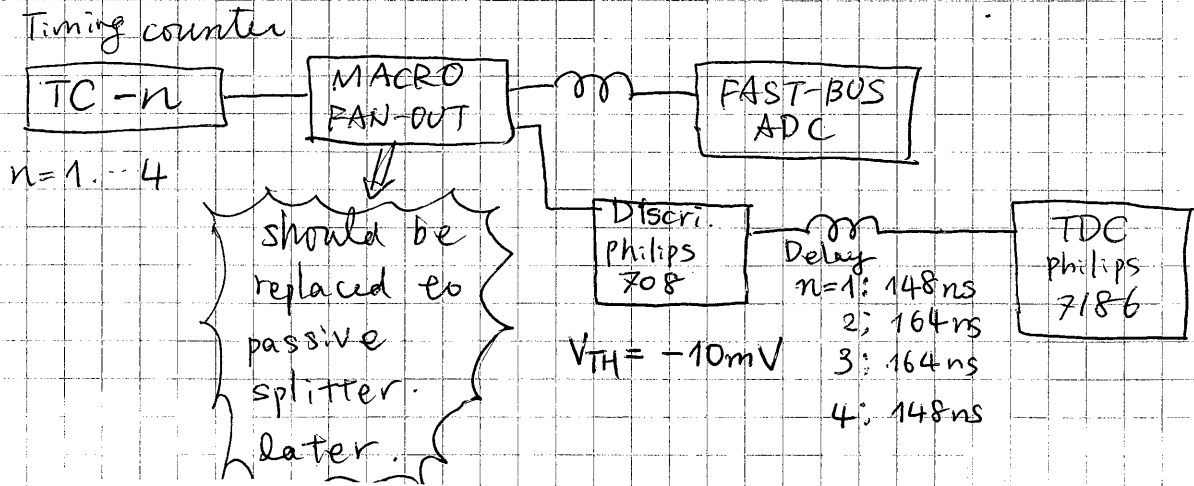
pedestal

saved H.V. data as

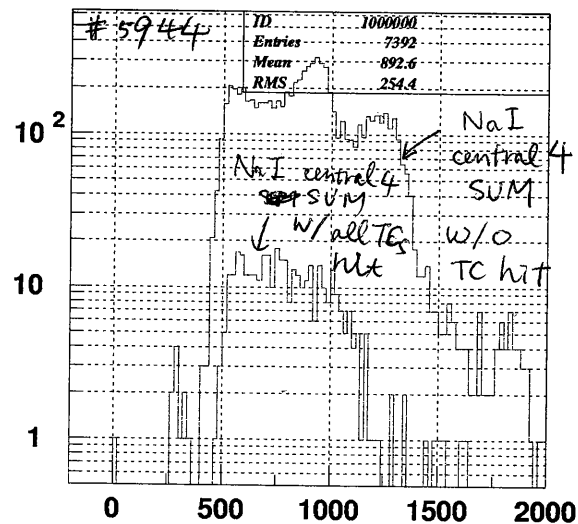
1e6\_031106\_2.hv



4 x Timing counters ~~installed~~ installed.



events whose start is not determined by S1



No peak found in NaI adc spectrum for TC hit events

#5944 (S1) \* (NaI 4) \* (Xe Front 8) \* (Xe Back 4) - circ. OFF  
 5:15 beam down - TCs in front of NaI  
 6:30 beam is back - No collimator for NaI  
 - 95mm φ collimator for Xe

#5945 same as #5944 Beam is unstable

#5946 pedestal beam ON circ. OFF

#5947 LED (387) ⇒ BAD JUNK Noisy

#5948 LED 18.5 ⇒ Looks good. OK

8:22 #5949 alpha

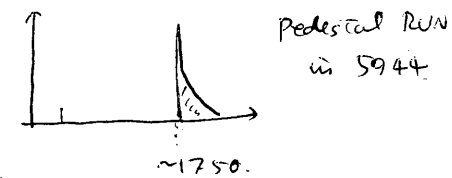
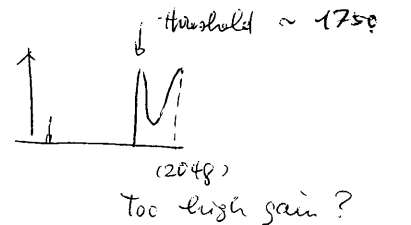
8:27 #5950 (S1) \* (NaI 4) \* (Xe Front 8) \* (Xe Back 4) same as #5945

RUN stopped 23825 events

o S1 ADC spectrum funny

Need to change the ADC?

→ S1 ADC channel changed from CRATE1, slot 7, ch 0 to CRATE1, slot 7, ch 1 front end. is modified accordingly.

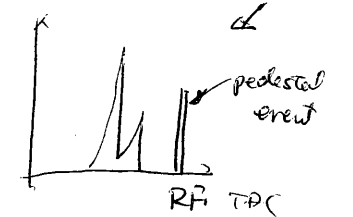


Now OK

o S1 TDC 2 RF

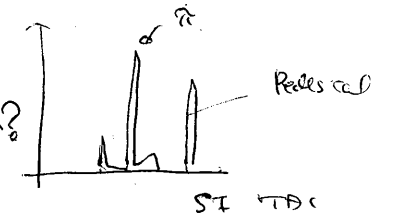
- RF timing was optimized (?) on 31/Oct/03 but it is .2.10e

Is this OK?

