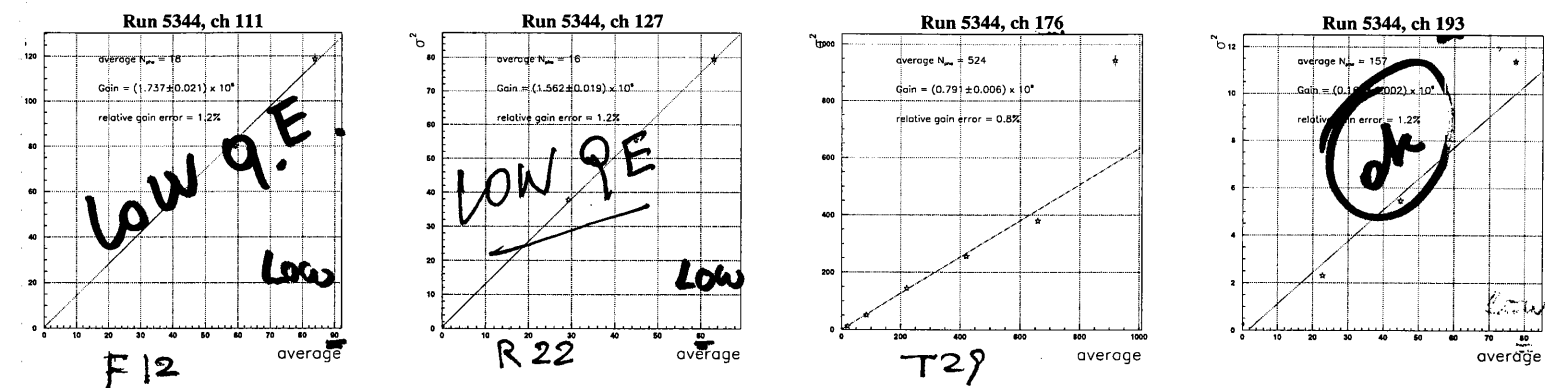


10/Oct./2003

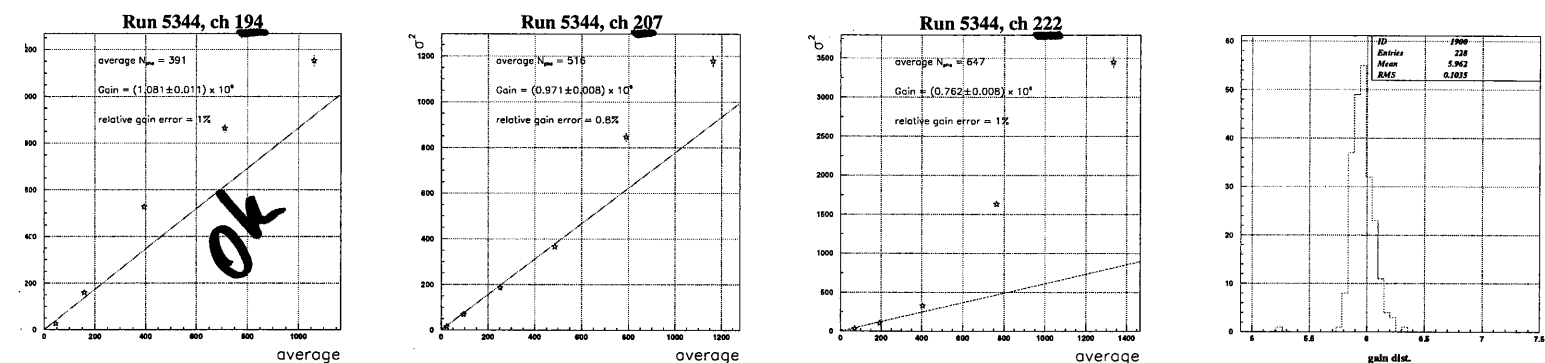
21:00. #5343. pedestal run. @ BEAM.ON. → All channels OK.
 21:01 #5344. LED calibration @ " " " "

Sigma variation of pedestal value of NaI data are checked

} #5298 (Beam Shutter closed)
 #5299 (Shutter opened)



Bad channels Gain fitting results @ LED calibration #5344.

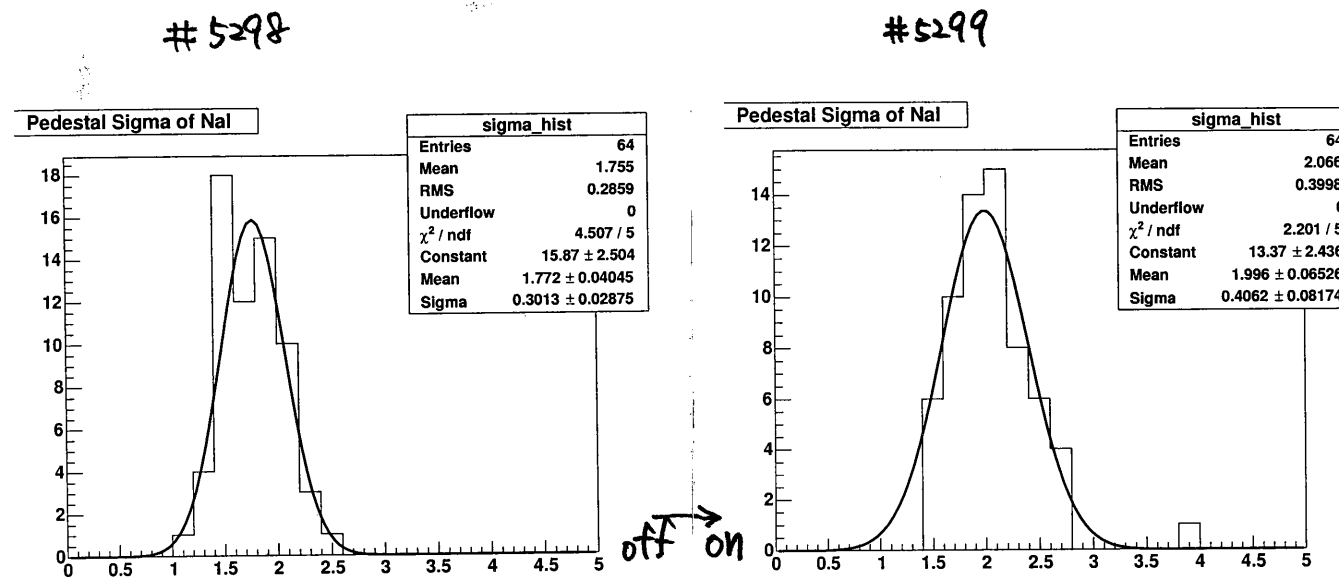


Summary of Bad channels:

- Now, All PMTs have signal @ ADC. except for HV off 3PMTs.

But, some PMTs, gain fitting curves are strange.

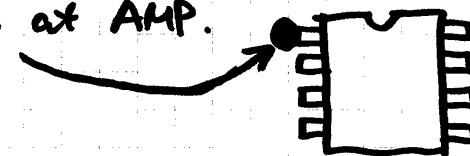
ADC 64 (F12)	} HV. off.	→ T23 is not HV off. This PMT is unplugged because of F70 problem.
ADC 120 (T23)		
ADC 172 (L24)		
111 (F12)	} Very low gain	
127 (R22)		
193 (L38)		
136 (T29)	} Bad calibrated.	
194 (BT38)		
207 (BK1)		
222 (BK13)		



sigma of pedestal just bigger (1.772 → 1.996) than closed.
 • in shutter open.

Concerning a broken channel of F70 (T23):

• The positive power line for current buffer AMP is broken at AMP.



• So, this power port is connected to other channels power port by cable, now.

⇒ F70 problem is fixed.

ADC 193. The signal was ok at output. cable found to be short. (from FOUT to bundy) Replaced G7-30

RUN # 5345 Pedestal run

RUN # 5346 LED to check signals (shutter closed)

193 seems ok now, also 120 after Hejiri's good job! we now investigate 111 & 127 but see α -run first!!

RUN # 5347 α - shutter closed. h. 00:10

ADC 111 = This PMT must have a low QE or see few ph's since everything seems ok. & furthermore, it is already set for 1200 V!!

ADC 127 same as 111 Maybe a bad contact to the PMT feed through but... it's 100 AM!! see you tomorrow!!

RUN # 5349 Cosmic-Ray. shutter closed. 1:00 a.m.

Suddenly, Xenon circulation does NOT work.

Circulation pump control by LabView is available, but xenon flow = 0. \Rightarrow Circulation STOPPED. (12:20)

2:20 #5349 stopped.

NaI cosmic ray trigger is introduced.

The rate of CR NaI is too high. (~ 40 Hz)

normal condition \sim several Hz \rightarrow need to be checked. Discr. thresh.

17. Oct. 2003

05:30 We found that the flow control valve was CLOSED. Why???

Now, this valve is opened.

Xenon Circulation Restart!!

Files of #5350 \rightarrow #5363 are to be removed.

2:30

\downarrow TDC cabling and test. only for LeCroy-discriminators \leftrightarrow FB TDC slot 5,7.

5:00

TDC's ~~are~~ do not still work.

may be problem with memory access... to banks. or too much histo.

Useless { ~~5:24 #5362 pedestal~~
~~5:26 #5363 LED run~~
~~5:32 #5364 α particle run~~ } shutter closed.

7:30

circulation stop

exchanged LN₂ tank 100l \rightarrow 100l

circulation restart

shutter closed

9:16 #5365 pedestal

----- Many channels have broad pedestals.

(#64 2.9ch
#105 3.2ch)

9:18 #5366 LED run

\Rightarrow Many channels were not calibrated well.

#5367 α particle run

9:42 #5368 LED run

Note:

When most of PMT have broad pedestal (~ 10 ch),

• "q_sum" distribution can differ from the real distribution.

because ...

histo.c

if (cadc[i] > adccalib_param.pedestal_sigma[i] * 3)

hist \rightarrow qsum += cadc[i];

Hr. Meier comes and investigates

- Power restored circuit breakers not higher up the line?
- Our local circuit breakers OK
- he thinks we may have to distribute the power better over the different phases
- I suggest we do that if we have another power-outage !!!

14⁵⁰ - LHe target seems to be slowly recovering pump on again
 - beam vacuum safely restored without breaking the differential window

Run 5373 Pedestal Run after recovering from power down.

Run 5374 ~~check~~ LEP run for checking all channels.

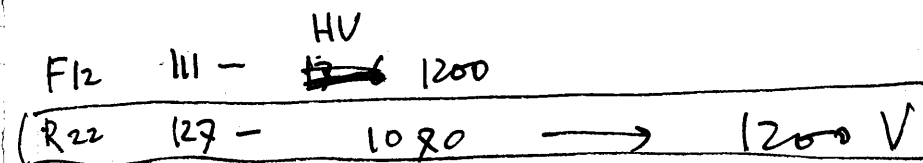
SWAP

ADC (original)		ADC new
111	4-16 ↔ 4-15 4- 8 ¹⁵	110 ¹¹⁰
127	4-32 ↔ 4- 31 4-24	119
176	6-29 ↔ 6- 30 6-21	168
* 194	7-31	
207	8-12 ↔ 8- 4 8-4	199
222	8-27 ↔ 8- 19 8-19	214

15:47 #5375 pedestal
 15:48 #5376 LEP

Channel	Status	Gain (QE)
111	OK	110 gain (QE) small
127	OK	119 small
176	OK	168 OK
207	OK	199 Bad shape?
222	OK	214 Bad

Tel 5882



ADC 194 BT 38 signal cable repaired

Summary

- R3 HV problem → recovered by HV channel swap.
- R22 (ADC 127) low QE (?) → HV raised to 1200 V (← 1080)
- BT38 signal shape Bad → recovered by repairing signal cable
- T29 (ADC 126) bad calib → recovered without no change.

Still Bad

- ✓ L4 HV down.
- ✓ L24 trip
- ✓ BK 1 (ADC 207) bad calib
- ✓ BK 13 (ADC 222) "
- ✓ F12 (ADC 111) low QE

Run# 5377 LED run (with Beam ON)

~~pedestal run~~

5378 Pedestal run

Bad Pedestal

64 L20 ~3 channels

105 F30 ~3 channels

T24 ABC
173

L4 61

~~APC 172 is missing since~~

APC 173, 172 ~~were swapped~~ have been swapped...

Who did it?

→ recovered

~~Run# 5379 Pedestal (Beam is ON)~~

~~" 5381 LED (")~~

17/10/03

Run# 5379 Pedestal (Beam ON)

5381 LED (")

APC 194 recovered (~~the~~ HV must be adjusted)

~7 x 10⁶

MSCB TROUBLE?

The circulation pump - LN₂ valve system seems not working. Beam blocker shut & control. Labview seems not to communicate with S600

17:40 PMT BT38 (corresponding to ADC #194) ~~not~~ HV set to 800V (it was 950)

LED intensity settings ~~not~~ increased by 1, so {92,...,102} → {93,...,103}, as many PMT's see very few photoelectrons at the first step.

Run # 5382 Pedestal (~~the~~ beam blocker still shut)

Run # 5383 LED (" " " ")

17:45 Xe Circulation ~~now~~ doesn't seem to work. Indicator of Xe flow displays ~0 lpm

MSCB - address of S600 was changed to 0xFFFF

IF it happens ^{again} Do following s

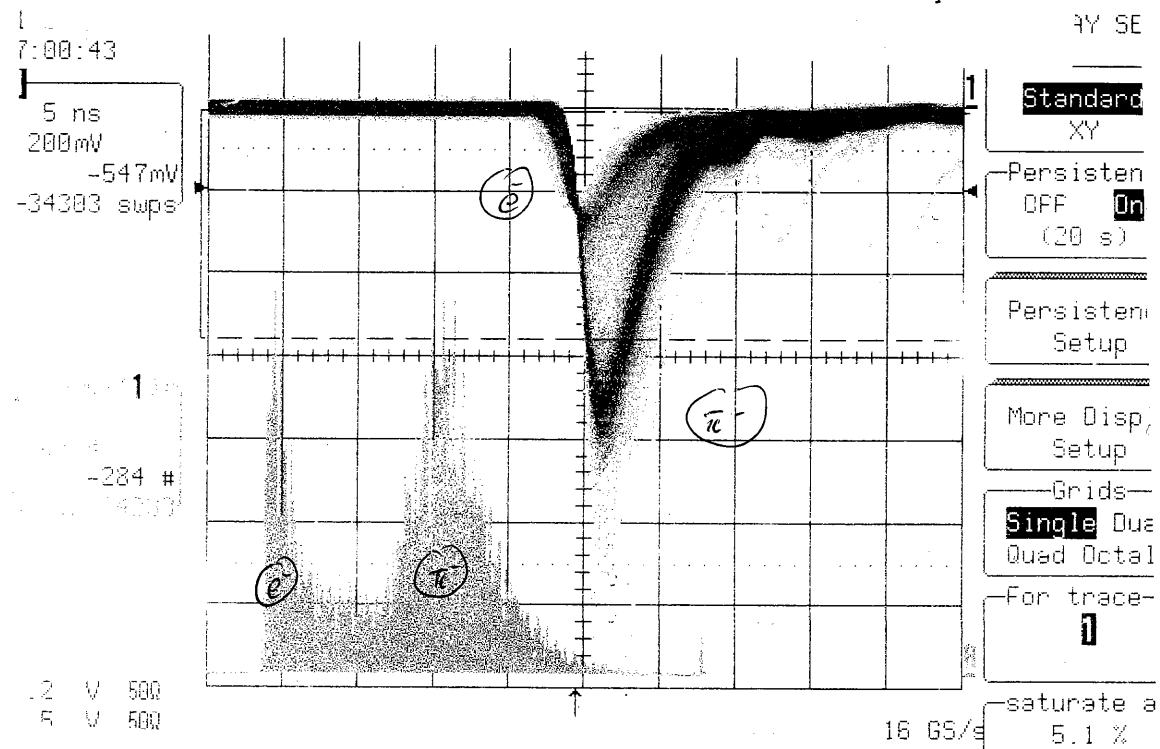
- stop labview
- open cygwin window on PStmp13
- % ~ /mscb/msc -d PStmp13:
- In msc program

(If you find a module whose address is changed)

- % a 0xFFFF ← current address
- % sa ① ① (for instance, the module's address should be ①)
- % exit (Address is written on module's face)
- restart labview

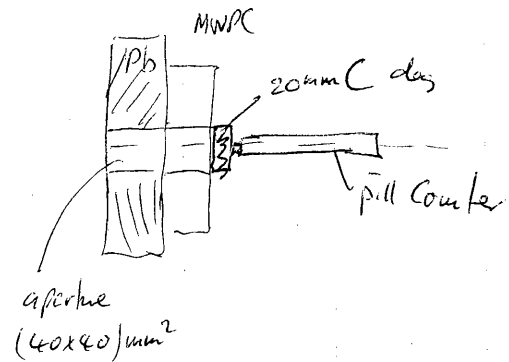
Initial π^- -beam tuning finished

with 20mm C degrader
upfront of pill



Actual Settings -- Sat Oct 11 16:40:30 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	575	0.1390	1.0
QTB52	-294	-0.0696	1.0
ASY51	-685	-0.1641	1.0
QSL51	-551	-0.1355	1.0
QSL52	1000	0.2437	1.0
ASL51	-11604	-0.1739	1.0
QSL53	-561	-0.1363	1.0
QSL54	851	0.2046	1.0
SSL51	0	0.0000	1.0
SSK51	0	0.0000	1.0
FSH51	110	0.2759	4.1
FSH52	200	0.2007	4.1
DSC51	0	0.0615	4.1
DSC52	370	0.3636	4.1
FS53-O	650	0.6496	4.1
FS53-U	650	0.6501	4.1
FS53-L	80	0.0796	4.1
FS53-R	80	0.0803	4.1



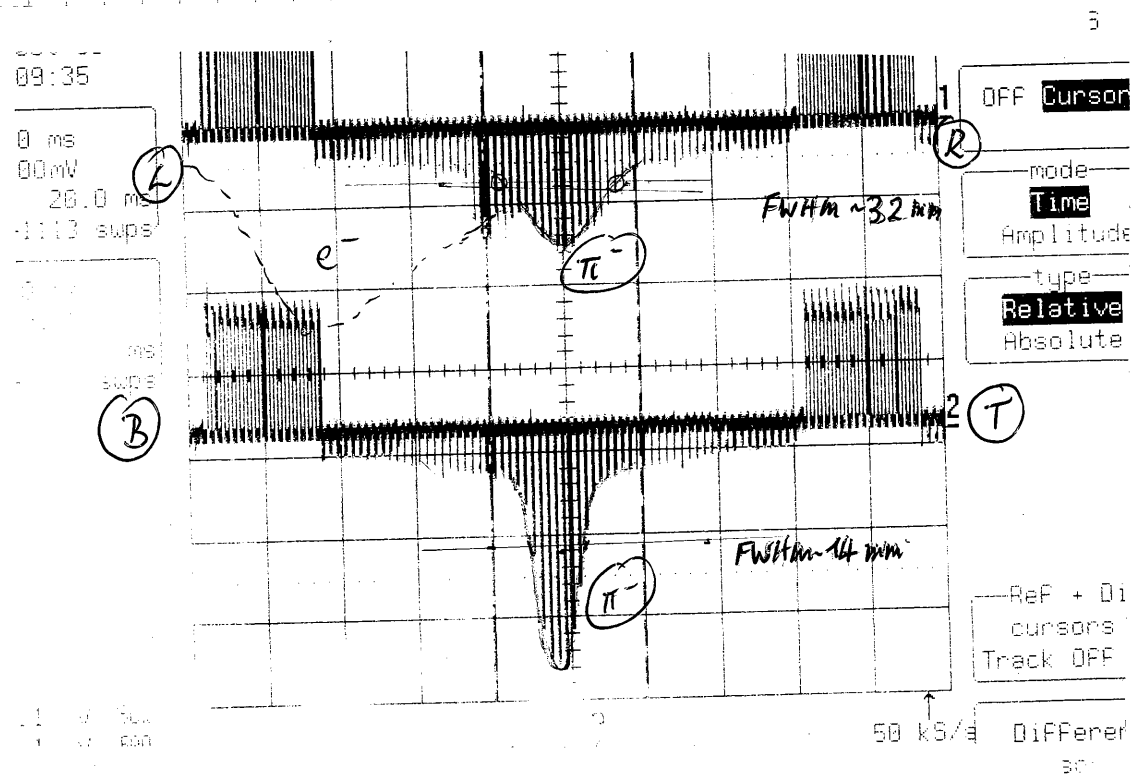
Pill position slightly
DS of wanted
position due to
degrader + MWPC

but this can be compensated
for with
QSC S3/S4

We now have intense π^- line

Rate ~ 11.1k p.u.RF/10⁵ pulses in 2mm pill
with present slit settings
0.576 sec 1773 μ A

Chamber profile



New Start profile measurement

Starting Rate	Pill (π^-)	115706 / 10 ⁶ p	with 20mm C
	Pill u.RF	111585 / 10 ⁶ p	Degrader upfront of
	Time	5.765 sec	Pill
			Dpill = 550mV
			HV = -600V

To do scan we remove 20mm C degrader.
Set Dpill = 346mV (pot) check on Scope threshold correct.

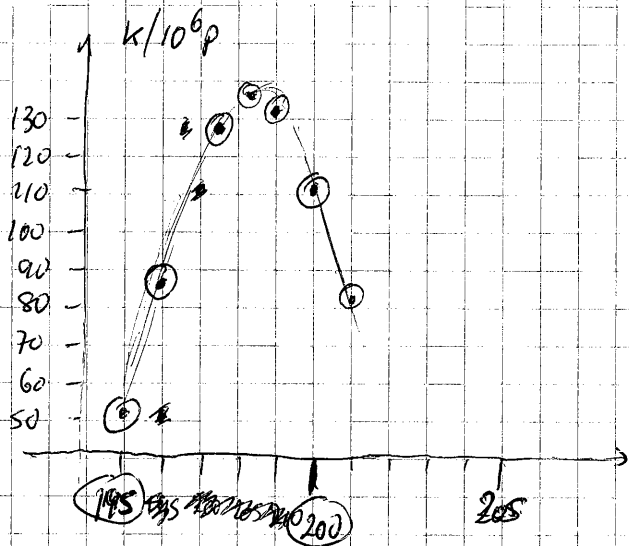
Scanner Central Coordinates

H: 139.4 mm
V: 197.3 mm

MAX 209
MIN 69
267 127

Set Vertical roughly to Max.