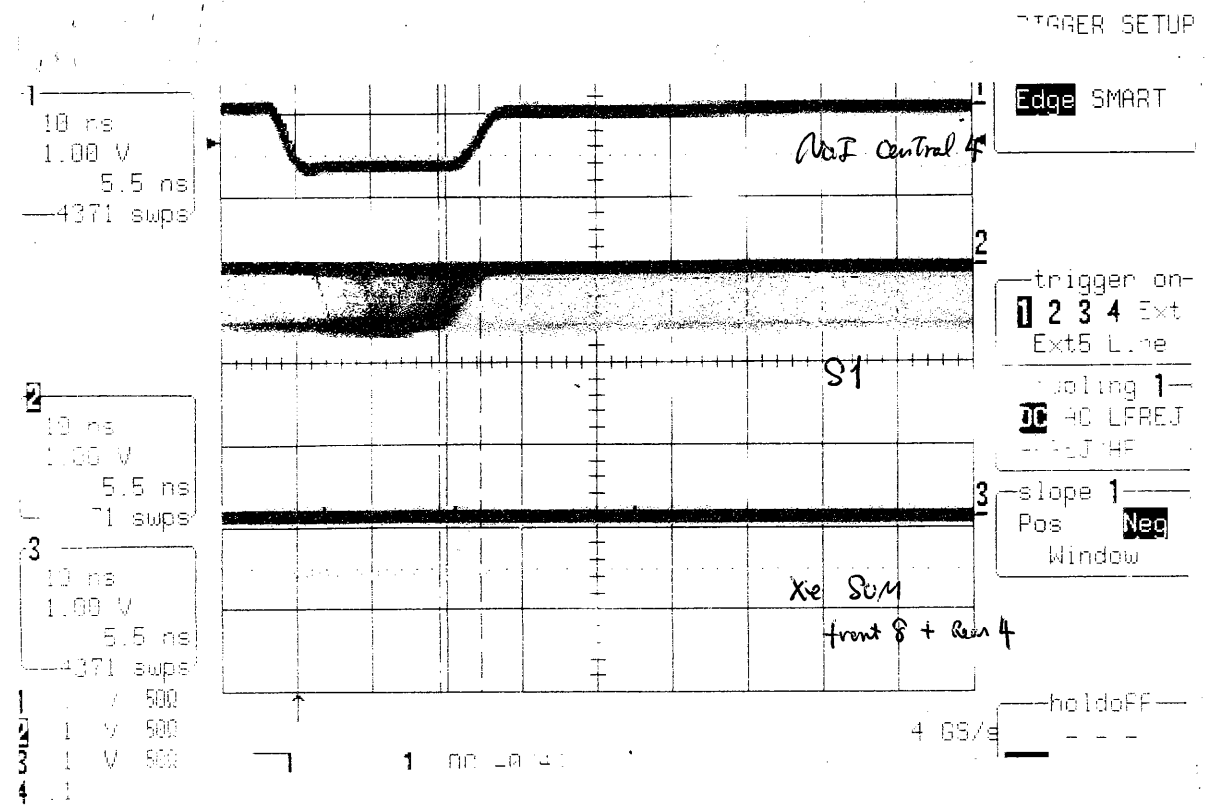


- S1 TDC

need to install CF discriminator?



Coincidence width of S1, NaI, Xe is changed as shown in the next page.



14:18 #5951 moved for alignment of the target (again!)

- found the target center axis displaced by 8mm
  - > aligned again within an accuracy of ±1mm
  - Z position was measured. Distance between Pb wall and Kapton window 95mm.
- PRK SM

6/Nov/03

Concerning the TDC input of "S1" and "RF", these TDC stop signals were required coincidence with COMMON START. before the previous RUN (#5950).

(See LOG on 20/Oct. by K.O.TI.YH.)

Now, we don't require this coincidence for TDC stop of S1 and RF due to reduce some strange peaks.

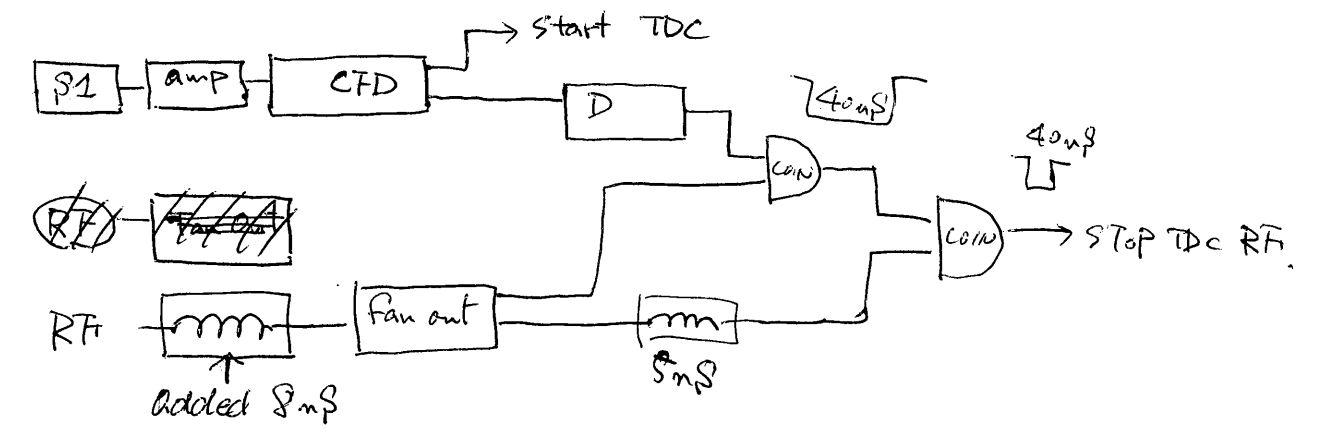
And we also unplugged "pedestal triggers" for a moment.

15:00 #5952 - TEST RUN ← What is the trigger condition?

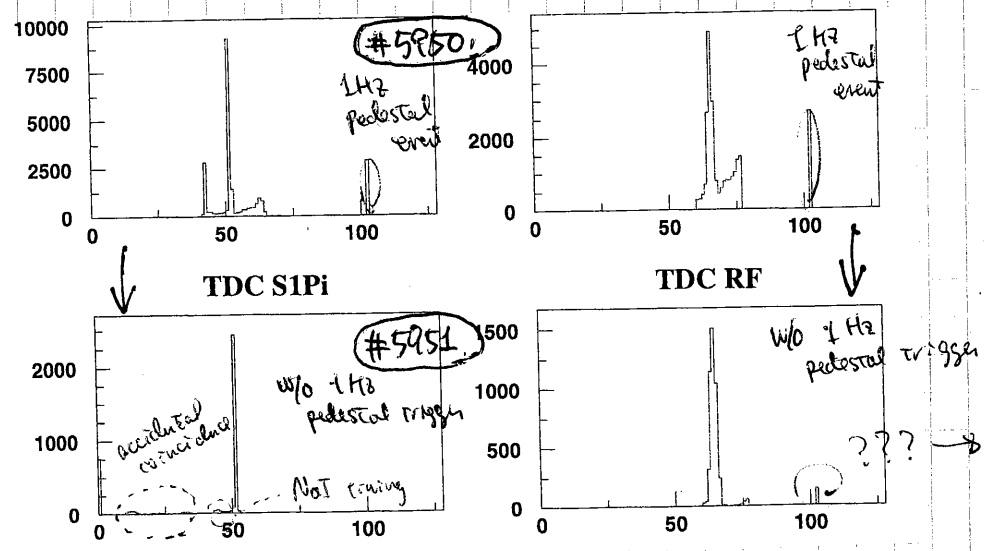
S1 Discriminator is changed to constant-fraction type in Beam Electronics Rack.