V 197.3 = 127890 pill-RF
200.0 = 111.0 k
195.0 = 51.0 k
205.0 = 6.1 k
196.0 = 87.3 k
201.0 = 80.1 k
199.0 = 133.3 k
198.5 = 136.7 k



Rough V. Centre 198.5

No 20mm C degrader!!!

$D_{pill}^{\pi} = 346 \text{ mV (pdt)}$
 $D_{pill}^{RF} = 200 \text{ mV (pdt)}$

$\bar{x} = 141.0$
 $\sigma = 7.743$
 $\Sigma = 537.93 \text{ k}/10^6 \text{ p}$

New horizontal Scan: V = 198.5 mm.

	(Pill all)/10 ⁶ p	(Pill π)/10 ⁶ p	(Pill-RF)/10 ⁶ p
140 mm	208.4 k	152.1 k	139.7 k
145.0	206.3 k	142.6 k	126.3 k
150.0	157.1 k	86.8 k	68.6 k
155.0	123.9 k	39.2 k	18.3 k
160.0	145.7 k	27.5 k	26.3 k
165.0	104.1 k	17.0 k	0.52 k
135.0	155.8 k	119.6 k	101.6 k
130.0	97.2 k	61.1 k	55.3 k
125.0	55.1 k	29.0 k	24.6 k
120.0	3.4 k	0.92 k	0.38 k

Set H: 141.0

Vertical Scan

200 mm	170.6 k	124.2 k	114.2 k
205 mm	20.7 k	8.7 k	6.1 k
206 mm	14.2 k	5.0 k	3.2 k
207.0	10.2 k	3.1 k	1.7 k
208.0	7.7 k	2.1 k	1.0 k
204.0	29.0 k	14.3 k	11.0 k
203.0	45.0 k	28.0 k	23.6 k
202.0	73.2 k	51.1 k	35.2 k
201.0	119.8 k	86.5 k	78.7 k
199.0	202.6 k	147.9 k	137.1 k

Vertical Scan Continued:

Pos	Pill all/10 ⁶ p	Pill π /10 ⁶ p	Pill-RF/10 ⁶ p
198.0	204.5 k	149.4 k	138.3 k
197.0	184.2 k	134.1 k	123.8 k
196.0	132.3 k	96.2 k	88.1 k
195.0	83.9 k	59.9 k	53.7 k
194.0	36.4 k	31.2 k	26.8 k
193.0	26.4 k	15.6 k	12.5 k
192.0	15.8 k	7.6 k	5.4 k

$\bar{x} = 198.3$
 $\sigma = 2.385 \text{ mm}$
 $\Sigma = 860.4 \text{ k}/10^6 \text{ p}$

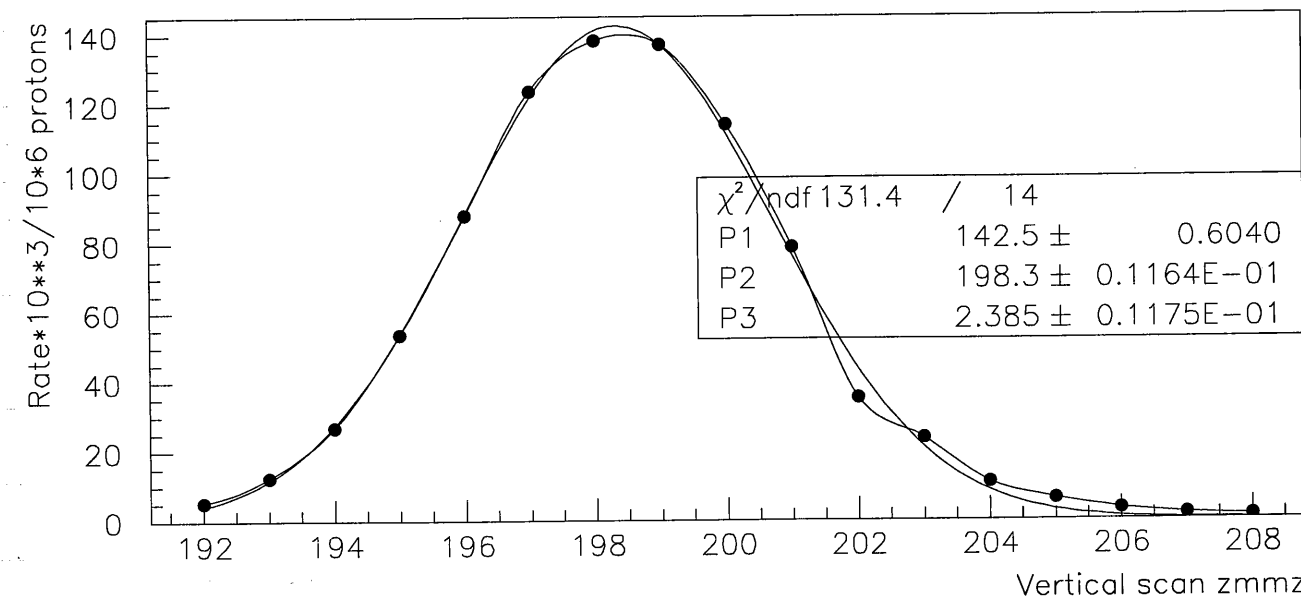
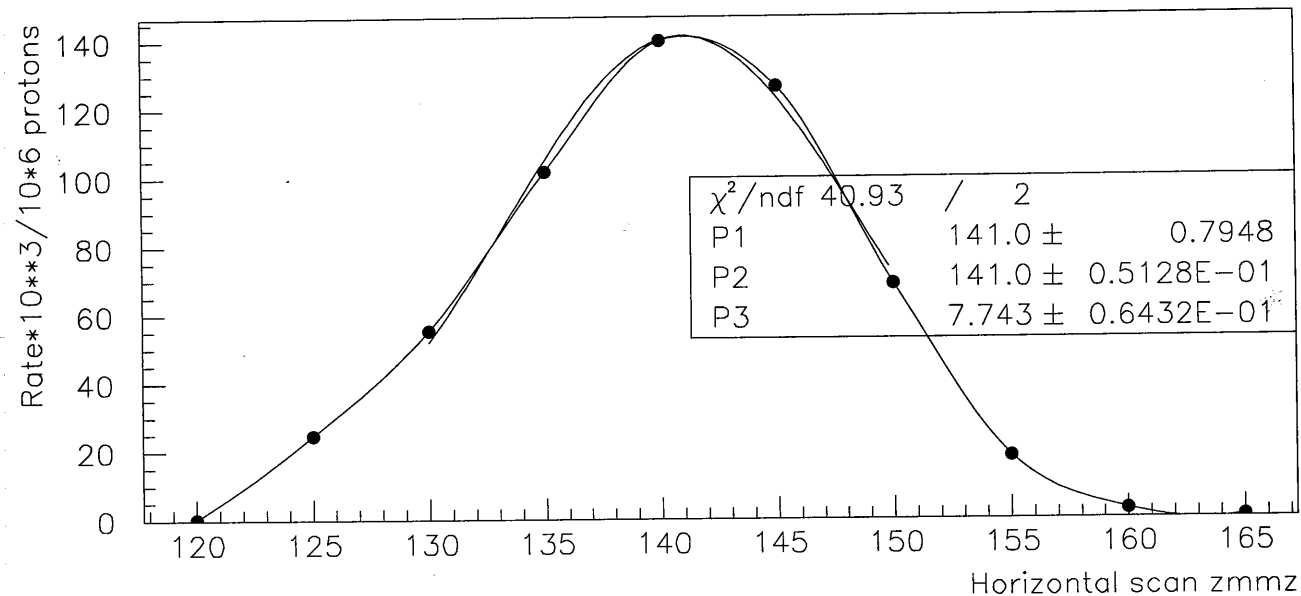
Rate @ Optimum:

H: 141.0
V: 198.3

Pill all = 201.7 k/10⁶p

Pill π = 147.2 k/10⁶p

Pill-RF = 135.7 k/10⁶p



Rate Estimate:

① Gaussian Approx: $R_{\pi} = 2 \frac{\Delta x \Delta y}{r_{pmt}^2} \cdot R_{pmt} = 2 \times 7.743 \times 2.385 \times 135.7 \text{ k}/10^6 \text{ p}$

$R_{\pi} = 5 \cdot 10^6 \text{ } \pi^- / 10^6 \text{ p}$ in coincidence with RF

$R_{\pi} = 5 \cdot 10^5 (\pi^- \cdot RF) / \text{MAS}$
 $R_{\pi} = 9 \cdot 10^5 \text{ } \pi^- \cdot RF @ 1800 \mu\text{A } 84 \text{ cm Tg}$

② Summation Method:

$$R_{\pi} = \frac{1}{R_{pmt}} \frac{\Delta x \Delta y}{\pi r_{pmt}^2} S_x S_y$$

$$= \frac{1}{135.7 \text{ k}/10^6 \text{ p}} \frac{5 \cdot 1}{\pi \cdot 4^2} 537.93 \text{ k}/10^6 \text{ p} \times 860.4 \text{ k}/10^6 \text{ p}$$

$R_{\pi} = 5.4 \cdot 10^6 (\pi^- \cdot RF) / 10^6 \text{ p}$

$R_{\pi} = 5.4 \cdot 10^5 (\pi^- \cdot RF) / \text{MAS}$
 $R_{\pi} = 9.8 \cdot 10^5 \text{ } \pi^- \cdot RF @ 1.8 \text{ mA } 84 \text{ cm Tg}$

This is still with the slab closed. Somewhat we can get more rate & towards the end of the beam period we will get 6 cm Tg E
 $\therefore R_{\pi} > \text{factor } 1.5$

Conclusion looks like we can achieve goal of a few Hz back-to-back γ -events in 5° opening angle !!!

N.B. We have a problem with ASC51 which I also noticed this morning but went away again

The Current sometimes is Not Stable but continuously goes down !!!

the optimal DAC = -11604 STABLE
 & ADC ~ -0.1739 Changes

$ADC = \frac{\text{Current}}{\text{MAX Current } 500 \text{ A}}$

We have to get Control group + Electrical group to look @ it on MONDAY

— So we call it a night & continue tomorrow with the SLIT Curves !!!

22:00 It is found that NIM PHILLIPS LEVEL TRANSLATOR (726) has been broken since this morning(?).

Every channel continues to output logical "1".

⇒ Not fixed.

RUN 5887 : α with shutter open

19:10 We decide to increase the HV for the BACK FACE PMTS

ADC	PMT.	GAIN	OLD HV	NEW HV
196	BK27	0.72	933	960
197	BK29	0.73	834	860
198	BK21	0.74	791	810
199	BK24	0.69	890	920
200	BK15	0.73	865	885
201	BK18	0.73	830	860
202	BK 9	0.72	905	925
203	BK12	0.78	860	865
204	BK31	0.80	891	905
205	BK 6	0.72	818	840
208	BK20	0.76	755	865
211	BK ?	0.80	771	775
215	BK11	0.65	682	710
217	BK 5	0.79	812	825
220	BK 19	0.76	706	730
221	BK 22	0.79	684	710
222	BAD	—	844	—
223	BK16	0.77	866	880
225	BK10	0.7	801	830
226	BK 2	0.66	827	866
227	BK 4	0.64	860	860

1eb_031011_nsi_2.lv

RUN 5388 LED to check pins
 RUN 5391 PED - shutter open
 RUN 5392 LED - " "
 RUN 5393 α - shutter open

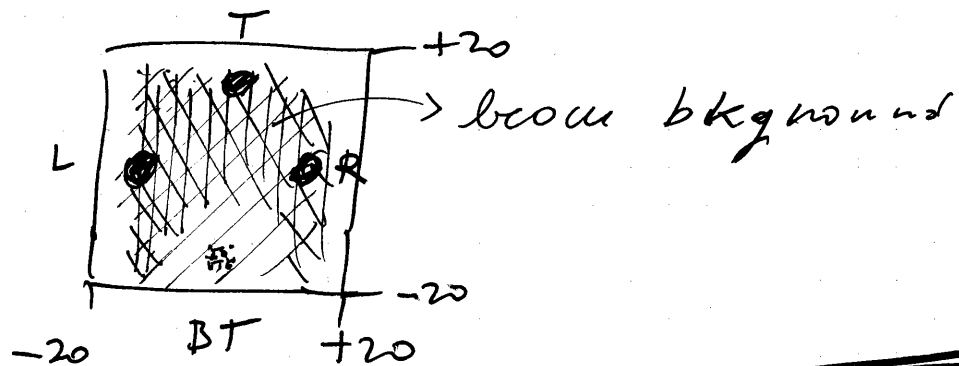
|GOOD|
 RUNS

Changed ODB equipment/hv/setting R3 L4 swapped
 ADC15

since this morning

\rightarrow 5387
 In the α -RUN the bottom α triggers less than the others.
 The trigger required 2 PMTs over threshold for the
 source (while 1 PMT $>$ thresh for T, L, R).
 We changed in order to have 1 PMT $>$ thr
 also for BT α , BUT NOTHING CHANGED!

I.E. RUN 5393:



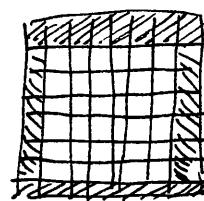
FROM HERE TO 13/10 h. 14:40
 BAD GATE TO LXe !!
 00

12/Oct./2003.

02:46 LN₂ empty. Circulation Stop.

High N₂ tank exchange. 100L \rightarrow 100h.

Circulation Restart.



~04:00 Veto logic for cosmic ray events rejection @ NaI is installed.

We find the output pulse shape & straggle.

$\rightarrow \Sigma(\text{NaI @ outer})$.

We are going to look for the new FI/FO module, ~~on Sunday~~

4:11 Run # 5394. pedestal run.

Run # 5395. LED calibration run.



Now, VIM level translator was broken (\Rightarrow see Kenji's report, yesterday)

so, we turn off the "LED & PED" switch (from CLOCK),
 for the cosmic ray data taking.

Notice!! Turn ON when next pedestal & LED run.

4:31 RUN # 5396. Cosmic ray run. Start.

(Trigger event limit is increased 30000 \rightarrow 300000.
 Because, we hope to fit the bandau peak @ NaI.)

~~High Voltage haven't applied~~ to one of the TC for Cf
 After we change the setting of HV, midas doesn't work correctly.

6:37 RUN # 5397 Cosmic Ray

\rightarrow Stopped! 7:03

☹ We have been applying old HV setting (R3 and L4 wasn't swapped!)
 \rightarrow Edit odb (Now. HV of R3 \approx 900V, HV of L4 = 0).

7:06 RUN #5398 Cosmic Run
 9:33 stop 5398
 9:35 #5399 CR
 9:43 ~~#5399~~ #5401 Cosmic Run

Trigger logic replaced.

threshold = -100 mV

level adapters.

USE [TTL → NIM PSI LC100 Level converter
 NIM → ECL PHILIPS 7106
 (ECL OUTPUT Discriminator inserted in station 1 of the 0th CAMAC CRATE)

→ We should be able to take "LED", "PEP", "Cosmic" etc by computer control.

#5402 Pedestal run (computer control only) (ok)
 #5403 LEP " " (ok)

This way is used for

- Computer control
- TDC common start

#5404 α (ok)

10:18 am #5405 Cosmic Run (NaI + Xe)

event rate 2.0 Hz (beam off)

12/Oct/2003

10:25 HV 1-1 (HV trip)

11:17 stop 5405

Beam on

11:18

11:18

#5406 CR beam on event rate ~ 16 Hz

stopped by event limit (30000)

12:37

#5407 CR

15:00

LN2 empty stop circulation

change LN2 tank 100l → 100l

restart circulation

Pedestal long-term stability was checked.

a result is found @ /home/muegamma/~~office~~ users/satom/res/results.text.

16:00

#5408 Pedestal Run

beam blocker closed

#5409 LEP

Run 5410 α-source

16:35 The DAQ works properly as long as FastBus TDCs are not concerned.

On the contrary, if RO-FB-TDC-1875 is defined, ^{neither} the ADC gate nor TDC common start signals are driven. The register NIM OUT 1 on SIS4100 NGF, which is used to toggle the LAM enable, is no longer generated, while it was properly set when RO-FB-TDC-1875 was undefined.

Therefore, there ~~are~~ might be some ^{hardware} troubles with one of the TDC boards.

16⁴⁰ Beam tuning cannot go on at present until repair of ASL51 Magnet Power Supply / control logic - the current is not stable long term, there are periods when OK for a couple of hours, then becomes unstable & current decreases. I will get the electrical group / control group to look @ it tomorrow morning (Monday)

Managed to find a few hours of relatively stable time to do Slit-Curve Measurements:

ASL51 re-optimized - hence new values !!! See below

Actual Settings -- Sun Oct 12 14:24:30 2003

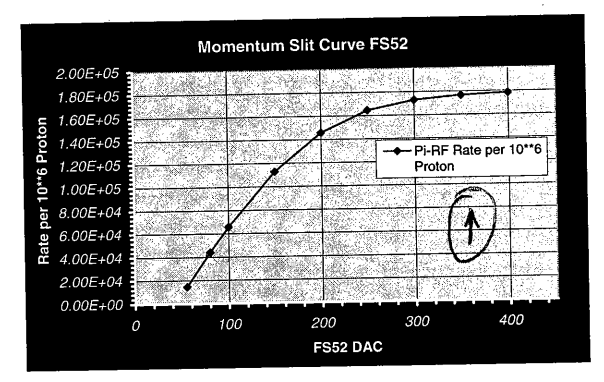
Device	DAC	ADC	Scaling
QTH51	1282	0.3099	1.0
QTH52	-652	-0.1563	1.0
QTH53	0	0.0000	1.0
ASZ51	-2755	-0.2020	0.3
QTB51	575	0.1390	1.0
QTB52	-294	-0.0696	1.0
ASY51	-685	-0.1641	1.0
QSL51	-551	-0.1355	1.0
QSL52	1000	0.2437	1.0
ASL51	-11594	-0.1736	1.0
QSL53	-561	-0.1365	1.0
QSL54	851	0.2046	1.0
SSL51	0	0.0000	1.0
SSK51	0	0.0000	1.0
FSH51	110	0.2755	4.1
FSH52	350	0.3509	4.1
DSC51	0	0.0496	4.1
DSC52	370	0.3636	4.1
FS53-O	500	0.5011	4.1
FS53-U	500	0.5009	4.1
FS53-L	80	0.0759	4.1
FS53-R	80	0.0811	4.1

≡ 86.8 Amps

MWPC τ_c - horizontal profile centred with this current !!!

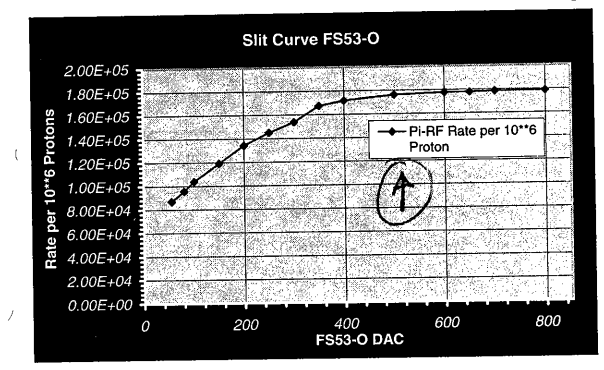
Slit Curves

Dac FS52	Pi-RF Rate per 10 ¹⁶ Proton
400	178500
350	176600
300	173000
250	164600
200	145700
150	112900
100	65800
80	44100
55	14500

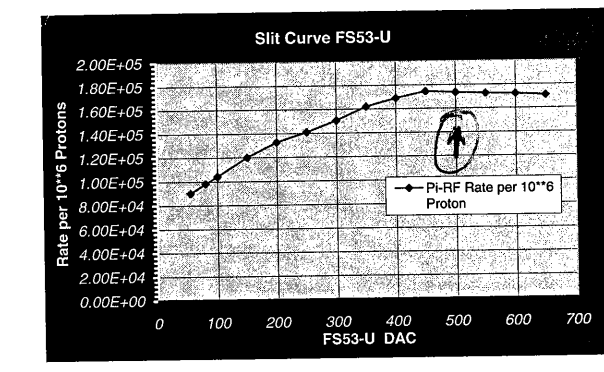


2mm Pill x RF
We want $\Delta p/p = \pm 1\%$
for run $\approx \pm 350$ DAC

Dac FS53-O	Pi-RF Rate per 10 ¹⁶ Proton
800	178800
700	178400
650	177900
600	177600
500	176200
450	171000
400	171700
350	167300
300	153800
250	145000
200	134300
150	119300
100	103900
80	95600
55	86900



Dac FS53-U	Pi-RF Rate per 10 ¹⁶ Proton
650	171000
600	172200
550	172700
500	173500
450	174600
400	169000
350	162100
300	150600
250	141000
200	132700
150	120200
100	104100
80	98200
55	90200



Measured Rate with FS52 = ± 350 $\Delta p/p \sim \pm 1\%$
FS53 o/u = 500

(Pi-RF) $R_{pill} = 170.2 \text{ k} / 10^{16} \text{ p}$
 $> 25\%$

c.f. yesterday ~~135.7~~ $135.7 \text{ k} / 10^{16} \text{ p}$
FS52 = ± 200

12/Oct./03.

NaI data taking status.

the problem (10/10 (2003) which the CR trigger rate of NaI was too high. was solved.

one channel of Discriminators was always 1. logic fan-out was also bad. → changed the channel.

Now the trigger rate of CR trigger rate of NaI ~ 2 Hz o.k.

Checking the

E-sum trigger & CR-veto. } @NaI side.

0	1	2	3				7
8							
16							
24				27	28		
32				35	36		
40							
48							
56							63

$$E_{sum} = NaI(27) + NaI(28) + NaI(35) + NaI(36)$$

#5411.

22:20. pedestal run.

22:23 #5412. NaI Esum-trigger ($V_{th}=200mV$).

w/ CR veto, BEAM ON.

(triggering rate ~ 0.7 Hz. (~ 25000 events/hour)).

13/Oct/2003.

02:19 Stop the RUN #5412. ~ 10000 events taken.

02:22 #5413 NaI Esum-trigger ($V_{th}=200mV$)

w/ CR veto. Beam OFF.

03:03 Stop the RUN #5413, (~ 0.15 Hz). These events are triggered by cosmic ray which aren't rejected by CR-veto.

13/Oct./2003.

03:16. RUN #5414. pedestal RUN. BEAM blockers CLOSED.

⇒ ALL channels OK.

03:19. RUN #5415. LED calibration RUN. "

03:44. RUN #5416. X-ray run. "

04:06. RUN #5417. NaI Esum-trig. $V_{th}=150mV$. BEAM ON.