- Constant fraction delay ≈ 4nsec
- Threshold - 480mV (486mV)

RF coincidence timing was modified because RF TDC signal distributed in the range less than 20nsec and there were overflow events



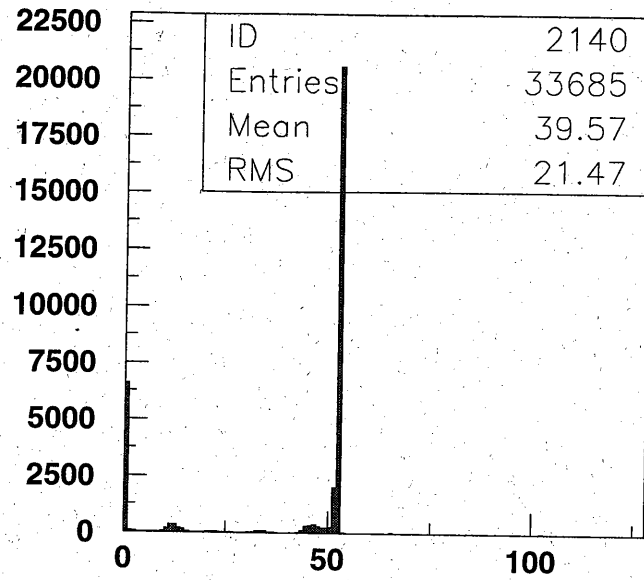
13:38 RUN #5951. TDC timing check RUN for S1 & RF. (1Hz Pedestal trigger removed)



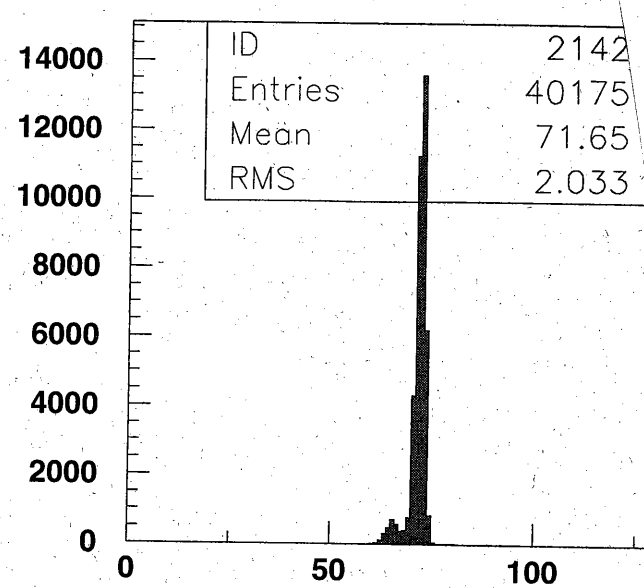
CIT, 21/Oct/03.



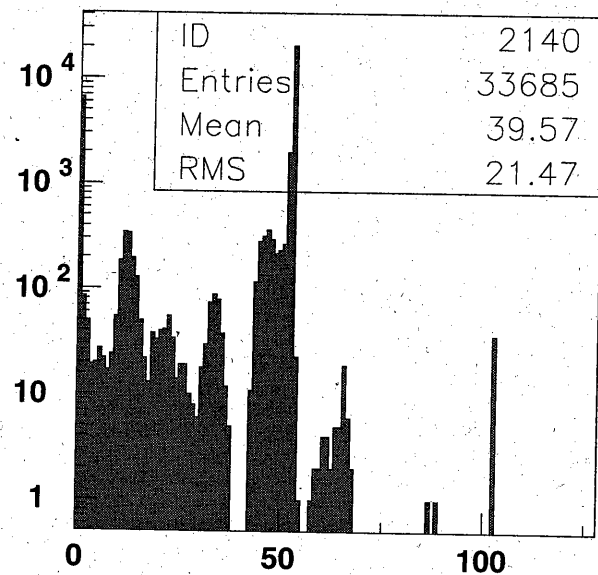
06-Nov-2003



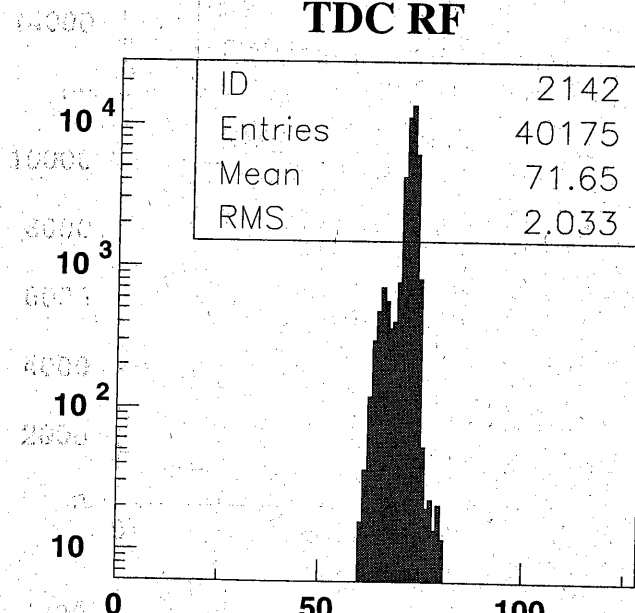
TDC S1Pi



TDC RF



TDC S1Pi



TDC RF

1800 Finally beam back again ⇒ Set up beam electronics after Tg replaced

6/11/2003

Tg-repositioned CFD for S1 introduced into trigger

S1 HV = -1900V

DS1 threshold 650mV pdr (pulse wr hyst) was 620mV previously

S1 $\pi$ .RF retuned

S1 $\pi$ .RF.8 retuned

Sol<sup>n</sup> A

S1 $\pi$  18.47 M/10<sup>6</sup>p  
 S1 $\pi$ .RF 15.09 M/10<sup>6</sup>p  
 S1 $\pi$ .RF.8(NaI) 7844/10<sup>6</sup>p

Meg III pi Stg. set

Confirms pill scan value of 1.5 · 10<sup>6</sup>  $\pi$ -RF/MAS

∴ all  $\pi$ s pass thro. S1 but not all make stop in Tg.

Now QSCS3 - 543  
 QSCS4 + 778

} focus @ Tg Centre ONLY QSCS3/4 altered  
 expect lower rate

S1 $\pi$  11.98 M/10<sup>6</sup>p  
 S1 $\pi$ .RF 9.73 M/10<sup>6</sup>p  
 S1 $\pi$ .RF.8(NaI) 5623/10<sup>6</sup>p

Meg III pi Stg. set  
 QSCS3 - 543 } focus @ Tg Centre  
 QSCS4 + 778

Now Meg III pi Z $\phi$  deg. set

Sol<sup>n</sup> B

S1 $\pi$  21.65 M/10<sup>6</sup>p  
 S1 $\pi$ .RF 17.73 M/10<sup>6</sup>p  
 S1 $\pi$ .RF.8(NaI) 9567/10<sup>6</sup>p

Meg III pi Z $\phi$  deg. set  
 ~ 17% more rate @ S1 than Sol<sup>n</sup> A

Conclusion should Run with Sol<sup>n</sup> B & see if  $\pi^0$ -event rate also ~ 17% more.

Suggest data-taking with Version B ⇒ Meg III pi Z $\phi$  deg. set  
 & Version A ⇒ Meg III pi Stg. set

Setup window Beam PC: Diskset → choose file → open → set

name should appear in load file location

as shown above  
 Meg III pi Stg. set  
 is correct  
 file

06-Nov-2003

19:17 #5953 pedestal  
19:19 #5954 LED (7&5) } Junk. Do Not Use

ADC input connectors was loose.  
↳ plugged in

19:18 #5955 pedestal ADC#238,245 :  $\alpha > 10$ . LED was unstable.  
19:20 #5956 LED (7&5) DO NOT USE  
I will continue with collimator scan tomorrow P-R.