Stopped & remove the data file.

NaI gain calibration from cosmic ray data of #5396 was done. ~ 6% deviation around MIP peaks. this could be more precise when # of events will be available. larger

gain graph.

04:10.

RUN #5417. start.

⇒ See next page!

(Attenuator of NaI36 is modified)

-20dB ⇒ -23dB.

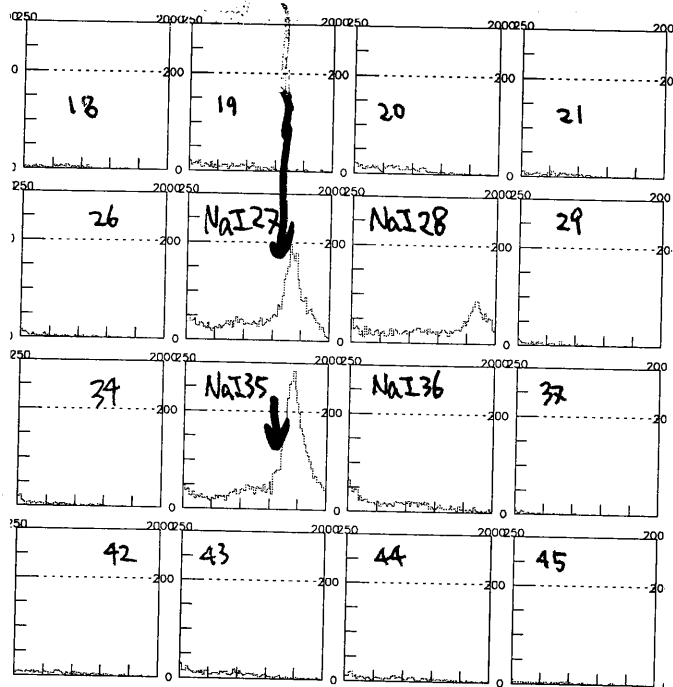
04:30 Lig. N2 tank exchange 100l → 100l.

05:09 circulation flow stopped. ☹️ circulation pump had stopped!

Unable to ~~turn on~~ restart the circulation pump via Labview (No response from the Lab view).

Now, Circulation STOP.

13/Oct/2003. Trigger threshold maybe trigger here. ~ 90 MeV (Fine calibration is not done still now)



The 1st Spectra (NaI) from stopped π at pill counter.

RUN # 5412. (see previous page).

- ▶ Triggered by 4NaI sum (center 4NaI).
- Trigger signal is generated by the energy sum of NaI, only. We don't require the LXe information and RF signal.

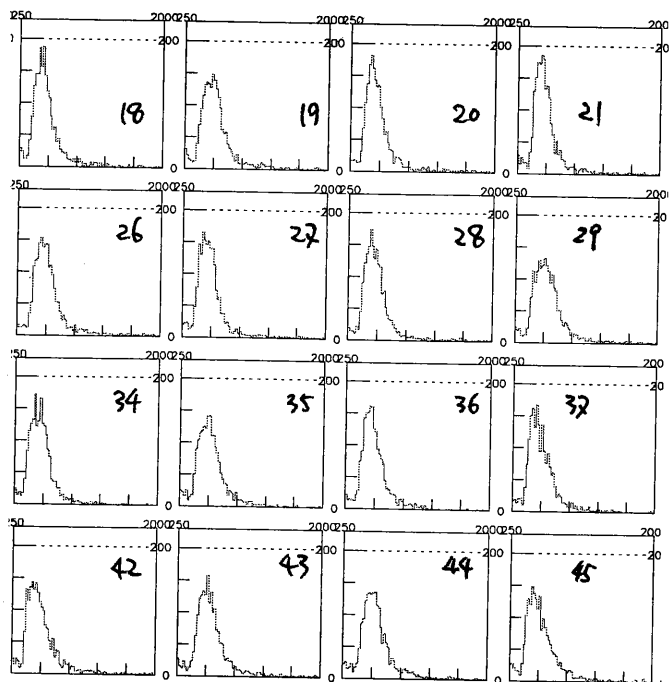
← Upstream

~~NaI 36~~ NaI 36 energy spectrum has no peak. \Rightarrow Overframe events...

So, we modified the attenuator of NaI 36, (-20dB \rightarrow -23dB).

~~NaI 36~~ on RUN # 5417.

and we also modified the threshold level of E-sum trigger (-200 mV \Rightarrow -150 mV).



← NaI energy spectra triggered by CR (NaI self). (RUN # 5396).

It seems the centre 4x4 NaI modules are calibrated correctly.

NaI 36 is NOT strange.

Why this PMT has no peak @ #5412?

13/Oct/2003.

→ The RUN # 5413 is taken as same setup of RUN # 5412 but in this RUN, Beam blocker was closed.

Counting rate ~~was~~ decreased: 0.7 Hz \Rightarrow 0.15 Hz.

And the 80 MeV peak disappeared!!

So, we could confirm the energy spectra (@ #5412) are from the Beam.

→ Concerning the energy spectrum @ LXe.

Unfortunately, Q-sum of LXe has no significant entry @ #5412.

Does the timing of NaI give rise to distortion from the LXe???

→ On the RUN # 5417:

▶ the 80 MeV peak is not appeared @ NaI 36 still now. and the peak of NaI 27 disappeared!!

▶ Attenuated channel is correct?? \Rightarrow Iwamoto-san?

06:33 #5417. stopped, ~10000 events taken.

We checked the attenuation channel.

\Rightarrow D-4 (NaI 27) was attenuated! It's wrong!! Now, we modified the attenuation channel, NaI 36. (-20dB \rightarrow -23dB).

06:44 RUN # 5418, same as previous setting. Start.

~7:15 Run stopped

7:20 Beam (ASL51) not properly tuned for π^- !!

don't know the situation for RUNs 5412-5418.

But since the spectra in Run 5418 are similar to those in Run 5412, suspect that we just observed only electron background (Brems)...

9:?? or 10:?? Circ. Pump restarted.

13/Oct/2003

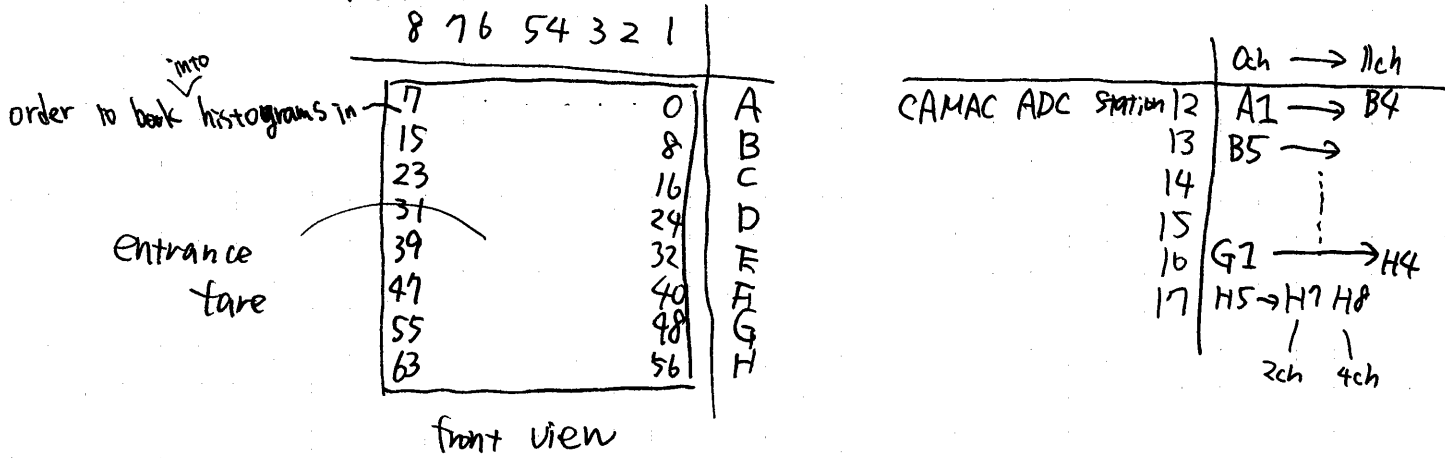
13/Oct/2003

9:20 #5419 pedestal run

9:21 #5420 LE run

9:49 #5421 d run.

modified histogram names of NaIs.



9:58 #5423 Cosmic Run (NaI or Xe trig)

◎ TDC problem was resolved.

It was found FB TDC in slot 23 (slot 6 by TERAS beam test) was broken to block FB busline and to disturb LAM signals of ADCs and TDCs.

The broken TDC is now being fixed by SM. (Maybe problem with FUSE?)

CURRENT ODB STATUS.

- ◻ /Ana / Module sw / --- All "y"
- ◻ /Ana / Bank sw / --- Both 'TIMG' and 'HIST' are "1". The others = "0".

Number of Army elements.

- ◻ FTDC --- 128 (slot 21 + slot 19) FB TDC
 - ◻ CTDC --- 64 (Station 19+20+22+23) CAMAC TDC
 - ◻ TTDC --- 128+64
 - ◻ WTDC --- 128+64
- } for TDC calibration.

If the broken TDC could be fixed,

- recover parameter ~~*****~~ N_FTDC ^{to 192} ~~*****~~ in "analyzer.h"
- remove the coment over {~~8~~, 64} in CHANNEL_MAP tdc-map in "fronthead.c"
- install the fixed TDC into slot ~~17~~.
- finally, compile "FIAL".

11:30

Electrical Group + Control Group have checked ABLS1 Magnet found a defective switch in the regulator circuit which has been temporarily bridged - Make beam & see if Magnet now stable?

Optimize ABLS2 in Ti-RF optimum DAC = -11592
ADC = -0.1734 *

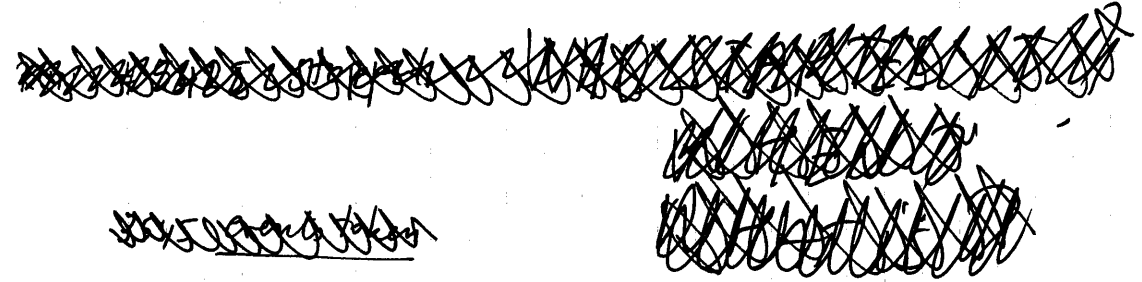
* This is value to watch as well as the horizontal τ -profile in chamber should be centered.

11:57

Problems with Accelerator ion Source Cooling

No beam in near future !!!

14:10



The beam seems alive now!

14:30 The ADC gate was found to be ~~90~~ **90** ns wide! It should be ~600 ns!! That's why:

- 1) The average pedestal value dropped in the last runs.
 - 2) The various peaks ~~at~~ ^α ~~cosmics~~ were lower (or nothing is seen in LXe)
 - 3) Who knows what are we integrating.
- SO: BEWARE OF THE PREVIOUS RUN!

[Just rotating one knob we restored the original 600 ns gate.]

14:45 Pedestal run # 5425 (the beam shutter is open, hence beam on)

5426 LED RUN @ 10^6 This run is not good we must take calibration with beam off.

15:10 #5427 α RUN with background on

17:00 The threshold for NaI self trigger (center 4 NaI's sum) was changed from -160 mV → -85 mV

17:05 # 5428 Beam ON NaI Esum-trig $V_{th} = -85 mV$

17:25 Xe flow rate reduced down to 7.5 lpm

Run # 5428

NaI E5 (36th counter) ~~is~~ seems not to take part in trigger....

We will check it.

↓
found that a cable was disconnected for NaI E5.

5429 died by online problem (artificial).

54~~29~~³⁰ 17:37 42 30000 events.

NaI Trig, $V_{th} = -85 mV$, with Cosmic Veto.
Beam is ON.

* π beam tune.

* pill counter is at center of beam profile.

17:52

5431 Pedestal Run (Beam ON)

17:55

5432 LED (Beam on)

18:02 # 5433 α (Beam on)

18:10 Main part of Beam tuning finished.

ASLS1 Magnet seems OK up to now i.e. Stable

DAC -11578 ADC = -0.1734

Remaining Slit Curves:

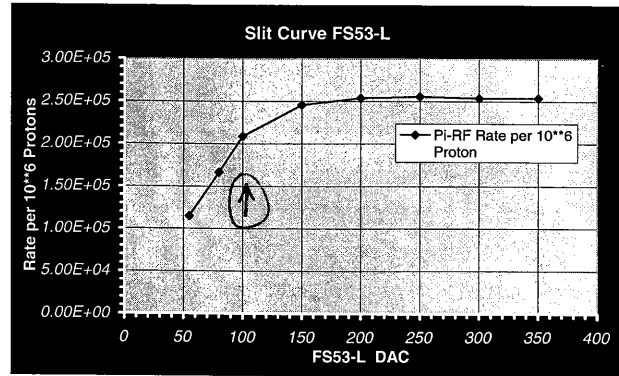
Slit Curves FSS3 L/R.		ASLS1 -11578 -0.1734 ADC.
FSS3L	P11-RF/10 ⁶ p	FSS3R = 80
80	166.5k	
100	208.7k	
150	245.6k	
200	253.7k	
250	255.7k	
300	254.0k	
350	253.9k	
SS	115.0k	

Set 100

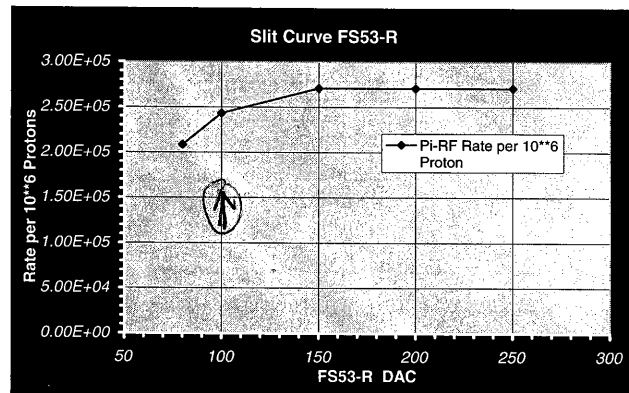
FSS3R	P11-RF/10 ⁶ p
80	208.5k
100	243.3k π > e
150	271.0k e π > π
200	271.0k e > π
250	271.0k

Set 100

Dac FS53-L	Pi-RF Rate per 10**6 Proton
350	253900
300	254000
250	255700
200	253700
150	245600
100	208700
80	166500
55	115000



Dac FS53-R	Pi-RF Rate per 10**6 Proton
250	271000
200	271000
150	271000
100	243300
80	208500
55	



Slit setting 100/100 chosen because of S/N if we goes to values > 100 electron contamination rises & e^- peak pulsed spectrum > π^- peak !!!

optimize QSL53/54

$R(p_{\pi} \cdot R_F) = 243.0 \text{ k} / 10^6 \text{ p}$ $1783 \mu\text{A}$
 $D_{\text{pion}} 346 \text{ mV (pot)}$ 5.706 sec

PH10
 P11 D001.hf
 MWD0 D002.hf

New Profile Scan

Horizontal Scan V: 198.2

Horz	$p_{\pi} \cdot R_F / 10^6 \text{ p}$	π^-
140	238.4k	240.0
145	228.7k	229.6
150	151.3k	151.9k
155	63.3k	62.1k
160	73.1k	13.0k
165	1.6k	1.5k
135	182.7k	178.6k
130	108.3k	109.4k
125	51.9k	51.1k
120	1.1k	1.0k

$\bar{X} = 141.4 \text{ mm}$
 $\sigma = 8.622 \text{ mm}$
 $\Sigma = 1039.6 \text{ k} / 10^6 \text{ p}$

$D_{\text{pion}} = 165 \text{ mV} !!!$

Horz	$p_{\pi} \cdot R_F / 10^6 \text{ p}$
140	367.6 k
145	376.5 k
150	320.5 k
155	269.0 k
160	306.9 k
165	181.1 k
170	6.9 k
135	281.5 k
130	191.0 k
125	107.6 k
120	7.3 k

Cut ->

PTO

Profile Scan continued:

Set H: 141.4

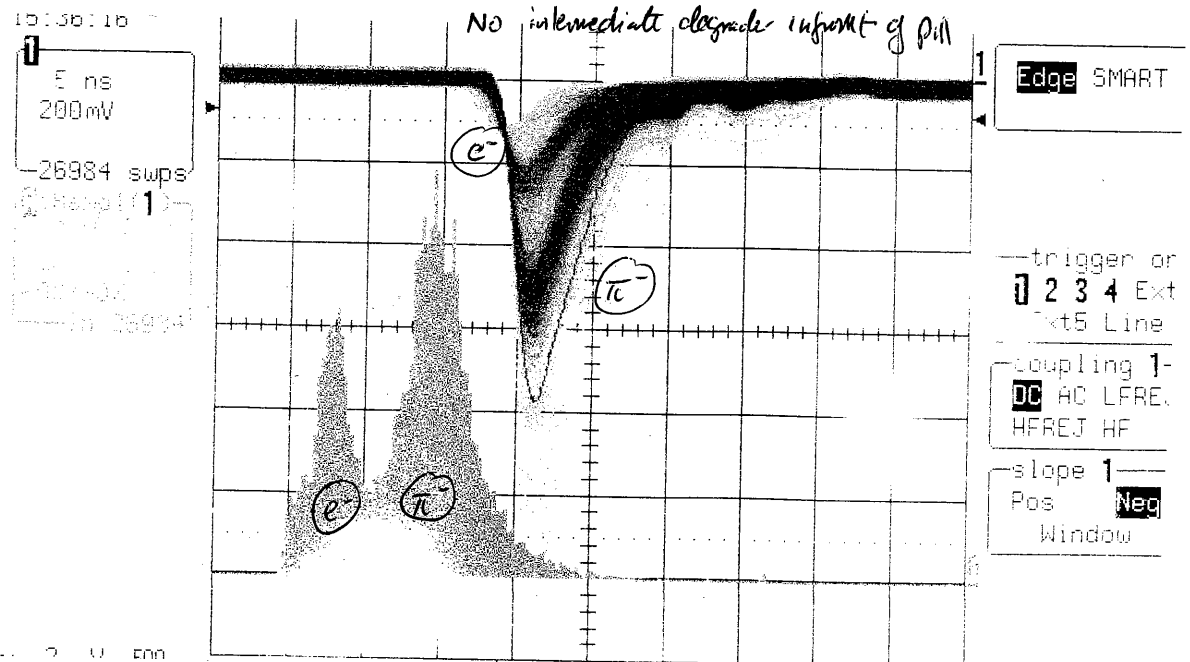
Vertical Scan:

Vert pos	$p_{\pi} \cdot R_F / 10^6 \text{ p}$	$p_{\pi} \cdot R_F / 10^6 \text{ p}$
200	301.3 k	192.9 k
201	212.5 k	132.4 k
202	133.4 k	77.2 k
203	82.9 k	39.1 k
204	60.6 k	21.7 k
205	44.6 k	12.4 k
206	31.5 k	7.06 k
207	23.9 k	4.39 k
208	17.7 k	2.45 k
209	14.1 k	1.57 k
210	11.4 k	0.93 k
199	361.2 k	233.4 k
198	376.3 k	243.6 k
197	333.6 k	214.4 k
196	251.3 k	159.2 k
195	157.2 k	94.8 k
194	89.2 k	47.5 k
193	56.3 k	24.9 k
192	37.9 k	12.9 k
191	26.6 k	6.95 k
190	19.6 k	3.97 k
189	15.0 k	2.36 k
188	12.1 k	1.45 k
187	10.3 k	0.96 k

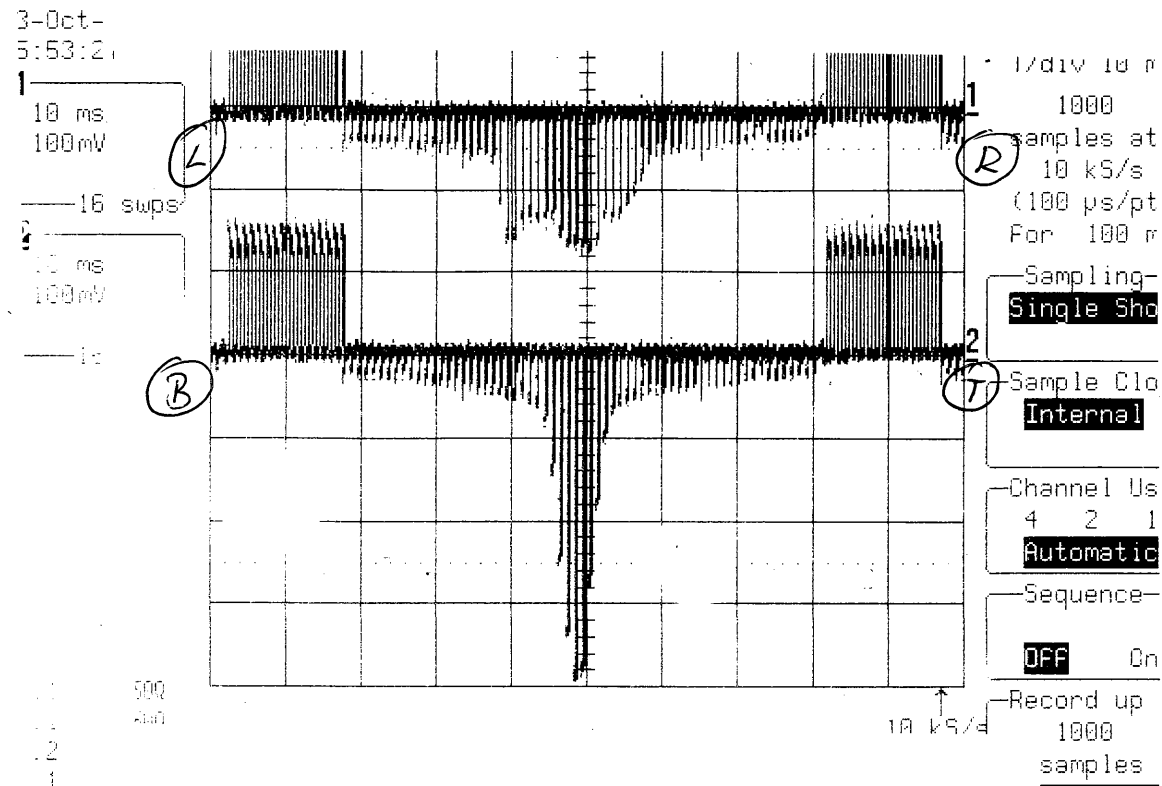
24 pts

$\bar{X} = 198.3 \text{ mm}$
 $\sigma = 2.45 \text{ mm}$
 $\Sigma = 1538.49 \text{ k} / 10^6 \text{ p}$

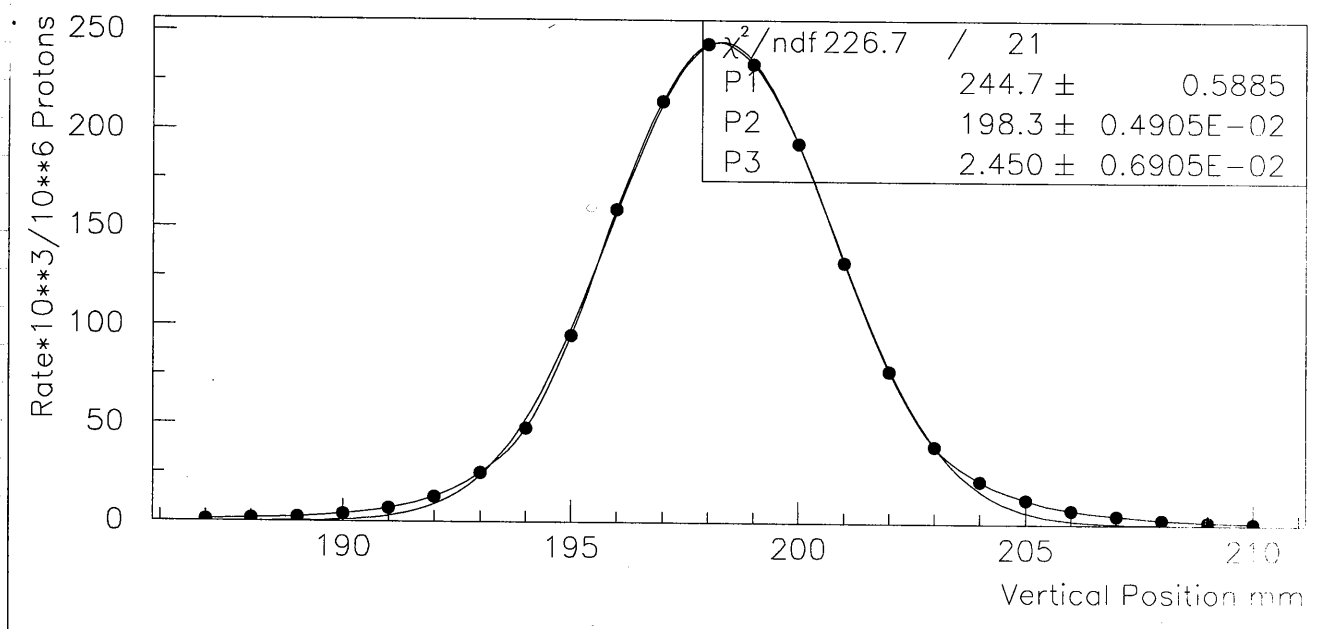
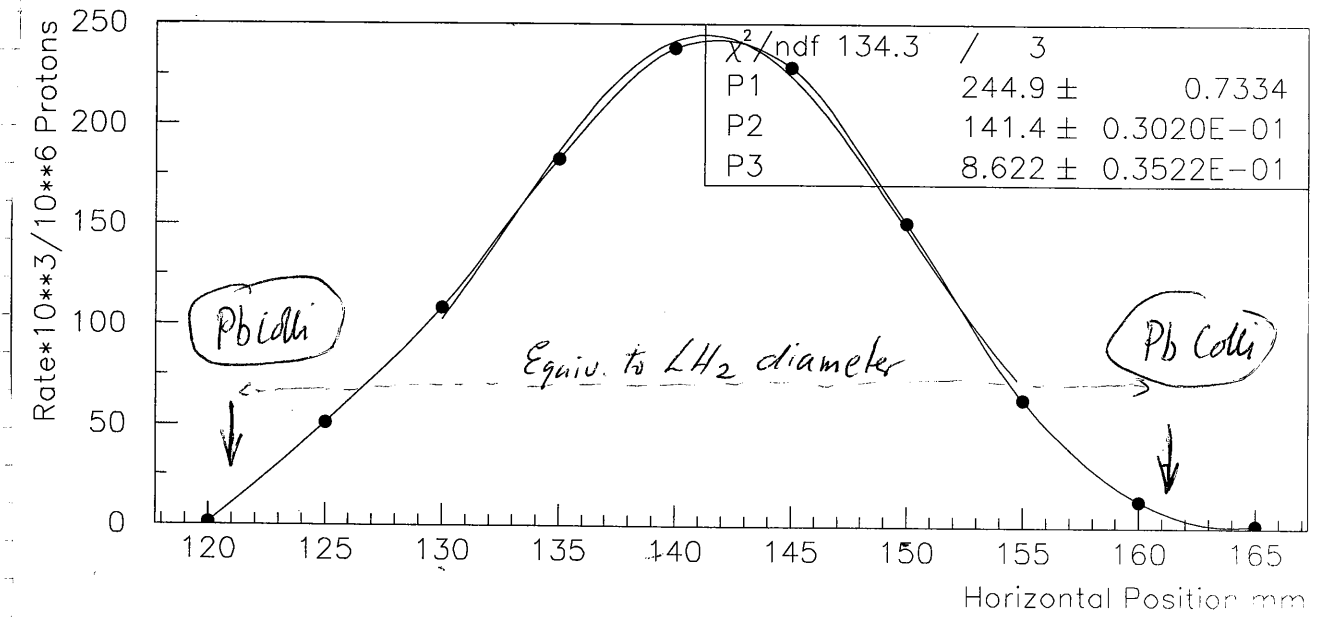
Rate @ MAX H: 141.4 = 244.8 k / 10^6 p
 V: 198.3



Beam profile after Pb-Collimator ~ 50mm upstream of focus @ pill



π^- Beam Profile @ focus (pill) ~ 50mm DS of Centre of Chamber



Meg 11 pi. set

Actual Settings -- Mon Oct 13 18:20:40 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	575	0.1390	1.0
QTB52	-294	-0.0694	1.0
ASY51	-685	-0.1641	1.0
QSL51	-551	-0.1355	1.0
QSL52	1000	0.2437	1.0
ASL51	-11578	-0.1734	1.0
QSL53	-560	-0.1360	1.0
QSL54	853	0.2051	1.0
SSL51	0	0.0000	1.0
SSK51	0	0.0000	1.0
FSH51	110	0.2757	4.1
FSH52	350	0.3512	4.1
DSC51	0	0.0491	4.1
DSC52	370	0.3636	4.1
FS53-O	500	0.5011	4.1
FS53-U	500	0.5009	4.1
FS53-L	100	0.0991	4.1
FS53-R	100	0.1009	4.1

This would suggest that we can stop most of π^- in LH2 target with $\Delta P/p \sim \pm 1\%$
 \therefore Expect back-to-back photon rate from CEK within 50 opening angle
 $\sim 10\text{Hz}$

Rate estimate:

① Gaussian: $R = \frac{2\sigma \sigma_y R_{\text{pill}}}{\sqrt{\pi}} = \frac{2 \times 8.622 \times 2.45 \times 244.8 \times 10^6 \text{p}}{\sqrt{\pi}} = 1.03 \cdot 10^7 / 10^6 \text{p} \approx 1.03 \cdot 10^6 \pi \cdot RF / 10^6 \text{p} \approx \text{MAS}$

$R_{\pi} = 1.03 \cdot 10^6 (\pi \cdot RF) / \text{MAS}$
 $R_{\pi} \approx 1.9 \cdot 10^6 (\pi \cdot RF) \text{s}^{-1} @ 1800 \mu\text{A} \ \& \ 4 \text{cm TG}$

② Summation: $R = \frac{1}{R_{\text{pill}}} \frac{\Delta x \Delta y}{\pi r_{\text{pill}}^2} S_x S_y = \frac{1}{244.8 \times 10^6 \text{p}} \frac{1538.49 \times 10^6 \times 1039.6 \times 10^6 \text{p}}{\pi \cdot 1^2} = 1.04 \cdot 10^7 / 10^6 \text{p}$

π^- FLUX after Tuning

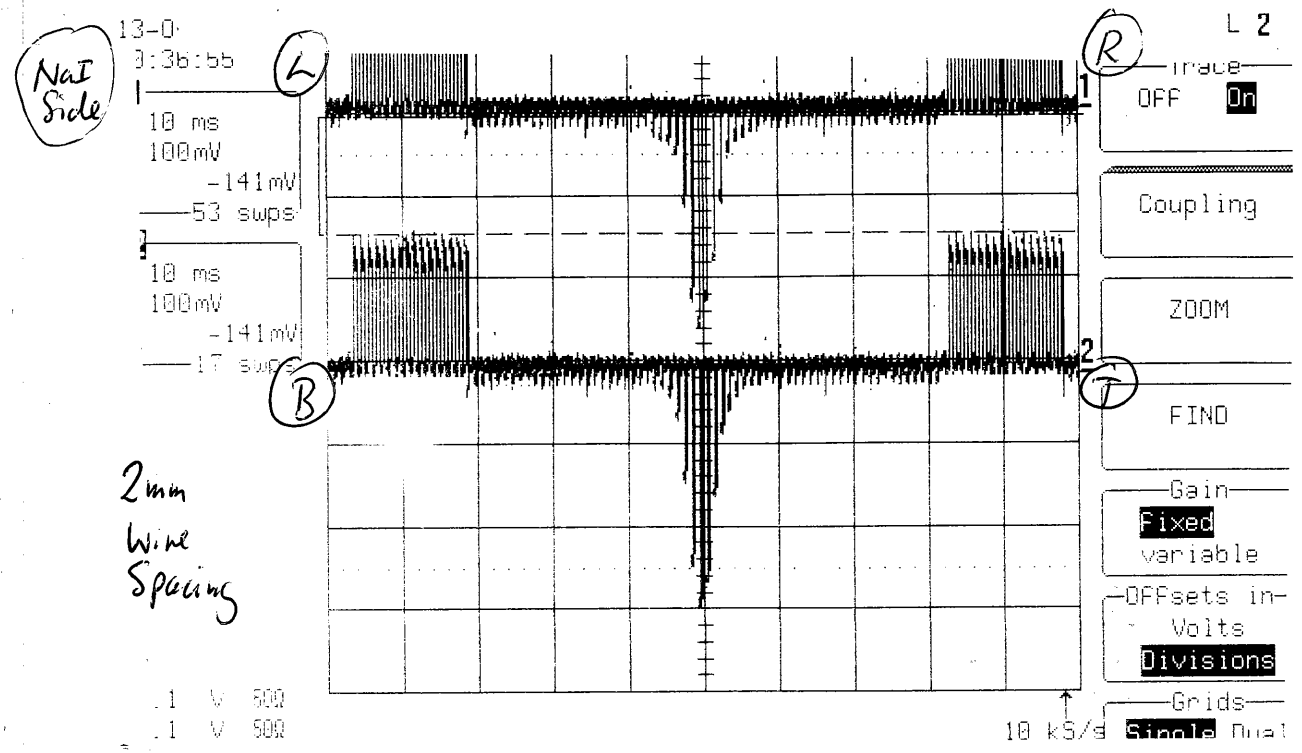
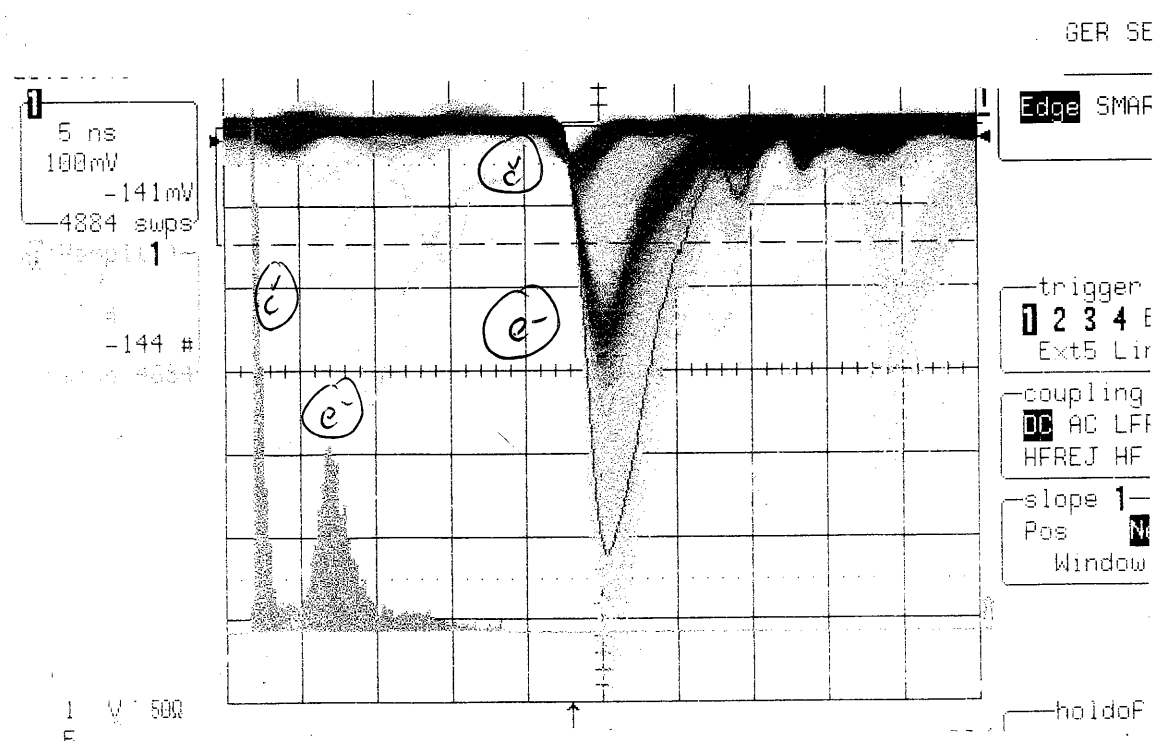
$R_{\pi} = 1.04 \cdot 10^6 \pi \cdot RF / \text{MAS}$
 $R_{\pi} \approx 1.9 \cdot 10^6 (\pi \cdot RF) \text{s}^{-1} @ 1800 \mu\text{A} \ \& \ 4 \text{cm TG}$

Electron Beam Study No intermediate degrader

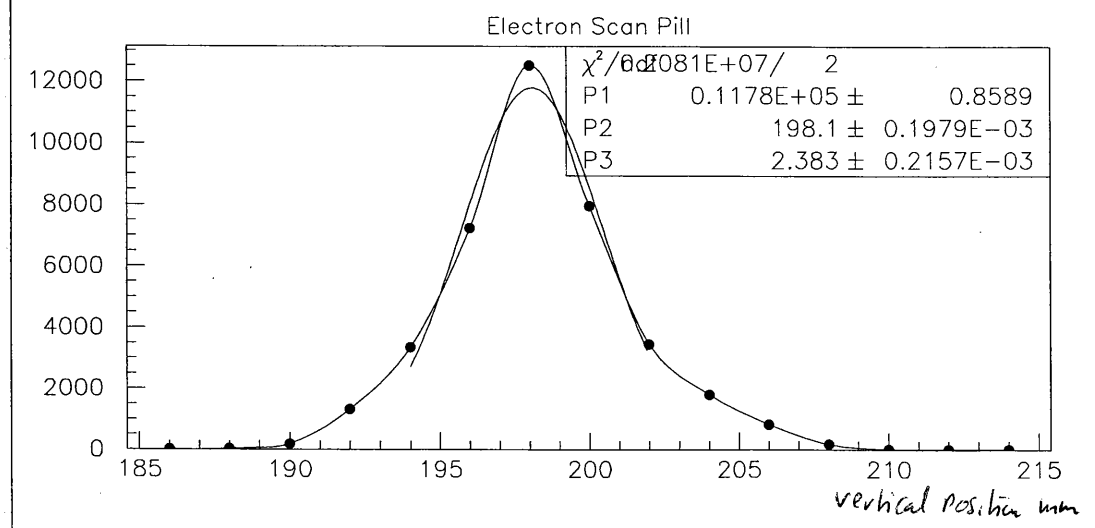
meg11e.set
Actual Settings -- Mon Oct 13 20:20:30 2003

Device	DAC	ADC	Scaling
QTH51	1156	0.2794	1.0
QTH52	-397	-0.0945	1.0
QTH53	0	0.0000	1.0
ASZ51	-2755	-0.2020	0.3
QTB51	506	0.1223	1.0
QTB52	-235	-0.0552	1.0
ASY51	-732	-0.1756	1.0
QSL51	-250	-0.0630	1.0
QSL52	713	0.1739	1.0
ASL51	-11983	-0.1795	1.0
QSL53	-628	-0.1524	1.0
QSL54	899	0.2164	1.0
SSL51	0	0.0000	1.0
SSK51	0	0.0000	1.0
FSH51	110	0.2755	4.1
FSH52	350	0.3509	4.1
DSC51	370	0.3077	4.1
DSC52	370	0.3636	4.1
FS53-O	500	0.4989	4.1
FS53-U	500	0.4989	4.1
FS53-L	100	0.1006	4.1
FS53-R	100	0.1004	4.1

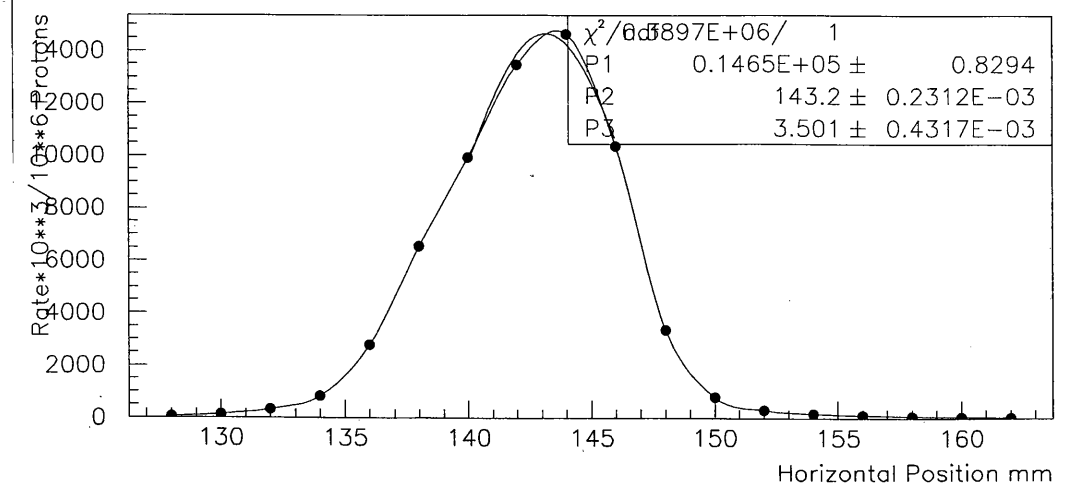
Optimized
Electron beam setting
with same slits as
TC-beam



2mm
Wire
Spacing



actually
 $e^+ \bar{\nu}_e$
but
1.4/42
 $e^- \nu_e$



Vertical Scan $D_{pill} = 160 \text{ mV}$

H: 141.4

Electron Scan
No Degradar (4mm)

Pos	pill(alt)/10 ⁶ p
200.0	7945 k
202.0	3448 k
204.0	1810 k
206.0	827 k
208.0	179 k
210.0	22 k
212.0	12.1 k
214.0	8.8 k
150 k	148.0
151 k	146.0
152 k	194.0
153 k	192.0
154 k	190.0
155 k	188.0
156 k	186.0

$\bar{X} = 198.1$

$\sigma = 2.383$

$\Sigma 38855.0 \text{ k}/10^6 \text{ p}$

Gaussian: $R_e = \frac{2\sigma\sqrt{\pi} R_{pill}}{r_{pill}^2} = 2 \times 2.383 \times 3501 \times \frac{1}{14810 \text{ k}/10^6 \text{ p}}$

$R_e = 2.47 \cdot 10^8 / 10^6 \text{ p}^{-2}$

$R_e \approx 2.5 \cdot 10^7 / \text{mAs}$

$R_e = 4.7 \cdot 10^7 \text{ e}^{-} \text{ s}^{-1} @ 1800 \mu\text{A}$
4 cm Tg

Summation:

$R_e = \frac{1}{R_{pill}} \frac{\Delta x \Delta y}{\pi r_{pill}^2} S_x S_y$

$= \frac{1}{14810 \text{ k}/10^6 \text{ p}} \cdot \frac{2 \cdot 2.38855 \text{ k}/10^6 \text{ p} \times 64052.5 \text{ k}}{\pi \cdot 12}$

$R_e = 2.14 \cdot 10^8 / 10^6 \text{ p}$

$R_e \sim 2.1 \cdot 10^7 / \text{mAs}$

$R_e \sim 3.9 \cdot 10^7 \text{ e}^{-} \text{ s}^{-1}$
@ 1800 μA
4 cm Tg

Horizontal Scan V: 198.1

Pos	pill(alt)/10 ⁶ p
140.0	9939 k
142.0	13462 k
144.0	14632 k
146.0	10367 k
148.0	3363 k
150.0	805 k
152.0	315 k
154.0	172 k
156.0	118 k
158.0	83 k
160.0	60.3 k
162.0	46.3 k
164.0	33.4 k
166.0	22.9 k
168.0	15.4 k
170.0	10.1 k
172.0	6.7 k
174.0	4.5 k
176.0	3.0 k
178.0	2.0 k

$\bar{X} = 143.2$

$\sigma = 3.501$

$\Sigma 64052.5 \text{ k}/10^6 \text{ p}$

Rate @ MAX V: 198.1
H: 143.2
14810 k/10⁶p

$\sim 40 \text{ MHz e}^{-} @ 1800 \mu\text{A}$ & 4cm Tg
in beam spot when tuned
for e⁻

21⁰⁵ Ok that's it for today tomorrow we can start the Range Curve Measurements

20:30 Measurement of the thresholds for α-trigger gives the following results:

- source RIGHT (driver from multiplicity output of discr. board C=0, N=2) : 99 mV
- TOP (" " " " " " " " " " C=0, N=4) : 99 mV
- LEFT (" " " " " " " " " " C=0, N=6) : 99.5 mV
- BOTTOM (" " " " " " " " " " C=0, N=8) : 108 mV

As we want to trigger events with two PMTs hit at least, we decided to set all the above thresholds to 75 mV.