19:29 #5957 LED (3&2)  
19:40 #5958  $\alpha$ .

20:59 #5959 pedestal  
21:01 #5960 LED (1&5)  
#5961 LED (1&5) again to check LED stability } unstable, DO NOT use.  
21:13 #5962 LED (1&5)  
21:18 #5963  $\alpha$

compare 2 versions of beam optics.  
see previous page for the ~~opt~~ versions.

See next page

21:23 #5964  $\pi^0$  (S1 \* NaI4 \* LXe front/back 4),  
↳ w/ TC,  $\phi 95$ mm Col @ LXe.  
↳ (B) ~~opt~~ version optics

Junk, wrong trigger setting.

21:28 #5965  $\pi^0$ , same as 5964.  
22333 events / 48 min = 7.75 Hz  
\* ~~1~~ 1 Hz pedestal still unplugged.

In #5963, 5965 - NO trigger signal from S1 because  
S1 cable to the trigger logic was unplugged

- ~~trigger level~~ @
- Multiplicity @ coincidence module for S1, NaI, Xe FASTBUS was "3"

⇒ DO NOT use those data

1 Hz pedestal plugged in  
23:00 #5966 test  
#5967 S1 \* NaI4 \* Xe F8 B4

Trigger rate  
 $41829 / 90 \times 60 - 1$   
 $= 6.7 \text{ Hz}$

- TC x 4
  - $\phi 95$ mm collimator for Xe
  - No collimator NaI
- NOT include pedestal trig.

⇒ (B) optics.

- 1 Hz pedestal trigger
- proton 1847  $\mu\text{A}$

ADC #777 turned OFF  $\Rightarrow$  NOT OFF but very small signal.  
204 recovered (?)

Things to be fixed

- ✓ LED calibration unstable  $\Rightarrow$  unplug & plug the cable  $\rightarrow$  get stable (maybe connector problem)
- Faulty PMTs
- Lazy-arch is not running

1:15 #5967 stopped for calibration  $5.5 \times 10^4$  evts

#5968 pedestal Beam ON circ. OFF

#5969 LED (1&5)  $\Rightarrow$  seems good. (stable)

#5970 LED (3&7)  $\Rightarrow$  seems good also (slightly slanted in time profile)

#5971 alpha BEAM ON circ. OFF  $\sim 4 \times 10^4$  evts

#5972 same as #5967 (B) beam setting.

2:11 HV error (1452) automatically rebooted

During taking #5972 "No ADC Gate" ( $6 \times 10^5$  evts!)  
 $\rightarrow$  ~~fixed by restarting frontend~~  $\rightarrow$  fixed by restarting frontend.

First  $1.48 \times 10^4$  evts OK  
 $\sim 7 \times 10^4$  evts in total for (B) setting  
 same condition as before but  
 w/o NaI trigger

3:45 #5973 (S1) \* (Xe Front 8, Back 4)

trigger rate (request) 1 kHz

Taken to check the possibility of position reconstruction on NaI side.

$\sim 1 \times 10^5$  events

4:00 Beam setting changed to (A) by loading meg 111 pi S1 set

#5974 pedestal Beam ON circ. OFF  
 Beam setting (A)

#5975 LED (3 & 7)  
 #5976 LED (1 & 5)

4:18 #5977 alpha

4:22 #5978 (S1) \* (NaI 4) \* (Xe FS Bk 4)  
 $\pi^0$  run

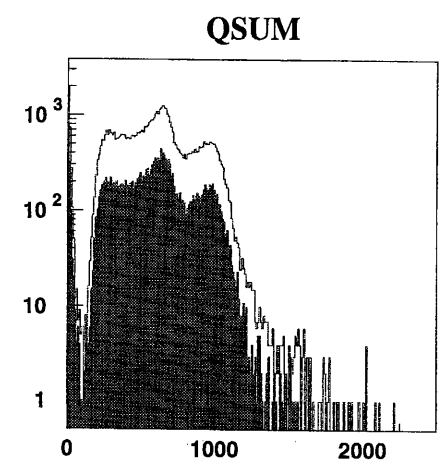
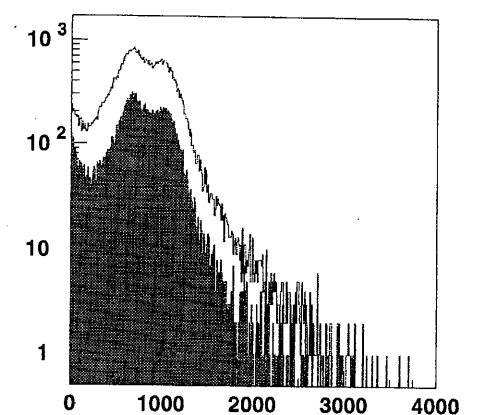
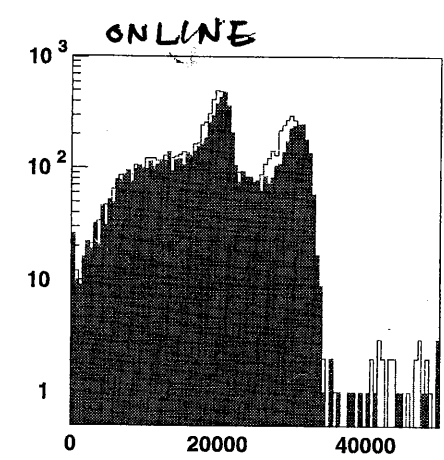
- TC x 4 & No collimator for ~~Xe~~ NaI
- $\phi$  95 collimator for Xe
- (A) Beam setting
- proton 1840  $\mu$ A

trigger rate 4.8 Hz NOT including pedestal trigger

5:51 #5979 same as #5978

Stopped on 7:43  $\sim 118$  min  $\Rightarrow \frac{38675 - (118 \times 60)}{118 \times 60} = 4.75$  Hz  
 38675 evts

Comparison of beam settings (A) & (B)



□ (B) (#5967)  
 ▨ (A) (#5978)

$\Rightarrow$  No significant change in the spectrum shape, but peak position shifted (gain shifted?)

• Trigger rate (B) 6.7 Hz  $\Rightarrow 7 \times 10^4$  evts in total (NOT including pedestal trigger)  
 (A) 4.8 Hz

• Faulty channel (see also the log on Oct. 10, '03)

- F12 (C111) small signal HV 1250 V
- R22 (C127) " HV 1200 V
- BT18 (C147) " HV 1029 V
- T33 (C168) " HV 817 V

$\left. \begin{array}{l} \text{better to} \\ \text{increase HV} \\ \text{(NOT yet)} \end{array} \right\}$

$\Rightarrow$  • Normal pedestal  
 • Low QE?

shifted even after offline gain correction

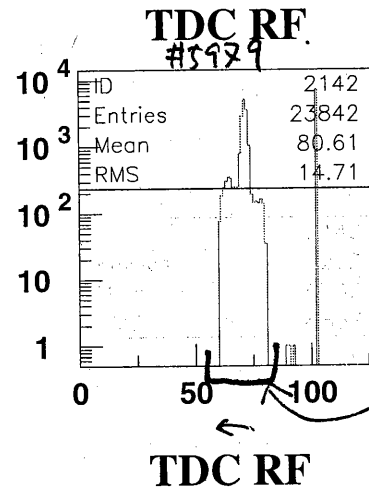
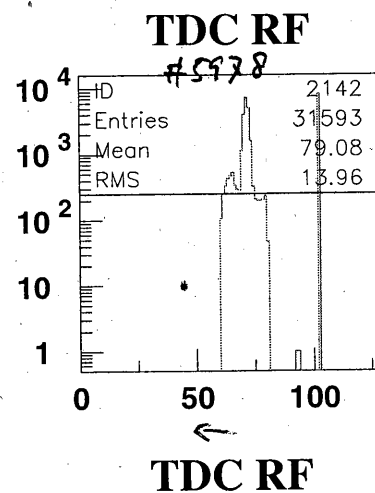
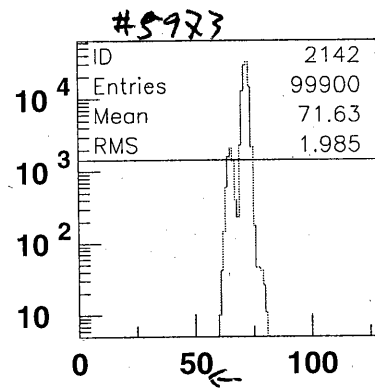
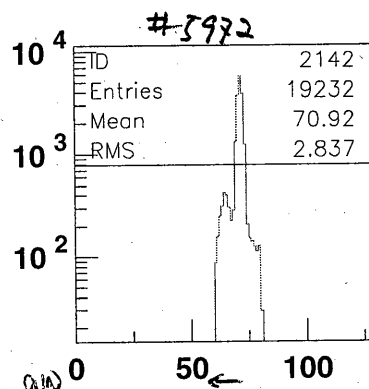
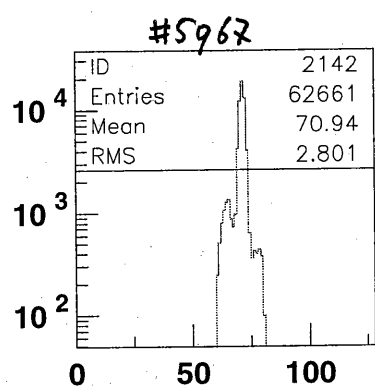
Things to do.

• Beam slit optimization

• (S1) \* (Xe F8) \* (TC3) / (BF4) / (TC4)

• (S1) \* (Xe F8) \* [(NaI4) OR (TC3) / (TC4)]

• check TDC RF vs NUMBER for #5929  
5928  
5923  
5922  
5967.



This peak didn't exist at the first ~30 min of run #5979.

SM on shift.

7/Nov/03

7:55 HV for BT18, T33 changed

T33 (C168) 847V → 957V  
BT18 (C147) 4029V → 4129V 1eb\_034407.6V

8:05 RUN #5980 Pedestal  
5981 LED (185) Beam on  
5982 LED (387) "  
5983 α "

Beam Breaker Closed!!!!

#5984 Pedestal Beam off  
#5985 LED (387) "  
#5986 LED (185) "  
#5987 α "

Refrigerator status

- Cold head temperature 170K  
- heater power 23%

≡ LAZY ARCH cannot be started ... Currently no way to investigate ≡  
Wait for SR to come back

Alarm for Lazy-ARCH disabled temporarily

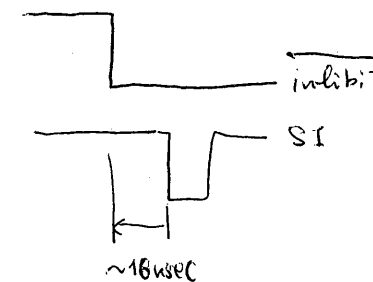
BB opened!!

9:42 RUN #5988 Do NOT USE this run for your analysis of LP, NiI  
(S1) \* (Xe Front) \* (NaI4) / (Back)

To check the RF stability as shown in the previous page

- 1Hz Pedestal trigger removed for several times in this RUN.
- S1 TDC inhibit is installed again (which was removed)

→ Chance coincidence in S1 TDC is removed in the range of 10 nsec before S1 signal

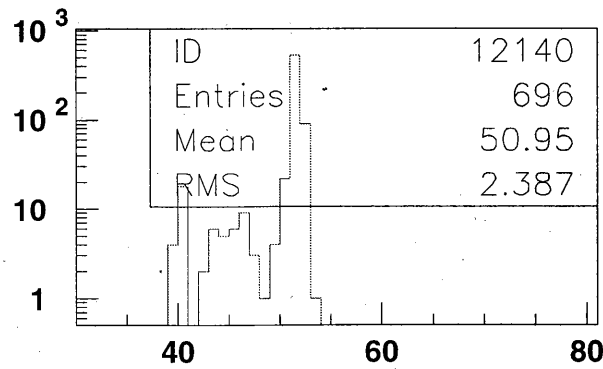
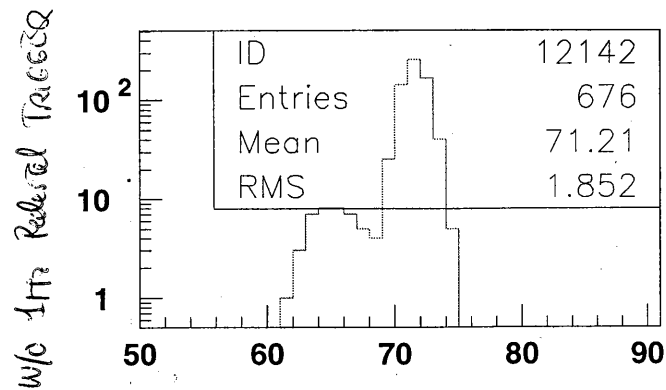