21:10 N₂ bottle empty, replaced - SHUTTER LEFT CLOSED.

- 20:50 Run # 5439 pedestal
- Run # 5440 LED

22:00 Run # 5441 Run di alpha (shutter closed)

22:45 Run # 5442 Cosmic ray run (beam ON, π⁻ setting)

14/Oct/2003.

0204. NaI self trigger installed into MIDAS.
We can select "6: NaI" trigger ~~button~~.
in the midas status window. after pushing start button

1:00. • NaI #36. Attenuator changed to 20 dB.
(original value).
all 4 channels of center NaI are set to 20 dB.

• Veto counter in front of NaI is installed.

~~Circulation Stopped!~~ Circulation pump has been very hot!
Closed circulation flow control valve. and wait till pump is cooled down.
The pump stops soon after switch on again. → kept off

2:10. Run #5443. pedestal. (beam on) circulation stop
 2:20 Run #5444 LED (beam on) "
 2:25 Run #5445 alpha (beam on) "
 2:35 Run #5446 NaI self (beam on) "

3:15. during connecting HV cable of Veto counter, we shut down the NaI HV.
 So, the HV of CR counter of LP was not ON.
 of one PHT (-2700V)

→ using terra term interface.
 the HV are on by manually.

4:00 Run #5447 CR run (beam on) "
 6:00 Run #5448 " "

C: ¥ online ¥ data disk almost full.
 old data are moved to e: ¥ 030925_03_PSI1 ¥

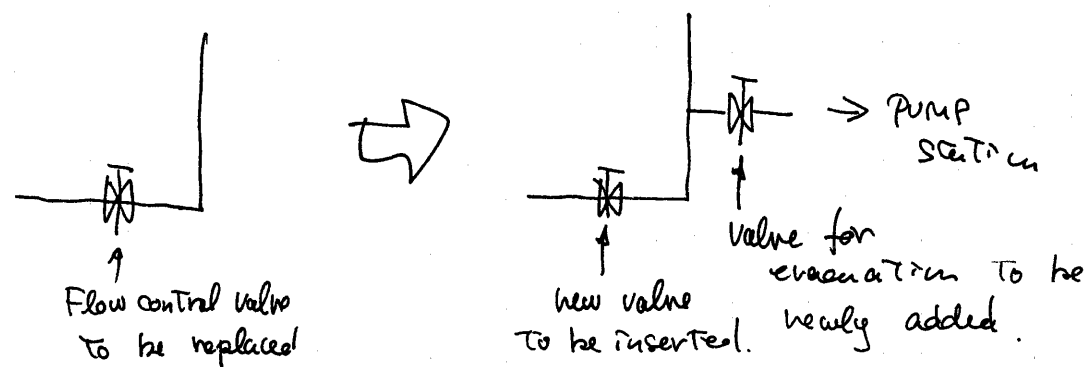
Run #5449. CR "
 5450 "

timing tuning for veto counter of charged particles are needed to be done. (now, beam is off.)
 signal cable are connected.
 HV → TC5-veto -1500V.

14/Oct/2003

9:50 #5451 pedestal } beam off
 9:51 #5452 LED }
 9:57 #5453 α }
 10:08 #5454 CR (LXe+NaI)

10:25 The valve for controlling the xenon flow rate cannot be closed/opened normally. We have to replace the valve tomorrow (Wed. 15/Oct.) and evacuate the line quickly. Until we finish replacement, the circulation pump is switched off!



13:31 #5455 pedestal } w/o circulation
 13:33 #5456 LED } beam OFF
 13:40 #5457 α }
 13:47 #5458 CR (NaI+LXe)

Try!
 PAW.exe display #lxe
 exe display #nai
 From #5455, online histograms were changed. If all the module switch is "8",

Not changed	1000 ~ 1256	ADC histo
	1500 ~ 1503	even, odd sum over LXe PMT
	3001	ADC sum
	3010 ~ 3013	differences of some pairs of ADCs. ex. C123-C24, C123-C120, ...
New	3100 ~ 3109	2D LXe event histogram. updated every 10 events.
	4000	TDC average
	5000 ~ 5063	NaI ADC
	5100 ~ 5109	2D NaI event histogram. updated every 10 events

histograms ID > 10000 were united into 2D histo

14/Oct/2003

#5459 removed.

14:50 #5460 CR (LXe only) run

16:49 #5461 CR (LXe + NaI)

16:55 #5462 CR (")

17:03 #5463 CR (LXe only)

17:43 #5464 "

17:59 #5465 "

18:04 Hydrogen target is ready now at the correct position.

100% filled. alignment accuracy ~ a few mm.

Beam ON

18:12 #5466 pedestal ADC#35 $\sigma=14.53$ ch

#5467 ~~ADC~~ ADC#37 $\sigma=14.4$ ch

#5468 ~~ADC~~

#5467 NaI self trigger test.

#5470 New histograms added

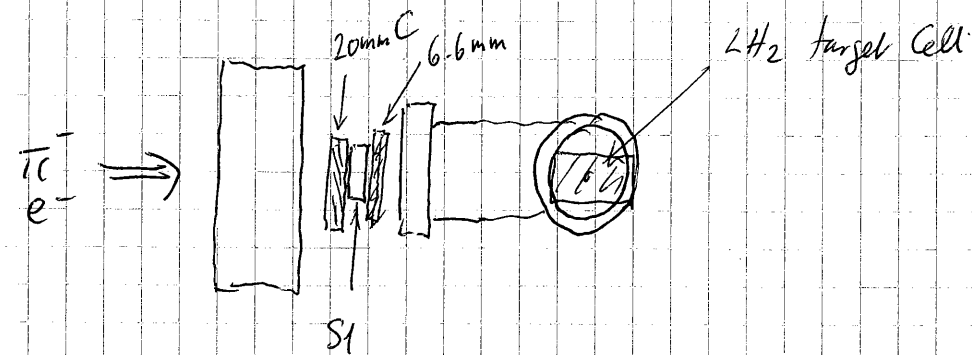
HID	name
5300	NaI Overall sum
5301	NaI Center sum

D5	D4
E5	E4

ADC ch.	slot	Sg	j	ADC ϕ	exceptions
9-1	9	11	0	164	9-1, 9-3 unplugged (ADC ϕ #164, #166 filled by 9-17, 9-18 respectively, see below)
9-16			15	179	
9-17	9	11	16	164	see above
9-18	9	11	17	166	see above
9-19			18		missing PMT's
9-32			31		
9-33	9	11	32	180	
9-48			47	195	
9-49	9	16	48	196	
9-80			79	228	
9-81	9	16	80	228	trigger counters
9-92			92	239	

ADC-ch	slot	Sg	j	ADC ϕ	exceptions
13-1			0	0	
13-96	13	2-3		95	
11-1	11	10	0	96	exceptions 11-10 unplugged (ADC ϕ #105 filled by 11-59, see below)
11-32			31	128	
11-33	11	10	32	240	attenuated (4 channels still need to be plugged)
11-48			47	255	
11-49	11	6	48		not in use (PMT's missing)
11-58			57		
11-59	11	6	58	105	see above
11-60	11	6	59	129	see below
11-61	11	6	60	128	exceptions 11-62 unplugged (ADC ϕ #129 filled by 11-60)
11-96			95	163	

1850 We have LH_2 target placed at correct location.
 Si counter (40x40x5) mm³ installed ~ 55mm DS of
 Pb- Collimator



Si Hv = -1900V

DS1 threshold for T = 600mV with 20mm Degrader in front of it

$$S1_{T} = 1.354 \text{ M}/10^5 \text{ p}$$

$$S1_{RF} = 1.017 \text{ M}/10^5 \text{ p}$$

$$\left. \begin{array}{l} 1807 \mu\text{A} \\ 0.565 \end{array} \right\}$$

Conclusion $S1 \text{ Sec} \sim 1.83 \cdot 10^6 T \cdot RF \text{ s}^{-1} @ 1800 \mu\text{A } 4 \text{ cm } T_s$

This confirms pill scans of yesterday !!!

New Range Curve

5472 19:25 ADC gate. is opened. by the coincidence of.

NaI self and. RF signals and. the plastic scintillator
 in front of the LH_2 target cell.

5473 20:25. NaI self trigger threshold down to ~ -32mV (~20.30 MeV)

#5474

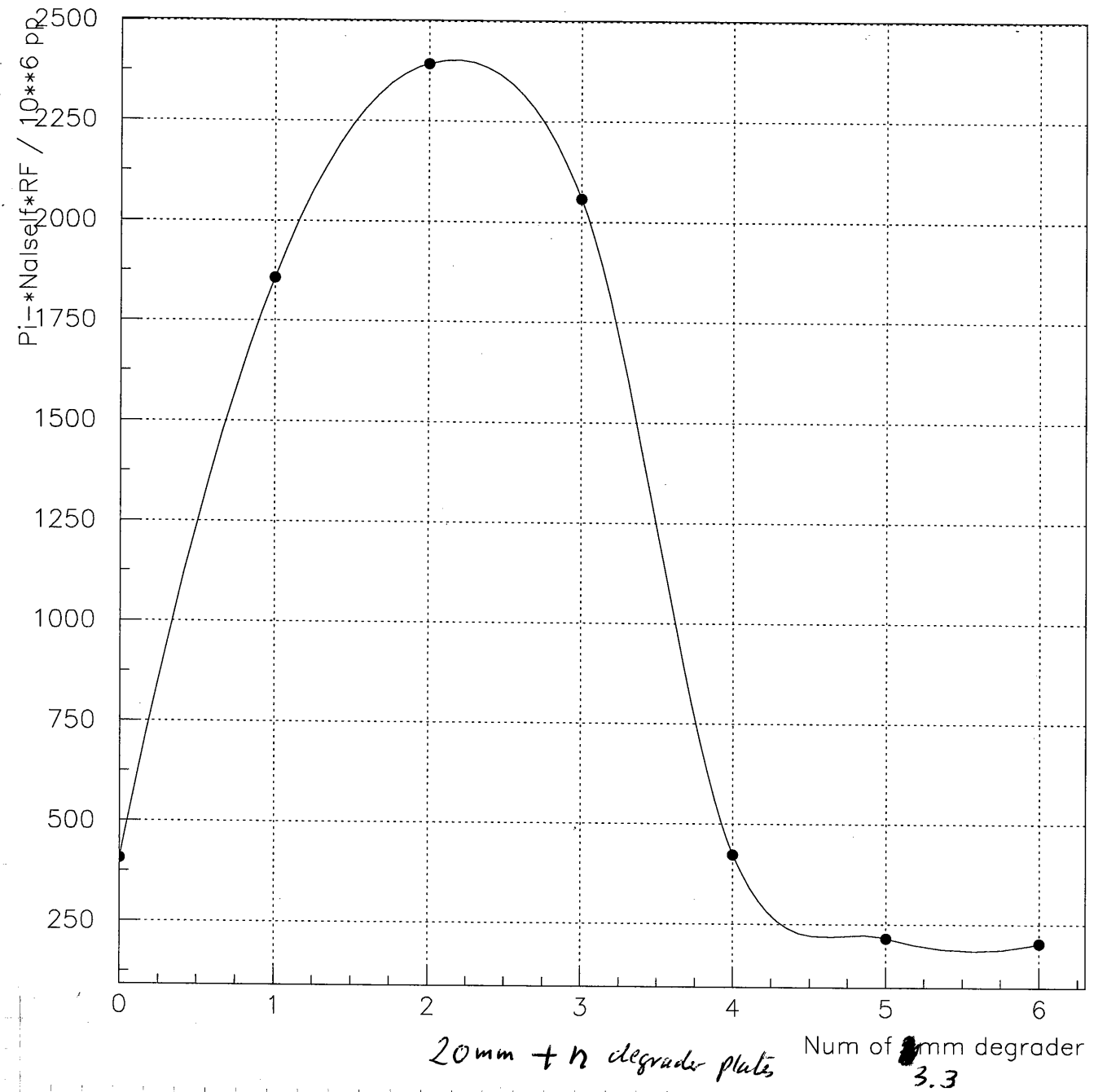
We make rough Range Curve with 20mm Fixed C degrader in front of
 S1 & Variable C degrader behind S1

Single degrader thickness 3.3 mm C

Calculated degrader thickness to stop in center of Target 26mm

Range Curve

using $S1_{T} \cdot RF \cdot \gamma$
 where $\gamma = \sum 4 \text{ NaI Central}$



Conclusion: Optimum as calculated 26.6 mm

We do very rough coincidence measurements

!!!

$$S1_{T} \cdot RF \cdot \gamma \sim 400 \text{ Hz} \quad (\text{from } N_{\text{NaI}}/4 \text{ expect say } 1200 \text{ Hz})$$

$$S1_{T} \cdot RF \cdot \gamma \cdot LP \sim 14 \text{ Hz} \quad \text{!!! very rough}$$

but order of magnitude as expected

15/Oct/2003.

0:16 ADC slot 11. fuse exchange (2A).
HV error HV13-4. (Bk4) ⇒ High voltage applied again. OK.

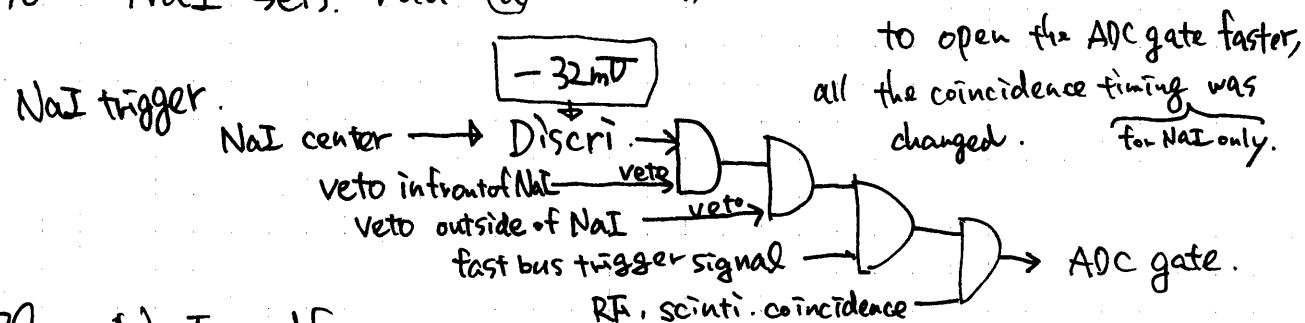
0:30 #5475 pedestal run @ circulation stop.
beam on.

original NaI self trigger rate w/o. DAQ veto ~ 500 Hz
DAQ rate ~ 90 Hz

0:35 #5476 LED run @ 1e6, circulation stop
beam on.

#5477 alpha run @ "

#5478 NaI self run @ "



4:04 #5479 NaI self run

4:50 #5480 pedestal run @ 1e6, circ. stop. beam on

#5481 LED @ "

#5482 alpha @ "

#5483 Xe self trigger @ "
~ 100 Hz

5:16 #5484 NaI self trigger

6:41 #5485 Xe + $\frac{S1\pi}{RF}$ trigger run.

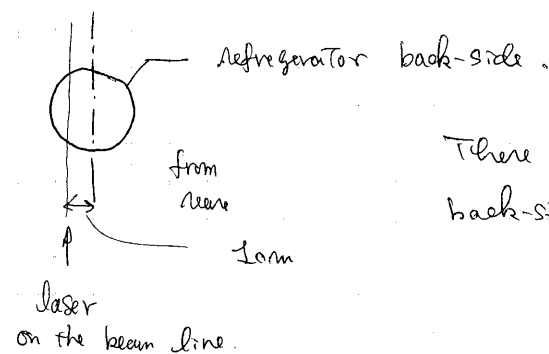
7:23 #5486 NaI self

8:00 #5487 Xe self trigger ~ 50, 60 Hz
with beam off.

8:10 Area access free.

- From yesterday, even when xenon circulation is stopped, liquid N₂ valve have been opened several times, suggesting that the refrigerator power has ~~dropped~~ decreased somehow. We need "re-generation" of the cold head or replacement of pure He gas. Before doing that, pressure tolerance is lowered from 0.132 - 0.136 to 0.132 - 0.137. Cold head temperature is 173.63 !!!!!

- Target alignment checked using a laser.



There is 1cm shift on the back-side of the refrigerator

Need alignment today

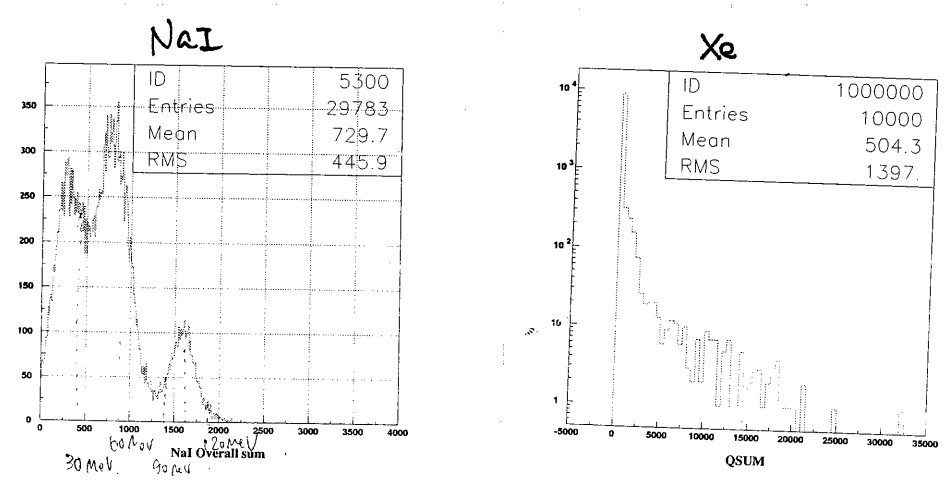
- Temperature setting value for the cold head of the target is changed from 19.4K to 18.9K so that we can stabilize the inner pressure around 1.05 ~ 1.06 Bar

9:10 Cold head temperature (LP) was raised to 190K to see the effect and cooled again. Now the temperature is 173.72K with full compressor power. SM

NaI spectrum looks good. but. we cannot see good Xe spectrum.

15/Oct/2003

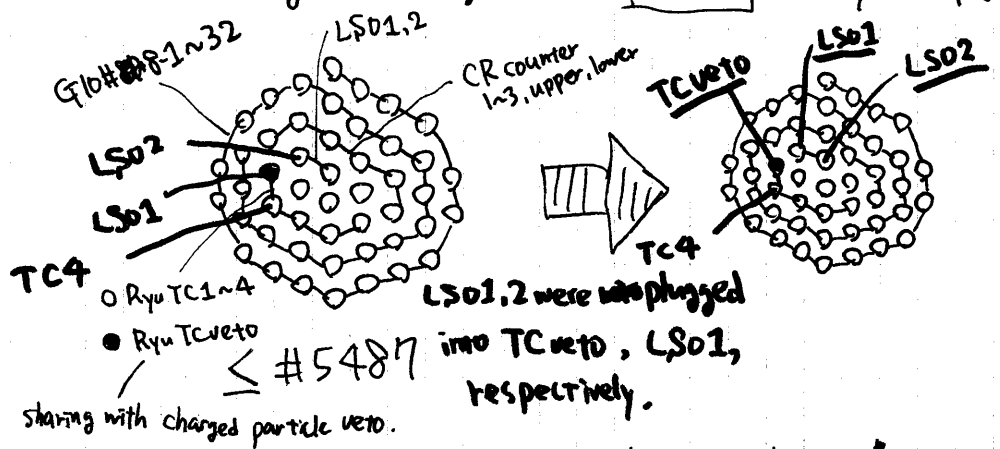
NaI + RF + S/P trigger.



energy range is a little different.
 450 ADC channel calibrated to ~30 MeV from CR MIP.
 (1600 ADC channel ~ 106 MeV)

8:00 ~ Beam Off. till next morning.

Changed the assignment of SGI6 burndy receptacle.



KO and TI assigned the ADC reading-out order as ... , TC4, TCveto, LS01, LS02, ... ,
 and they did not inform GF and DN of it. So GF and DN plugged the burndy cables
 on the holes for TCveto and LS01.

In my (KO's) opinion, signals in the same category should be got together.
 In this case, TC1,2,3,4, veto channels should be sequential in ADC reading-out order.
 This is why the burndy assignment was changed as KO and TI decided. KO.

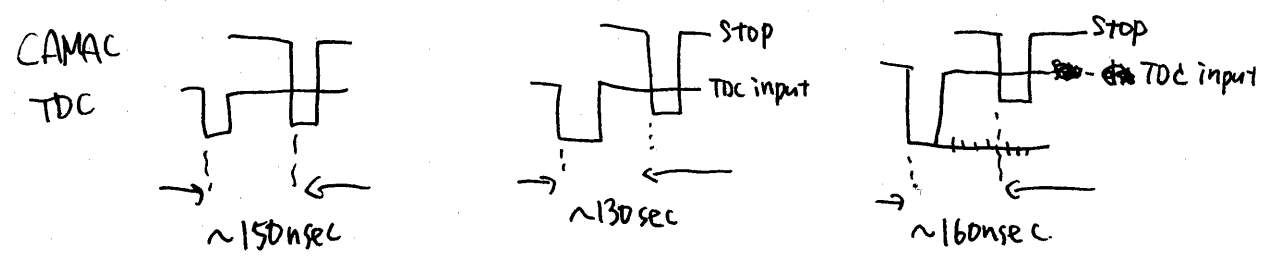
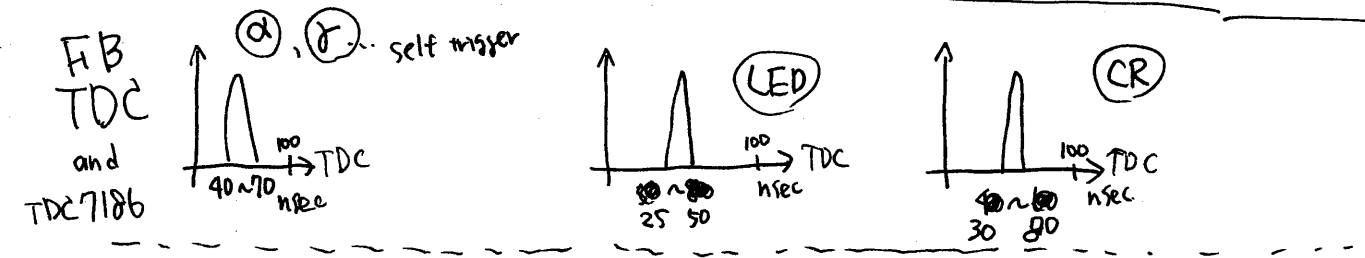
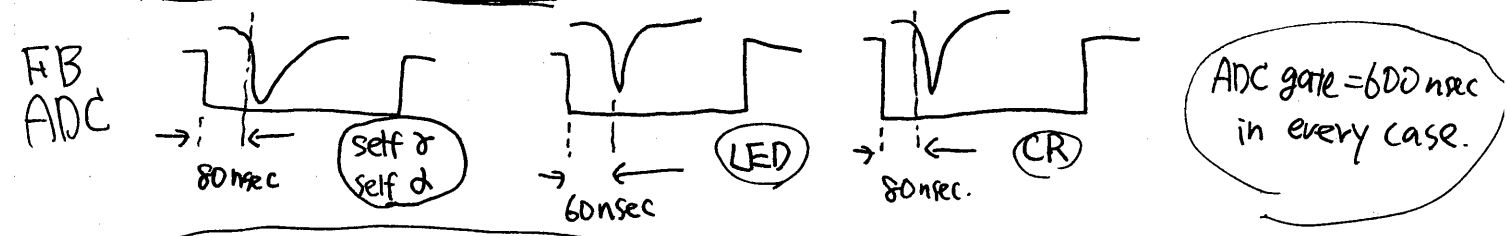
The Veto counter for charged particles has ^{been} installed and now
 its signals can be counted by ADC. (ADC #237)
 The burndy pin arrangements are ~~as before~~ ↑

15/Oct/2003 (Wed.)

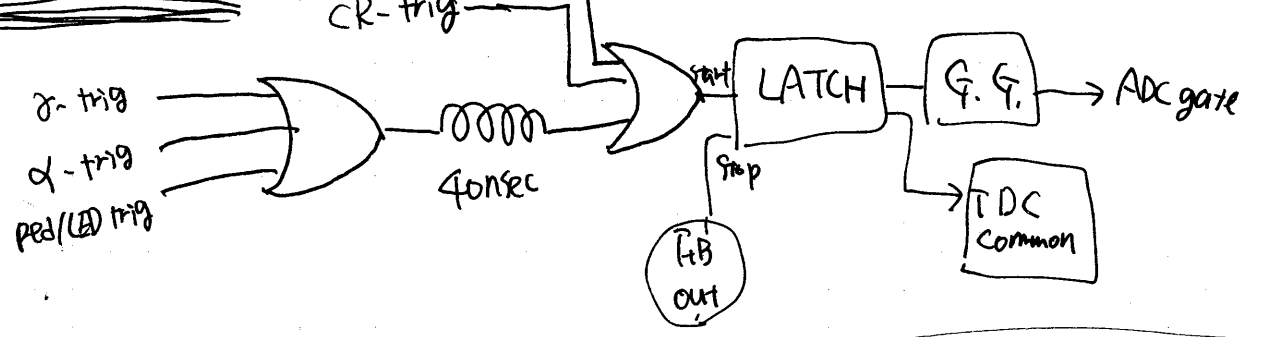
See also Log#4 P.71

ADC, TDC timing test.

Current timing for LXe



Current trigger ~~and~~ beam



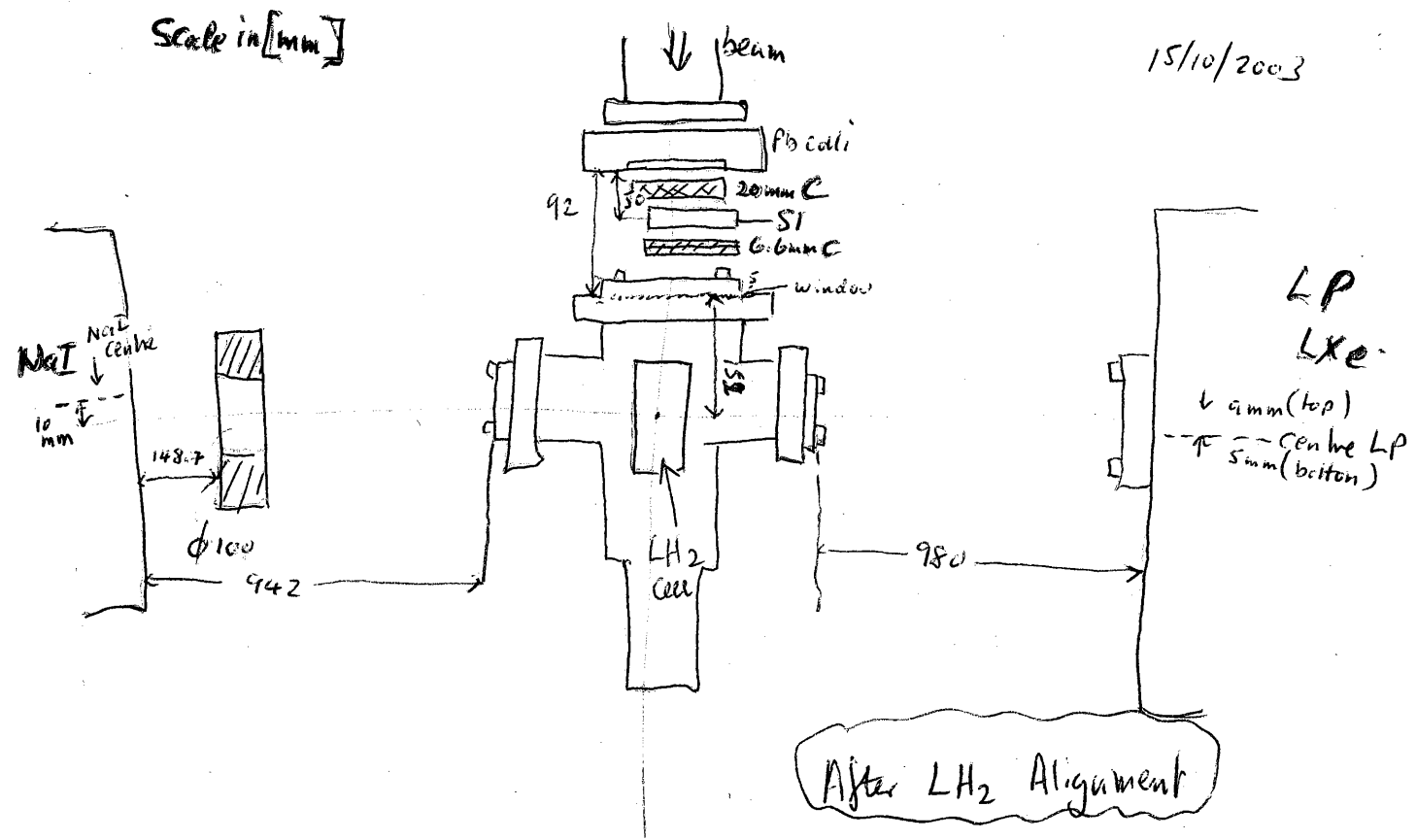
CAMAC TDCs require ~~stop~~ ^{STOP} ~80-nsec faster COMMON SIGNAL.
 40 nsec at least
 70-90 nsec for the best.

15/10/03

Regeneration of the cold head again → Succeeded!

15:35 compressor off
cold head set point = 250 k to try to regenerate the head

16:45 compressor off
cold head set point = 250 k
16:55 cold head temperature reached 250 k, leave this for 30 minutes
17:25 switched on compressor



16:05 Switched off the heater for in the cold head.
The cold head temperature reached 250k and started to be cooled again!

The temperature reached 172.25K, slightly but clearly better than previous. Inner vessel pressure is staying around 0.134 MPa stably (?)...

16:35 Cold head temperature is stable for this 30 minutes at 172.0K and inner vessel pressure is in the range between 0.134 and 0.135 MPa.

cold head temperature control with heater → off
Cold head control is done by ON/OFF of the compressor depending on the pressure.
17:50 cold head temperature 169.86 K
Xe pressure 0.131 MPa
Pressure Range 0.126 ~ 0.128 Bar
Temp 169.5 ~ 174.0K
Refrigerator is working well.

Installed USB 2.0 adapter at psmp17 (DAQ PC)
Removed Ethernet adapter as so, we will use USB to ethernet adapter (Corega USB-TX)

formatted USB 2.0 hard disc Lacie 1 (9G:) as NTFS
This disk will be used as storage together with PSI archive.

19:30 We again have a problem with ASLS1 magnet same as a couple of days ago the ADC value (current) is not stable

The correct values should be: Setpoint programme

ASLS1 DAC = -11571
ADC = -0.1734 = Current 86.7 amps

however DAC is stable but ADC goes down which will steer beam. we should try & keep ADC ~ -0.1734 ± sig 5 digits

I have presently set DAC = -11970 gives ADC = -0.1731
↓
-0.1734

Seems OK @ the moment!

If the rate of Ts seems low and the ADC is stable Run programme OPTIMA (click programme window either type 'O' or press Run)

This is setup to optimize ASLS1
N.B. before running programme follow the optima cable patch panel on electronics rack back to discriminator
pull out cable that goes to delay box
to optima → to delay box
- optima signal has double the pulse-ht

replace cable again after optimization as this is used for S1 & RF & coincidence

- We have re-optimized ASCS1

New Value DAC = -11999

ADC = -01736

Looks Stable @ present!

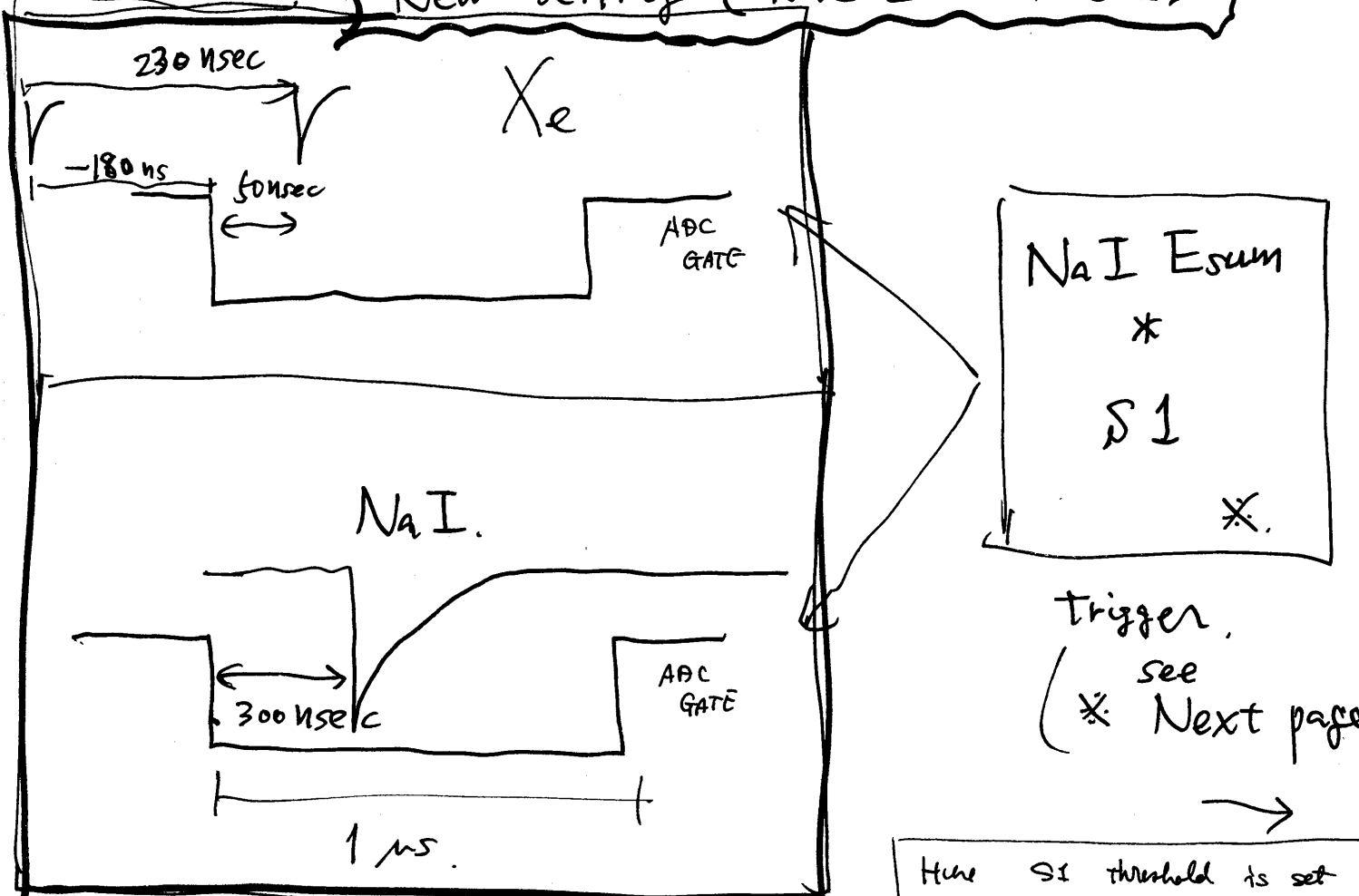
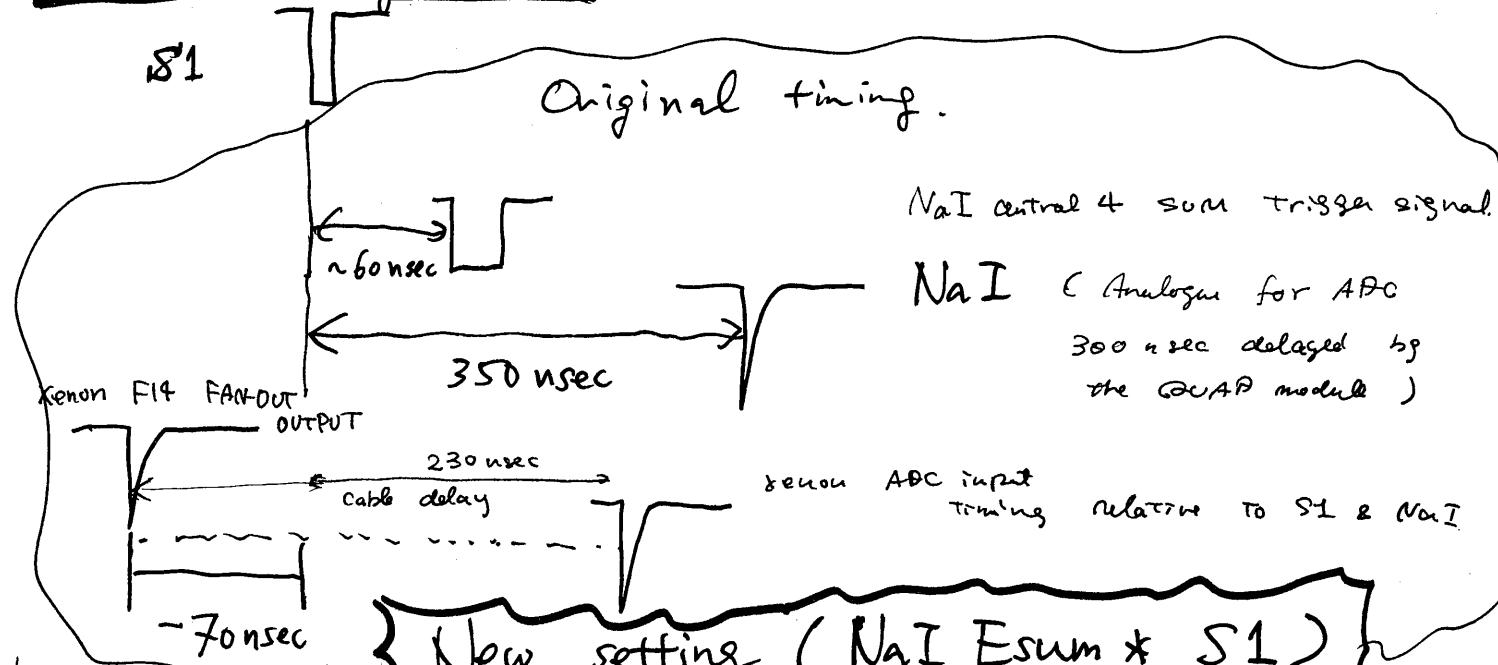
New Magnet file mag11piS1.set but has still correct ASCS1 = -11571 with above delay

The Window Cover on the Xe chamber is removed.

21:35	#5490	pedestal	beam on → LED was unstable → LED was unstable circulation off
21:40	#5491	LED	
21:49	#5492	α	
22:02	#5493	LED	
22:20	#5494	pedestal	
22:25	#5495	LED	
22:30	#5496	LED	

changed fal files /adccalib.c
 line 421 param → *param
 line 921 param → *param
 R.S.

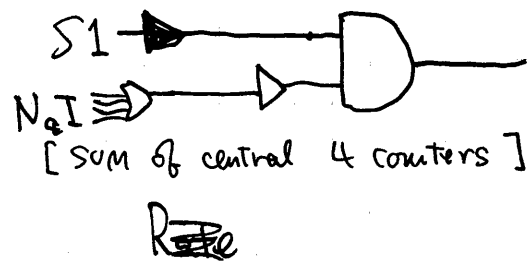
TRIG. Timing Tune 21:00 ~ 2:20 AM T.I, R.S, S.M, S.Y



16-Oct-2003
 2:19 Run 5500

NaI * S1 trigger Run

New Trigger (simplest)



2:30 AM ASL S1 DAC adjusted to -12033
(ADC = -0.1734)

★ Rate π^- 1.03 M ~~PP~~ / 10^5 PP

★ S1 * NaI ~ 560 / 10^5 PP
|||
0.59 sec

★ Live time $\sim \frac{85}{560/0.59} \approx 0.09$ (~9%)

Run # 5500 End 2:26 AM

★ Run # 5501 start 2:33 AM

Same as # 5500, with event_limit = 50000.

100 min @ 6000 sec
 $6 \times 10^3 \text{ sec} \times 10 \text{ Hz} \times 0.09 = 5.4 \times 10^4 \times 0.1 = 5400$

3:00 Found that the CAMAC scalars are not read out correctly.

CAMAC function for the SCALCER
NA(i) F(10) READ SCALCER i
NA(i) F(9) CLEAR SCALCER i AND OVERFLOW BIT i
→ Please fix ozone.

Summary

15-Oct-03 16-Oct

2:00 ~ ~~04:00~~ 04:00 (R.S, T.I, S.M, Sa.Y)

1. Measured timing
between: ① S1 - NaI sum $\approx +60 \text{ nsec}$
 ↑ ↑
 π^- disci out disci out

② S1 - Xe (before 230 nsec cable delay)
 $\approx -70 \text{ nsec}$

2. Change NaI trigger (S1 * NaI sum * CRVeto * ChargeVeto) * RF

→ faster trigger (S1 * NaI sum)

- Ⓐ reduce # of modules for logic.
- Ⓑ reduce cable delay

3. Measured new timing

- ① Gate - NaI signal
- ② Gate - Xe (before 230 nsec cable delay)

see - 2 pages. ← [NaI ① $\approx +300 \text{ nsec}$ (gate width 1 μsec)
Xe ② $\approx -50 \text{ nsec} - 180 \text{ nsec}$

4. Clean up !! $(\approx +50 \text{ nsec}$ after 230 μs delay) Ⓐ ADC

Many cables ~~are~~ have been connected to modules without termination (open cables).

Except for special cable (for C.F. disci etc) we detouched, and cleaned up.

5. [Run # 5500 (30000 events) 2:19 ~ 2:26
Run # 5501 (~~3 x 10⁵~~ 2.4 x 10⁵ events) 2:33 ~ 3:27

Now we have a simplest & fastest trigger for π^0 run.

Characteristics.

- ① S1 * NaI (4ch sum, th ~ 20 MeV (?))
- ② No bias trigger, for Xe side.
- ③ Too high rate ($\sim 10^3$ /sec for 1800mA proton)
- ④ \rightarrow Live time is $\sim 9\%$.
- ⑤ timing is defined by S1.

We will make (if beam is back ... not yet at the moment 7:40 16/Oct)

1. Xe (4 counter sum) * S1
 \rightarrow see if $h+\gamma$ is peaked.
 \sim energy ~~is~~ calibration

2. NaI * Xe * S1
 [with S1 timing]

4:00 ~ 4:30 R.S.'s Analysis for Run# 5501.

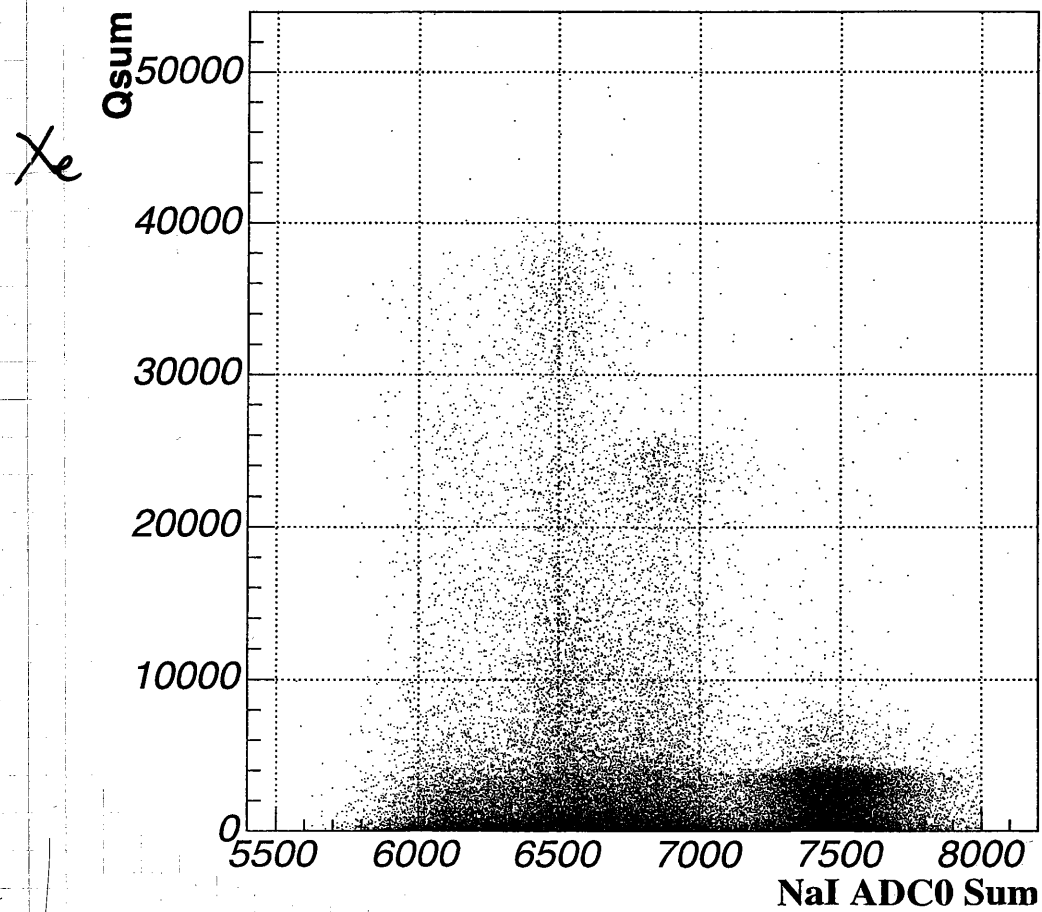
\Rightarrow see next page.