! One cannot see RF TDC appearance/disappearance ... should keep watching

10:41 RUN 5988 stopped

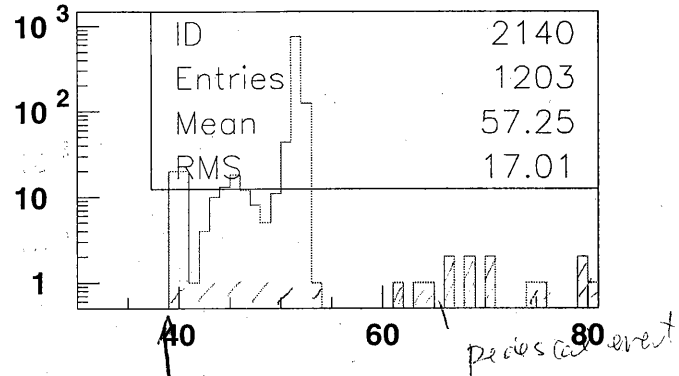
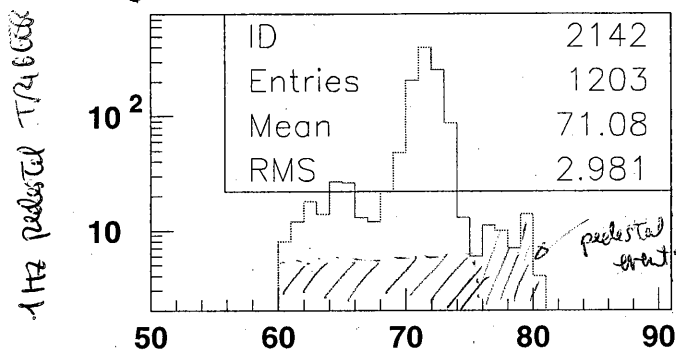
7 Nov 03

RUN 5988 after installing S1 TDC inhibit



TDC RF

TDC S1Pi



TDC RF

TDC S1Pi

~~with 1Hz pedestal TRIGGER~~

~~with 1Hz pedestal TRIGGER~~

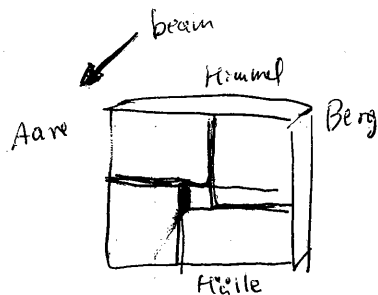
inhibit edge

pedestal event

Lead wall collimator Study

Current setting

Aare 18 mm  
Berg 22 mm  
Himmel 18 mm  
Hölle 19 mm



Aare 18mm → 15mm

Aare 15 mm  
Berg 22 mm  
Himmel 18 mm  
Hölle 19 mm

SETTING	S1π	S1π·RF	S1π·RF·δ(N <sub>2</sub> )
SETTING (A)	18.90 M/10 <sup>6</sup> p	14.3 M/10 <sup>6</sup> p	6940 /10 <sup>6</sup> p
SETTING (B)	21.1 M/10 <sup>6</sup> p	17.7 M/10 <sup>6</sup> p	9543 /10 <sup>6</sup> p

11:45 RUN # 5989 π<sup>0</sup> trigger (≡ S1 \* (Aare 18) \* (Nat 4))

Proton 1.85 mA Magnet setting (A) Pb wall Aare 18mm → 15mm

12:00 end 15 min 1 sec 5384 events  $\frac{5384-901}{901} = 4.98 \text{ Hz}$

12:04 change the magnet setting to (B)

12:06 RUN # 5990 π<sup>0</sup> trigger magnet setting (B) Pb wall Aare 15 mm

Proton 1.85 mA 12:13 RUN # 5991 same as RUN # 5990 → further take one more again

12:25 end 13 min 36 sec 5635 events  $\frac{5635-816}{816} = 5.91 \text{ Hz}$

Aare 15mm → 12mm

	S1π	S1π·RF	S1π·RF·δ(N <sub>2</sub> )
Aare 12mm Berg 22mm Himmel 18mm Hölle 19mm	SETTING (A) 18.2 M/10 <sup>6</sup> p	14.1 M/10 <sup>6</sup> p	6721 /10 <sup>6</sup> p
	SETTING (B) 20.5 M/10 <sup>6</sup> p	17.3 M/10 <sup>6</sup> p	9427 /10 <sup>6</sup> p

12:40 change the magnet setting to (A)

12:44 RUN # 5992 π<sup>0</sup> trigger magnet setting (A) Pb wall Aare 12mm

Proton 1.85 mA

13:00 end 14 min 02 sec 5099 events  $\frac{5099-842}{842} = 5.05 \text{ Hz}$

13:05 change to magnet setting to (B)

13:08 RUN # 5993 π<sup>0</sup> trigger

Magnet setting (B) Pb wall Aare 12mm; Proton current 1.843 mA

13:15 Stop the RUN # 5993, 5011 events.  $\frac{5011-1132}{1132} = 6.19 \text{ Hz}$

13:57 change the magnet setting to (A)

Aare 12mm → 9mm

	S1π	S1π·RF	S1π·RF·δ(N <sub>2</sub> )
Aare 9mm Berg 22mm Himmel 18mm Hölle 19mm	SETTING (A) 17.6 M/10 <sup>6</sup> p	14.0 M/10 <sup>6</sup> p	6655 /10 <sup>6</sup> p
	SETTING (B) 19.3 M/10 <sup>6</sup> p	16.3 M/10 <sup>6</sup> p	8629 /10 <sup>6</sup> p

Proton 1.84 mA

13:59 RUN # 5994 π<sup>0</sup> trigger Magnet setting (A) Pb wall Aare 9mm

14:14 end 13 min 58 sec 5069 events  $\frac{5069-838}{838} = 5.04 \text{ Hz}$

14:15 change the magnet setting to (B)

14:16 RUN # 5995 π<sup>0</sup> trigger

Magnet setting (B) Pb wall Aare 9mm

14:28 end 14 min 54 sec 5553 events  $\frac{5553-714}{714} = 6.77 \text{ Hz}$

14:37 change the magnet setting to (A) → found to be (B) later...

7 Nov 03

Aare 6mm → 6mm

Aare 6mm  
Berg 22mm  
Himmel 18mm  
Hölle 19mm

setting (A)

$S_{1\pi}$   $S_{1\pi * RF}$   $S_{1\pi * RF} * \delta(NaI)$   
16.8M/10<sup>6</sup>p ~~44.4M/10<sup>6</sup>p~~ ~~7269/10<sup>6</sup>p~~  
13.6 6336

setting (B)

17.1M/10<sup>6</sup>p 44.4M/10<sup>6</sup>p 7672/10<sup>6</sup>p

14:40 RUN # 5996  $\pi^0$  trigger

magnet setting ~~(A)~~ Pb wall Aare 6mm

(B)

15:03 end 17 min 16 sec 8706 events  $\frac{8706 - 1036}{1036} = 7.4 \text{ Hz} ???$

⚠ Magnet setting for this RUN is found to be (B)!!!!

RUN COMMENT on the data file is wrong.

Change the magnet setting to (A)

15:17 RUN # 5997  $\pi^0$  trigger

magnet setting (A) Pb wall Aare 6mm

15:32 end 45 min 44 sec 4849 events  $\frac{4849 - 944}{944} = 4.13 \text{ Hz}$

Aare 6mm → 3mm

Aare 3mm  
Berg 22mm  
Himmel 18mm  
Hölle 19mm

setting (A)

$S_{1\pi}$   $S_{1\pi * RF}$   $S_{1\pi * RF} * \delta(NaI)$   
15.9M/10<sup>6</sup>p 42.8M/10<sup>6</sup>p 6073/10<sup>6</sup>p

setting (B)

15.7M/10<sup>6</sup>p 42.7M/10<sup>6</sup>p 6359/10<sup>6</sup>p

15:53 RUN # 5998  $\pi^0$  trigger

magnet setting (A) Pb wall Aare 3mm

16:07 end 14 min 30 sec 5000 events  $\frac{5000 - 870}{870} = 4.75 \text{ Hz}$

16:16 RUN # 5999  $\pi^0$  trigger

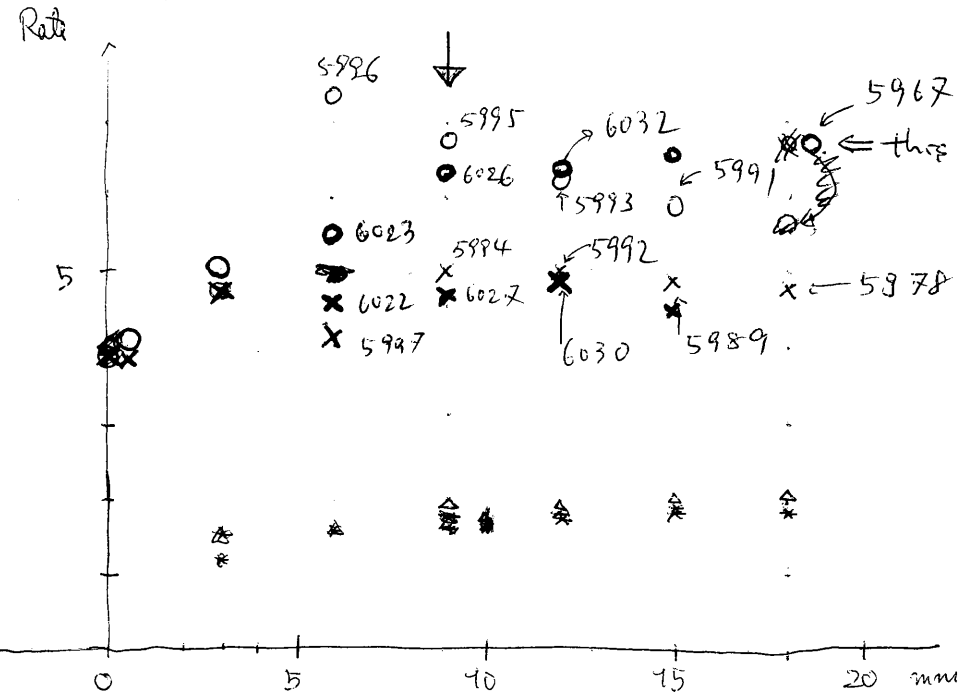
magnet setting (B) Pb wall Aare 3mm

16:29 end 13 min 39 sec 5000 events  $\frac{5000 - 819}{819} = 5.11 \text{ Hz}$

moved data files (run 5900 ~ 5963) to E:\031105-PSI

7 Nov 2003

Aare Wall Scan



Aare 3mm → 18mm  
Berg 22mm → 19mm

Aare-scan finished.  
Berg-scan start.

Aare 18mm  
Berg 19mm  
Himmel 18mm  
Hölle 19mm

setting (A)

$S_{1\pi}$   $S_{1\pi * RF}$   $S_{1\pi * RF} * \delta(NaI)$   
18.6M/10<sup>6</sup>p 13.5M/10<sup>6</sup>p 5588/10<sup>6</sup>p

setting (B)

20.8M/10<sup>6</sup>p 72.5M/10<sup>6</sup>p 2658/10<sup>6</sup>p

17:19 Run # 6000 pedestal

17:20 Run # 6001 LED (1 & 5)

17:27 Run # 6002 LED (3 & 2)

17:33 Run # 6003 X

Run # 6004 Junk.

17:35 Run # 6005  $\pi^0$  trigger  
magnet setting (B) Pb wall Berg 19mm

17:45 end 10 min 16 sec  $\frac{5000 - 616}{616} = 7.12 \text{ Hz}$

17:50 Run # 6006  $\pi^0$  trigger

magnet setting (A) Pb wall Berg 19mm.

18:02 end 16 min 45 sec  $\frac{5000 - 1005}{1005} = 7.98 \text{ Hz}$

7 Nov 2003

**Berg 19 mm → 16 mm**

Aare 18 mm  
Berg 16 mm  
Himmel 18 mm  
Halle 19 mm

Setting (A)  
Setting (B)

S1π	S1π*RF	S1π*RF * γ(Na2)
17.2 M/10 <sup>6</sup> p	12.6 M/10 <sup>6</sup> p	5750/10 <sup>6</sup> p
20.1 M/10 <sup>6</sup> p	17.0 M/10 <sup>6</sup> p	7319/10 <sup>6</sup> p

18:26 Run #6007 π<sup>0</sup> trigger

Magnet setting (A) Pb wall Berg 16 mm

18:41 end: 15 min 5 sec  $\frac{5000 - 905}{905} = 4.52 \text{ Hz}$

18:45 Run #6008 π<sup>0</sup> trigger

Magnet setting (B) Pb wall : Berg 16 mm

18:55 end: 10 <sup>min</sup> 37 sec  $\frac{5000 - 631}{631} = 6.92 \text{ Hz}$

**Berg 16 mm → 13 mm**

Aare 18 mm  
Berg 13 mm  
Himmel 18 mm  
Halle 19 mm

Setting (A)  
Setting (B)

S1π	S1π*RF	S1π*RF * γ(Na2)
15.4 M/10 <sup>6</sup> p	11.1 M/10 <sup>6</sup> p	4722/10 <sup>6</sup> p
18.9 M/10 <sup>6</sup> p	16.2 M/10 <sup>6</sup> p	7564/10 <sup>6</sup> p