$\sim 4:00$ Beam Down - Next message at 7:00 ...

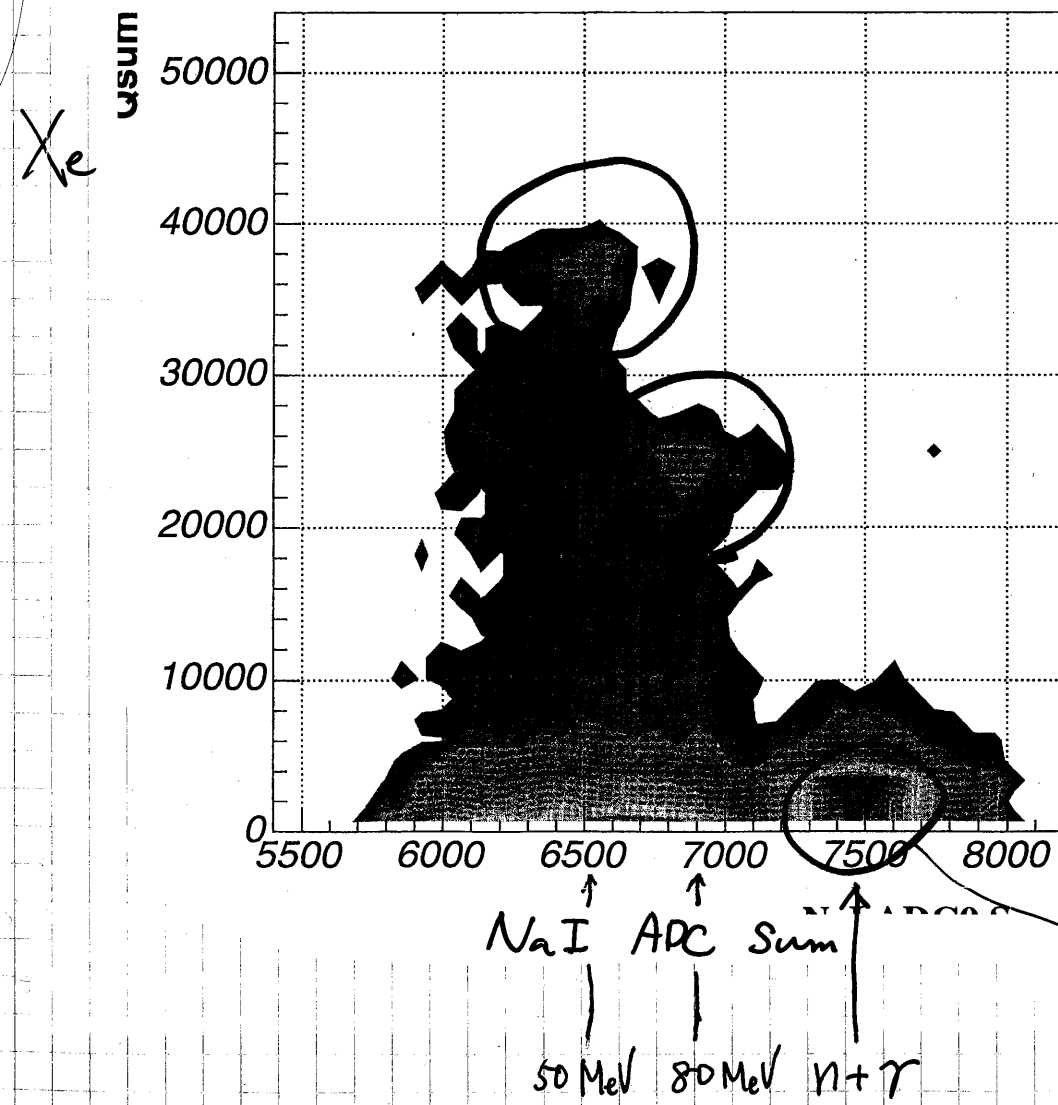
4:15 #5502 pedestal.
 #5503 LED

4:30 #5504 alpha run

Ryu Sawada's results

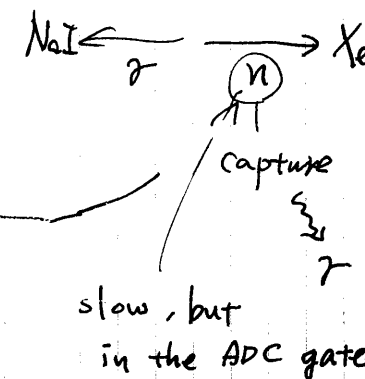


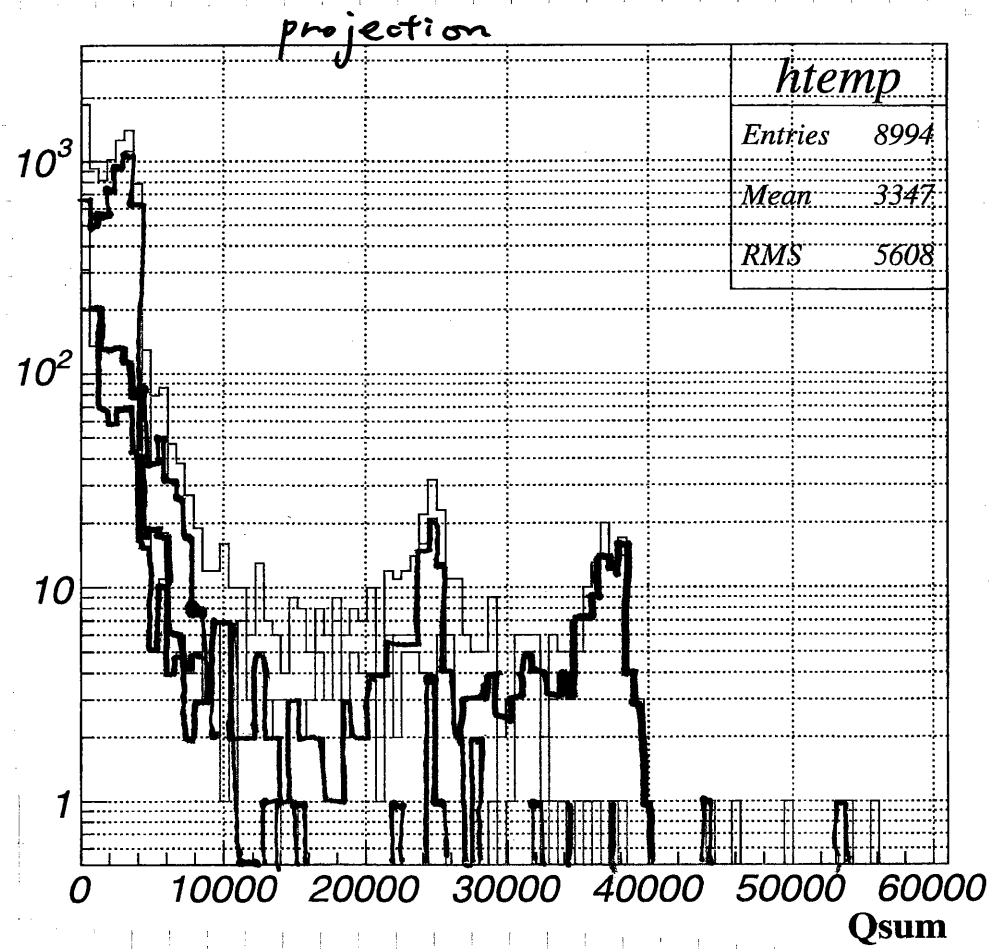
Cut:



Cut:

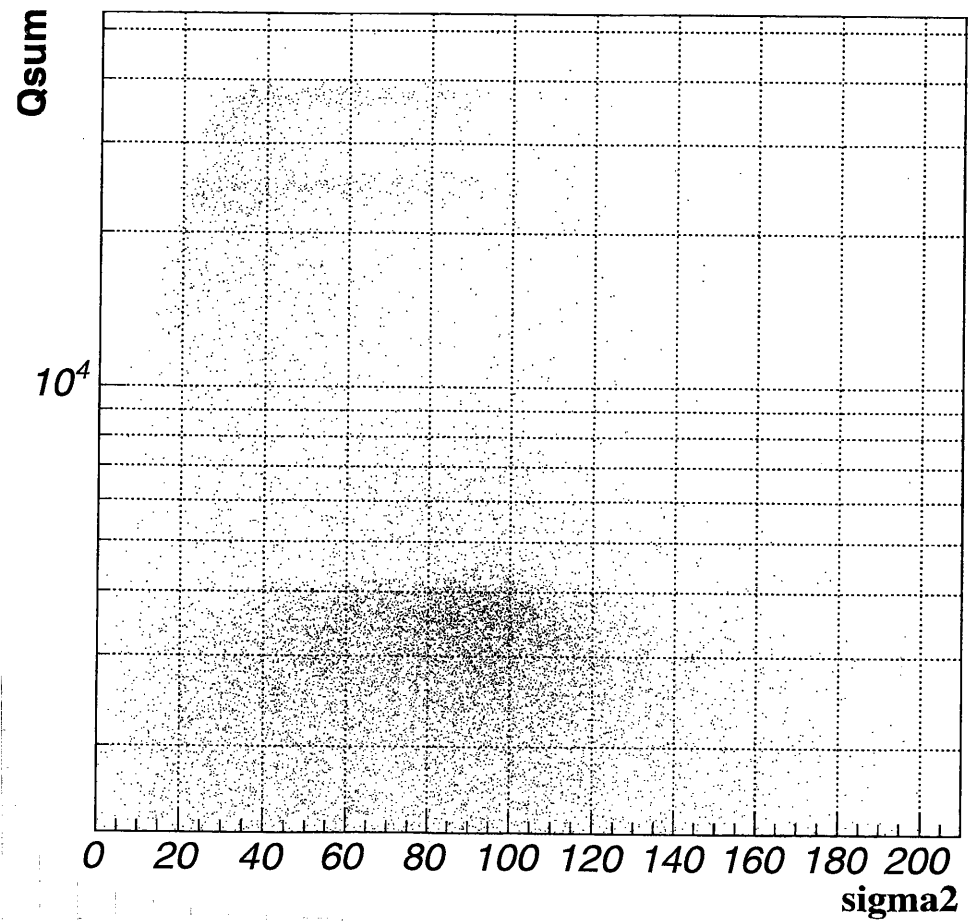
$$\sqrt{(x_{ave}^2 + y_{ave}^2)} < 5 \text{ cm} \quad (\text{Xe})$$





Xe ^{Average} position cut.

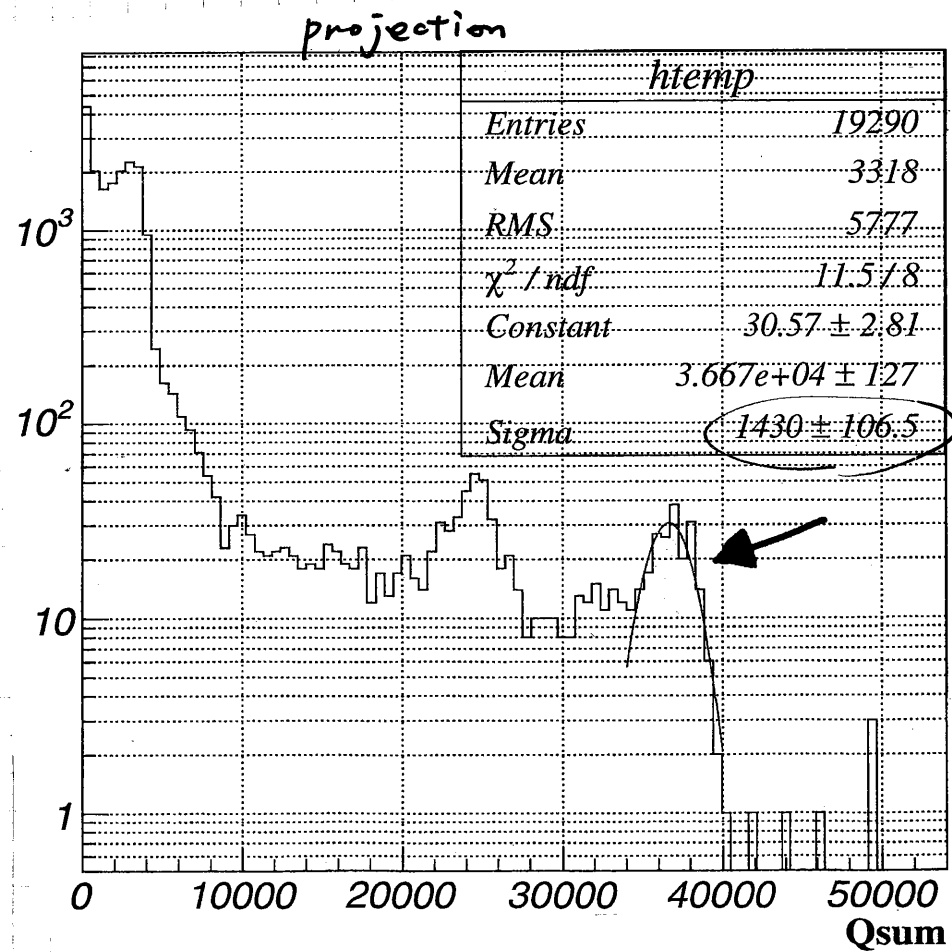
- NaI
6300 < ABCO < 6750
Sun
- 6750 < ... < 7100
- 7100 < ... < 8000



cut:

$$\sqrt{x_{ave}^2 + y_{ave}^2} < 5 \text{ cm}$$

(Xenon)



→ ~ 3% in σ

Run # 5501

π^0 identified !

5:15 # 5505 cosmic ray run.
beam down.

HV error HV # 13-4 (BK4) → recovered.

5:05 evacuation of circulation line stop
start circulation ~ 8.6 l/min

Various signals added.

- $\text{Si} \pi^-$ signal → NaI ADC 65
→ TDC 7186 12ch. 2187
- charged particle veto → TDC 7186 11ch. 2186
- RF signal → TDC 7186 13ch. 2188
- proton signal → scaler 22 slot ch 6

* FAL compiled to include counter names ~~above~~ listed above.

7:30 # 5506 pedestal run (beam off)

7:38 # 5507 COSMIC - RAY RUN (")

7:40 Beam has not come back yet.
Next message at 8:00

HV for CR counter of LP was not supplied. → fixed by telaterm.

7:40 Liq. N₂ exchanged. 100l → 100l

8:35 # 5508 cosmic ray run (beam off).

~ 9:50 No beam expected until after lunch
Repair of EEC finished in ~ 30 mins
Setup of accelerator takes about 2-3 hrs.

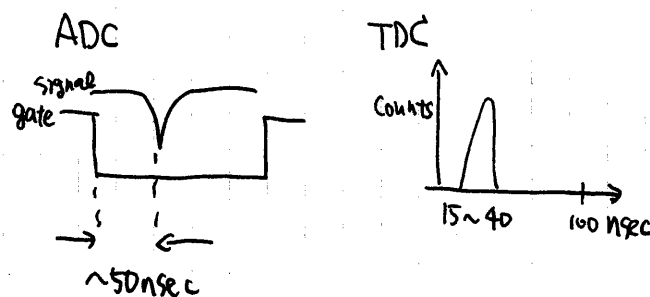
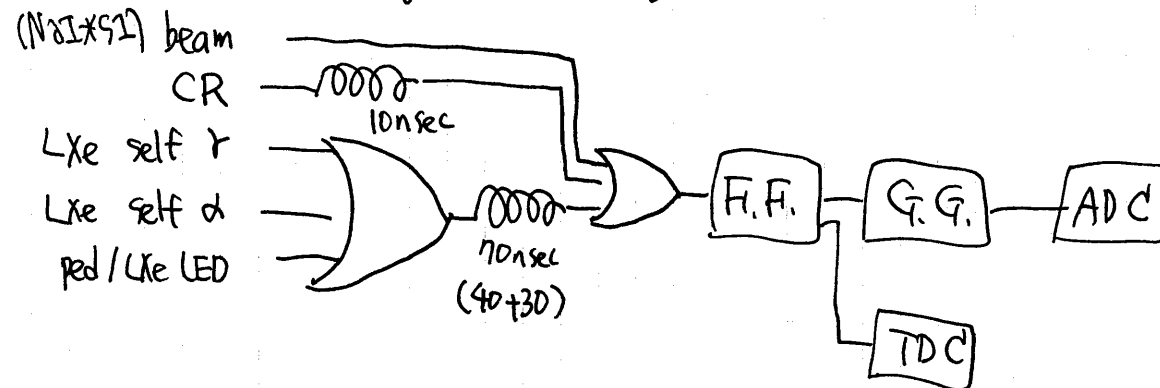
Electrical Group looking @ ASC problem

16/10/2003

14:00

① In every run mode.

ADC gate timing and TDC timing were ~~not~~ adjusted to the same as 'beam' timing.



(See also 15/10/03 log) ~~and~~

Note on CAMAC ~~module~~ ^{Discriminator} Phillips 7106

- If switch on front panel is set to CAMAC, the ~~module~~ does not output normally. (It requires CAMAC function)

Always keep them as LOCAL

Some ~~of~~ distributions of pedestals are broad! $\sigma \sim 15$.
We checked the connection of cables and reinserted them. → fixed!

16:00 # 5511 pedestal run w/o beam

16:05 # 5512 LED run w/o beam

16:26 # 5513 pedestal run w/ beam.

16:33 # 5514 ~~pedestal~~ LED run with beam ON.

16:56 # 5515 alpha run

The sum of lig. Xe. Front 4 PNTs has added to the trigger.
⇒ See next to the next page ★

Discriminator is burning! (PHILLIPS #106 Slot 6 CAMAC crate.)
 → replace the module.
 18:15 # 5516 Xe (central 4 PMTs) * S1 + random trigger
 19:33 # 5517 pedestal w/ beam ON
 17⁵⁰ Hopefully now the ASC Magnet problem has been fixed
 I reoptimize ASLS1 QPSC3, QPSC4 New setting in file

wrong trigger setting!
 LED trigger was found to be missed by anticoinc.

Meg 44pi S1 set

	DAC	ADC
ASLS1 =	-4546	-0.1744
QPSC3 =	-569	
QPSC4 =	855	

Please check whether ASLS1 ADC stable during the night.

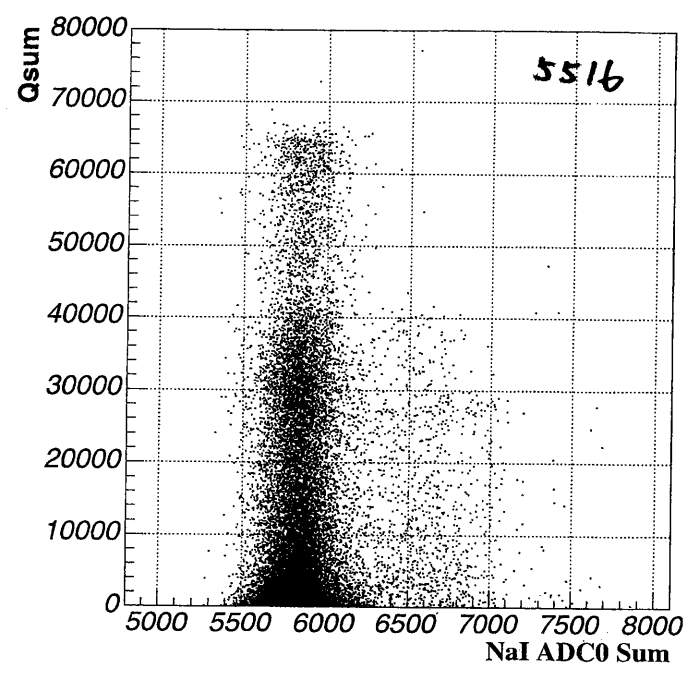
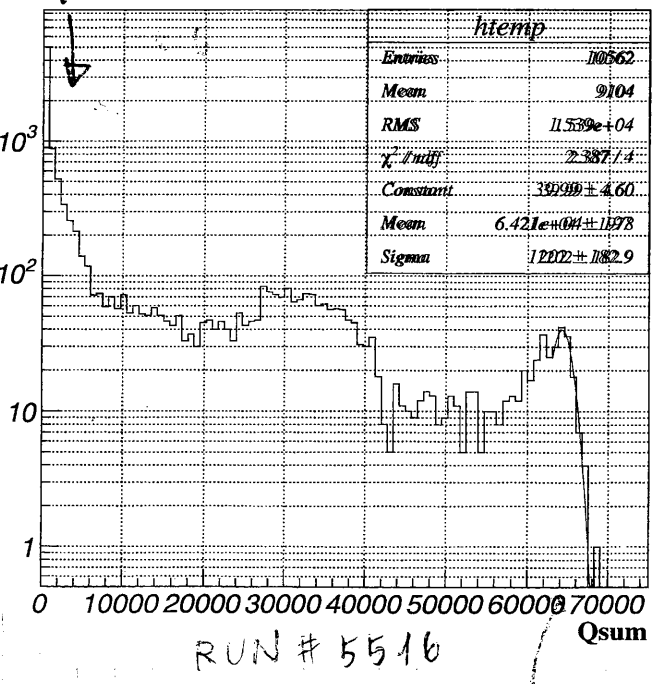
19:57 # 5519 same as # 5518
 20:02 # 5520 same as before
 20:05 # 5521 pedestal w/ beam ON
 maybe accelerator stopped during this run

20:16 # 5522 pedestal beam on
 20:17 # 5523 LED beam on
 Threshold setting for Xe central 4 PMTs is investigated here. Determined by looking the histo by eyes.