19:06 Run #6009 π<sup>0</sup> trigger

Magnet setting (B) Pb wall : Berg 13 mm

19:12 end: 11 min 19 sec  $\frac{5000 - 679}{679} = 6.36 \text{ Hz}$

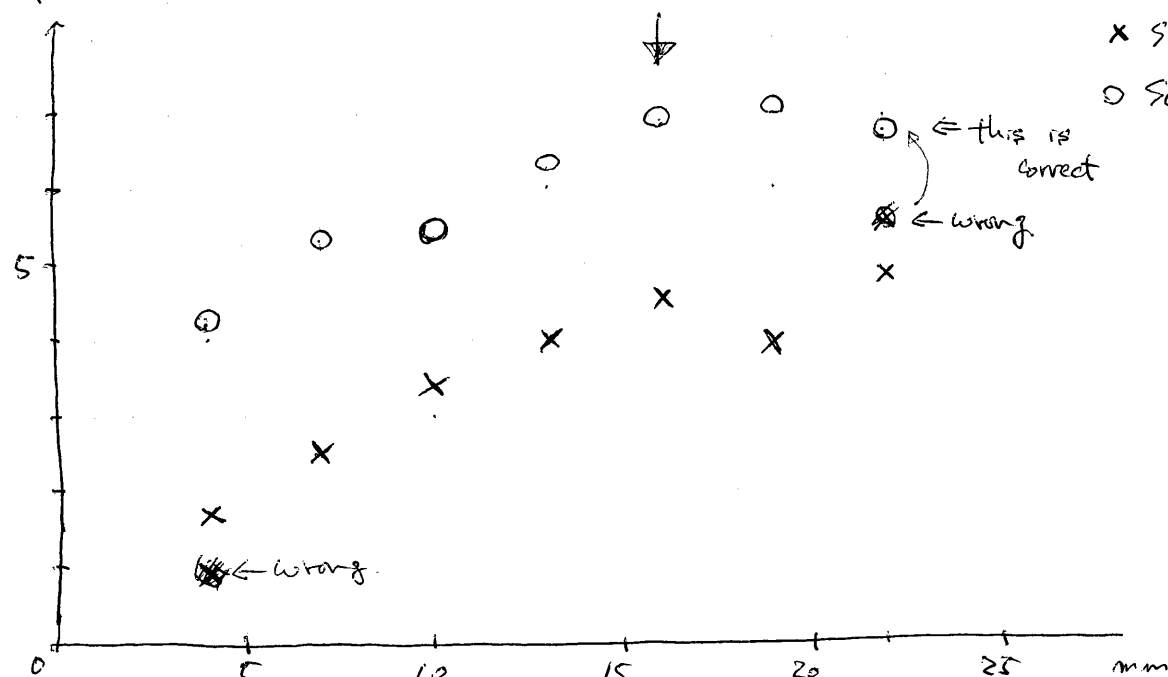
19:21 Run #6010 π<sup>0</sup> trigger

Magnet setting (A) Pb wall : Berg 13 mm

19:38 end: 16 min 39 sec  $\frac{5000 - 999}{999} = 4.01 \text{ Hz}$

7 Nov 2003

Berg wall scan



x Setting (A) trigger rate  
o Setting (B) trigger rate

**Berg 13 mm → 10 mm**

Aare 18 mm  
Berg 10 mm  
Himmel 18 mm  
Halle 19 mm

Setting (A)  
Setting (B)

S1π	S1π*RF	S1π*RF * γ(Na2)
13.0 M/10 <sup>6</sup> p	9.25 M/10 <sup>6</sup> p	3456/10 <sup>6</sup> p
17.4 M/10 <sup>6</sup> p	14.9 M/10 <sup>6</sup> p	5881/10 <sup>6</sup> p

20:50 Run #6011 π<sup>0</sup> trigger

Magnet setting (A) Pb wall : Berg 10 mm

↳ **JUNK.** wrong trigger

20:52 Run #6012 π<sup>0</sup> trigger

Magnet setting (A) Pb wall : Berg 10 mm

21:11 end: 19 min 5 sec  $\frac{5000 - 1145}{1145} = 3.37 \text{ Hz}$

21:14 Run #6013 π<sup>0</sup> trigger

Magnet setting (B) Pb wall : Berg 10 mm

21:27 end: 12 min 51 sec  $\frac{5000 - 771}{771} = 5.49 \text{ Hz}$



7-Nov-2003

Berg 10 mm → 7 mm

		S1π	S1π*RF	S1π*RF*γ(NaI)
Aare 18 mm	Setting (A)	10.6M/10 <sup>6</sup> p	7.22M/10 <sup>6</sup> p	2712/10 <sup>6</sup> p
Berg 7 mm				
Himmel 18 mm	Setting (B)	13.3M/10 <sup>6</sup> p	12.8M/10 <sup>6</sup> p	5455/10 <sup>6</sup> p
Halle 19 mm				

21:43 Run # 6014 π<sup>0</sup> trigger  
Magnet setting (B) Pb wall Berg 7 mm

21:56 end : 13 min 14 sec  $\frac{5000 - 794}{794} = 5.30 \text{ Hz}$

22:06 Run # 6015 π<sup>0</sup> trigger  
Magnet setting (A) Pb wall Berg 7 mm

22:34 end 28 min 16 sec.  $\frac{6000 - 1696}{1696} = 2.54 \text{ Hz}$

Berg 7 mm → 4 mm

		S1π	S1π*RF	S1π*RF*γ(NaI)
Aare 18 mm	Setting (A)	8.00M/10 <sup>6</sup> p	5.02M/10 <sup>6</sup> p	2413/10 <sup>6</sup> p
Berg 4 mm				
Himmel 18 mm	Setting (B)	13.1M/10 <sup>6</sup> p	11.2M/10 <sup>6</sup> p	6047/10 <sup>6</sup> p
Halle 19 mm				

23:01 Run # 6016 π<sup>0</sup> trigger  
Magnet setting (A) Pb wall Berg 4 mm  
↳ wrong trigger setting. Junk

23:03 Run # 6017 π<sup>0</sup> trigger  
Magnet setting (A) Pb wall Berg 4 mm  
23:46 end : 43 min 3 sec  $\frac{7000 - 2583}{2583} = 1.71 \text{ Hz}$

23:55 Run # 6018 π<sup>0</sup> trigger  
Magnet setting (B) Pb wall Berg 4 mm  
24:10 end 15 min 46 sec  $\frac{5000 - 946}{946} = 4.29 \text{ Hz}$

8-Nov-2003

Aare 18 → 0 mm  
Berg 4 mm → 22 mm

		S1π	S1π*RF	S1π*RF*γ(NaI)
Aare 0	Setting (A)	11.7M/10 <sup>6</sup> p	11.3M/10 <sup>6</sup> p	4516/10 <sup>6</sup> p
Berg 22 mm				
Himmel 18	Setting (B)	12.5M/10 <sup>6</sup> p	10.2M/10 <sup>6</sup> p	4522/10 <sup>6</sup> p
Halle 19				

0:40 Run # 6019 Junk

0:41 Run # 6020 π<sup>0</sup> trigger  
Magnet setting (A) Pb wall Aare 0 mm.  
1:1 end : 20 min 16 sec.  $\frac{6000 - 1216}{1216} = 3.93 \text{ Hz}$

★ For beam setting (A) "meg 111 pi S1 set" is used.  
In Peter's description on the beam settings on Nov. 6 we can find two ~~meg 111 pi S1~~ file names for setting (A)  
meg 111 pi S1 set & meg 111 pi S1 g. set. This is Cancelled  
Which is the right one? → should ask Peter.

1:10 Run # 6021 π<sup>0</sup> trigger  
Magnet setting (B) Pb wall Aare 0 mm  
1:27 end : 16 min 36 sec.  $\frac{5000 - 996}{996} = 4.02 \text{ Hz}$