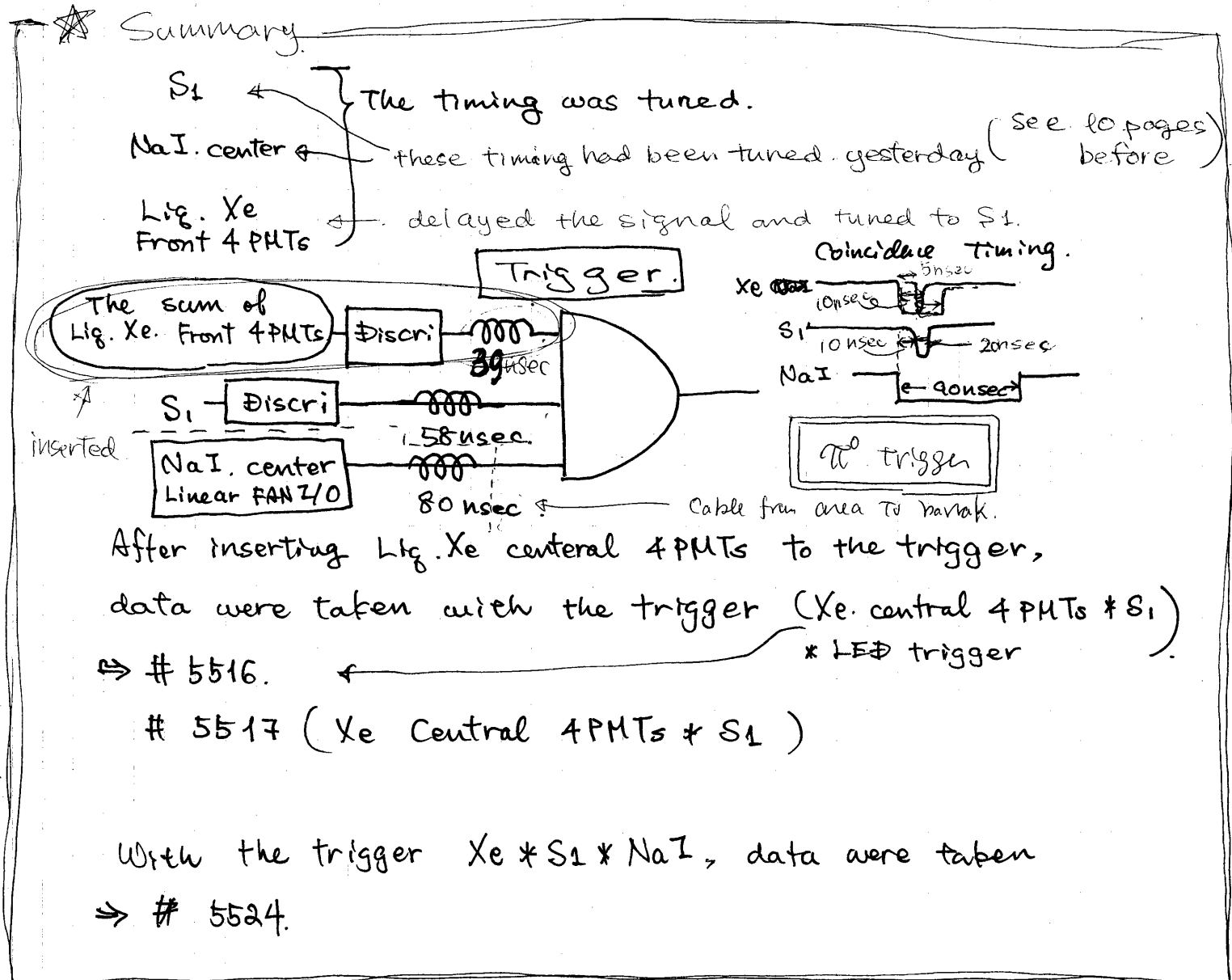
23:21 # 5524 Xe central 4 PMTs * S1 = π^0 trigger * NaI

Xe central 4 PMTs threshold -230 a.u.
 trigger rate $\sim 3.0 \text{ Hz}$ 30000 events

19:37 # 5518 Xe (central 4 PMTs) * S1
 trigger rate 91 Hz
 No NaI in the trigger logic
 Probably DAA rate?? (accepted events rate)



$\text{wTI} \sim \delta E \sim 2\%$



17 Oct 03

2:30 # 5525 Pedestal

2:31 # 5526 d. RUN

2:38 # 5527 LED

Nitrogen dewar is replaced. Circulation is paused.

Hydrogen Target Status		
4.2×10^{-5} Bar	1.062 Bar	19.0 K
Insulation VAC	Cell Pressure	Cell Temperature

3:02 Circulation is resumed.

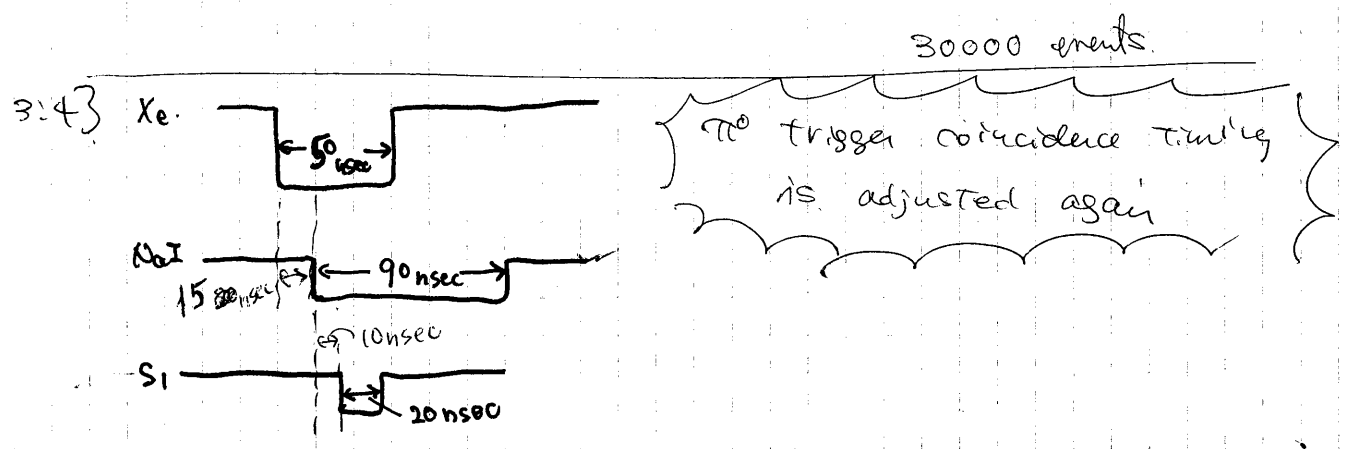
3:06 # 5528

NaI off RUN = Xe central 4 PMT * 81

Xe central 4 PMTs SUM threshold - 230 mV

TRIGGER RATE 580 ~ 610 Hz

(Proton Current 1747 μ A)



3:46 # 5529

NaI off RUN again after π^0 trigger timing adjustment

Xe central 4 PMTs SUM threshold - 230 mV

TRIGGER RATE 640 ~ 650 Hz

(Proton Current 1744 μ A)

17 Oct 03

3:51 # 5530

NaI off RUN with lower threshold for Xe central 4 PMT SUM threshold level - 280 mV

4:01 # 5531

NaI off RUN with even lower threshold for Xe central 4 PMT SUM threshold level - 330 mV

TRIGGER RATE 480 Hz

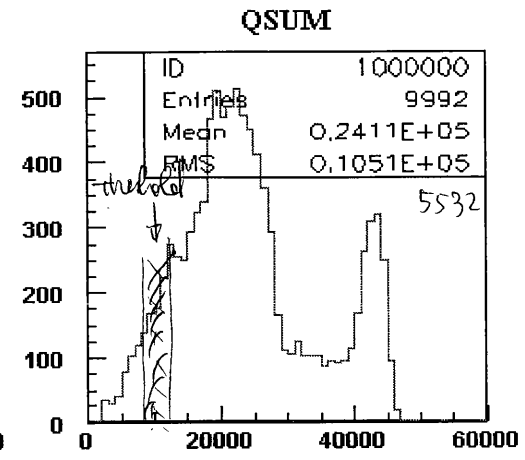
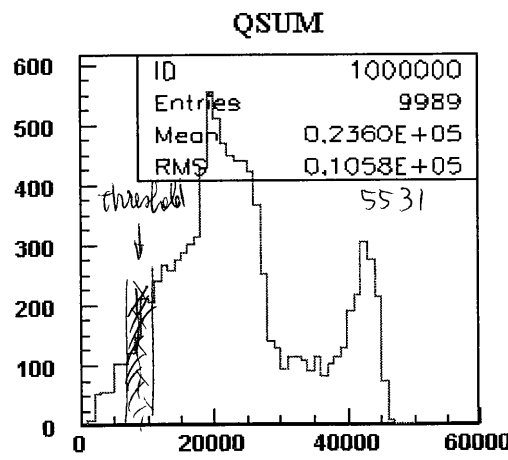
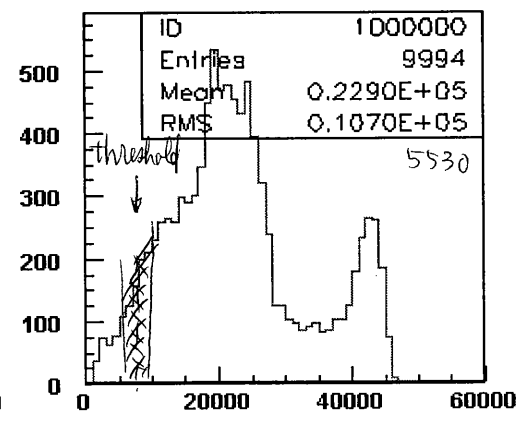
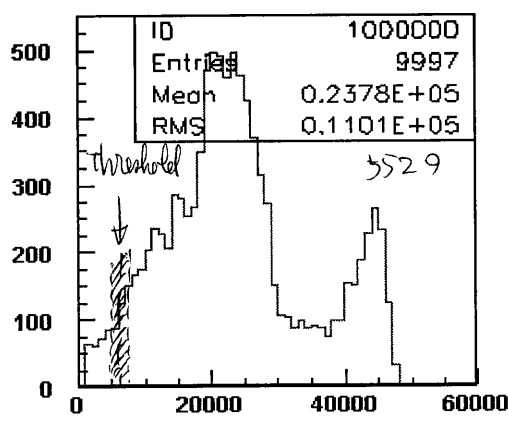
PROTON Current 1745 μ A

4:12 # 5532

NaI off RUN with even lower threshold for Xe central 4 PMT SUM threshold level - 380 mV

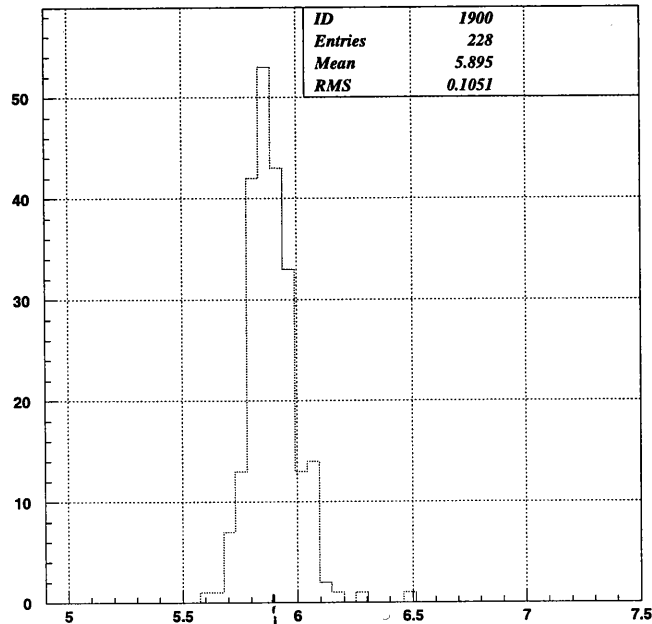
TRIGGER RATE 420 Hz

PROTON CURRENT 1753 μ A



threshold setting of -230 mV is well below π^0 signal

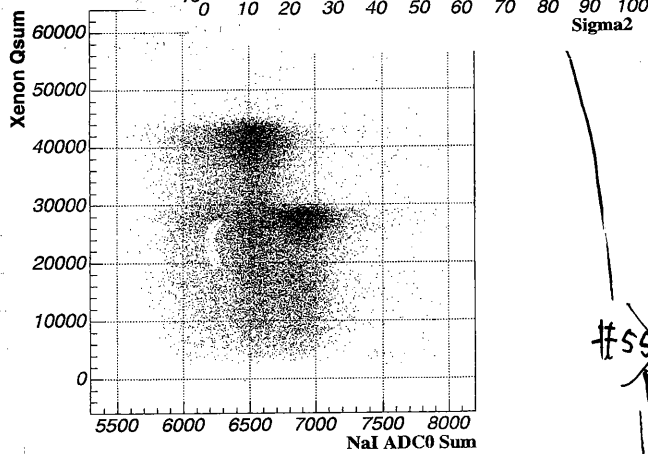
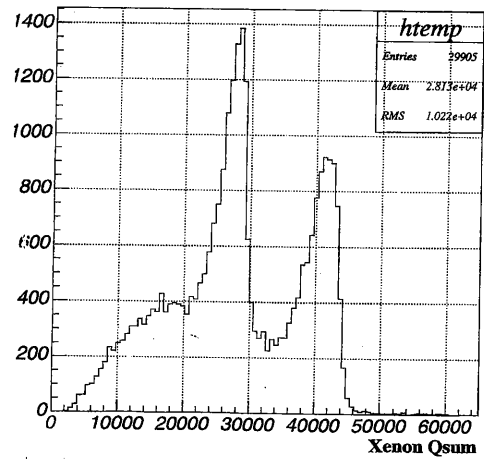
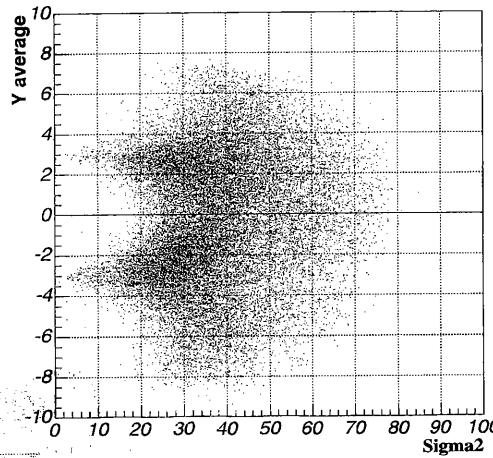
17 Oct 03



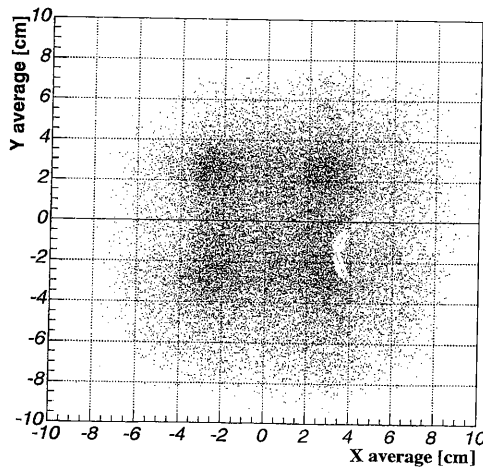
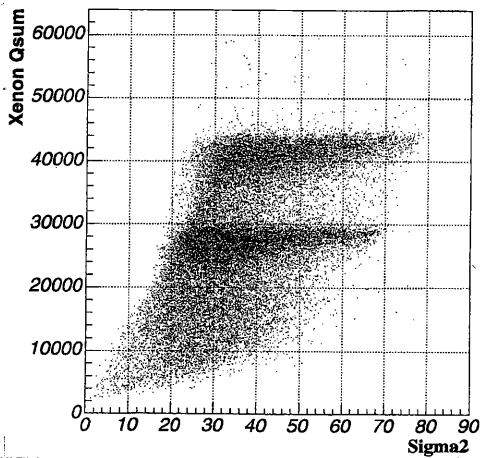
Gain distribution from #5527

average of gain is smaller than 1.0×10^6

gain dist.
 $\sim 0.7 \times 10^6$



~~#5523~~
~~18~~
5524



~~almost~~ almost no cut

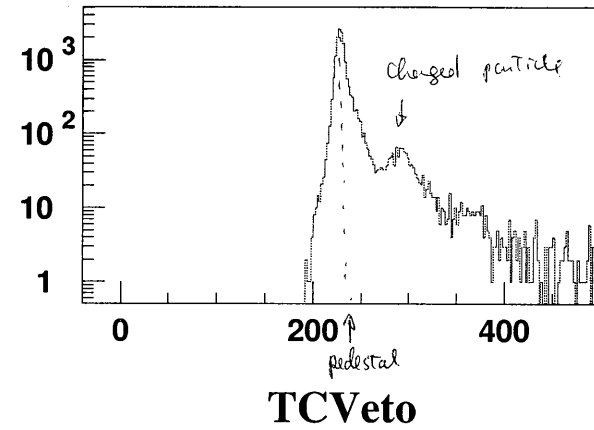
(xenon)

17 Oct 03

5:31 check the charged VETO counter in front of the NaI

#5533 NaI trigger * S1 (4ch sum)

VETO counter threshold -13 mV
HV. -1500V \rightarrow -1640V
this run



Charged Particle contents looks to be very small and can be removed in off-line analysis easily. So we will not use the signal in trigger

No TDC entries for VETO counter ??? timing ok
as far as we check on the oscilloscope.
Software is ready for reading CANAC TDC?

#5534 NaI quad trigger * S1

(output from NaI trigger module to get all events)

trigger rate ~ 20 kHz

QUAD signal timing is almost same as NaI center timing. So we use the same logic module for triggering

naicalib.c is slightly modified to give a correct NaI sum spectrum on the on-line spectrum

6:17 #5535

NaI QUAD TRIGGER * S1 again
QUAD threshold "100"

TRIGGER RATE ~ 20 kHz

6:42 #5536

QUAD * Xenon Central * S1

TRIGGER RATE ~ 20 Hz

8:19 stopped @ 10^5 evt

17 Oct 03

SUMMARY

- Xenon signal can be used in the trigger logic. 4 ch sum of the central PMTs on the front face is used to provide this signal. Threshold for this summed signal is set at ~ 230 mV, which is well below the signal.

- Using NaI central 4 ch sum and Xe central 4 ch sum signals, 30000 events have been taken. \rightarrow Another 70000 events should be taken

- Changed VETO counter is checked carefully. There are some charged particle events when we take data with NaI central 4 * S1. But these can be identified with VETO counter AAC.

- NaI QUAD trigger started to be used. TRIGGER RATE

$$\text{QUAD} * S1 \Rightarrow 20 \text{ kHz}$$

$$\text{Xe Central 4ch} * \text{QUAD} * S1 \Rightarrow 20 \text{ Hz}$$

QUAD threshold is set at "100"

- ASL51 is now stable.

DAQ plan

- Acquire sufficient amount of data with trigger settings

- S1 * NaI Central 4 ($\sim 1 \text{ kHz}$)

- S1 * NaI central 4 * Xenon central 4 ($\sim 2 \text{ Hz}$)

- S1 * QUAD ($\sim 20 \text{ kHz}$)

- S1 * QUAD * Xenon Central 4 ($\sim 20 \text{ Hz}$)

Problems to be fixed.

- Scaler in CAMAC station 23 looks to be out of order. Replace it.

- TDC for S1, charged veto, RF are always 0 (on overflow). Check whether this is hardware or software problems

- S1 AAC histogram is not filled correctly.

new implementation if possible

- Current γ -trigger of xenon detector may not fire for "deep" events and certainly do not fire for off-center events. For covering these events also, we need a new trigger signal using discriminator outputs (e.g. near panel sum signal) including those from new Phillips discriminators. Possible logic is OR of 4 ~~near~~ discriminator outputs for the front face and 4 outputs for near face. Please make new logic and check the performance.

~~Current setting of scaler~~

~~store~~

9:00 Broken scaler in slot 22 replaced by new one



current setting of scaler

slot #21	#22
ch0 brokench	ch0 accepted
ch1 request	ch1 S1 \leftarrow added after #5537
ch2 LED.PED OUT	
ch3 γ -trig	
ch4 alpha-trig	
ch5 CR-trig	ch5 proton

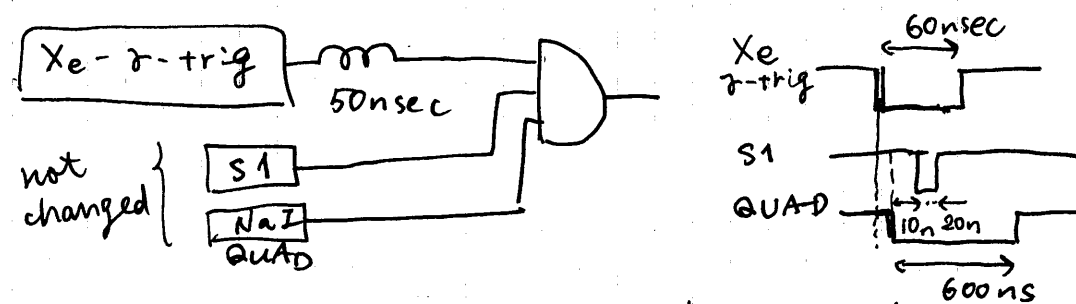
10:30 #5537 pedestal w/beam

#5538 alpha w/beam

#5539 LED w/beam

#5540 Xe γ -trig * S1 * NaI Quad

trig. rate $\sim 340 \text{ Hz}$ (request rate)
proton current $1728 \mu\text{A}$



Xe γ -trig multiplicity 1

#5541, 5542 same as #5540 NIM threshold -75 mV (not change)

Accelerator stopped $\sim 12:30$

14:45 Beam not back yet

#5543 Test run for file archive

Currently data is written in both local disk and ~~ftp~~ archive ftp

14:45 Beam is back but reduced rate $1217 \mu\text{A}$

#5544 pedestal w/ reduced beam at $1201 \mu\text{A}$

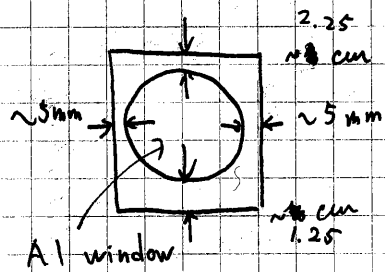
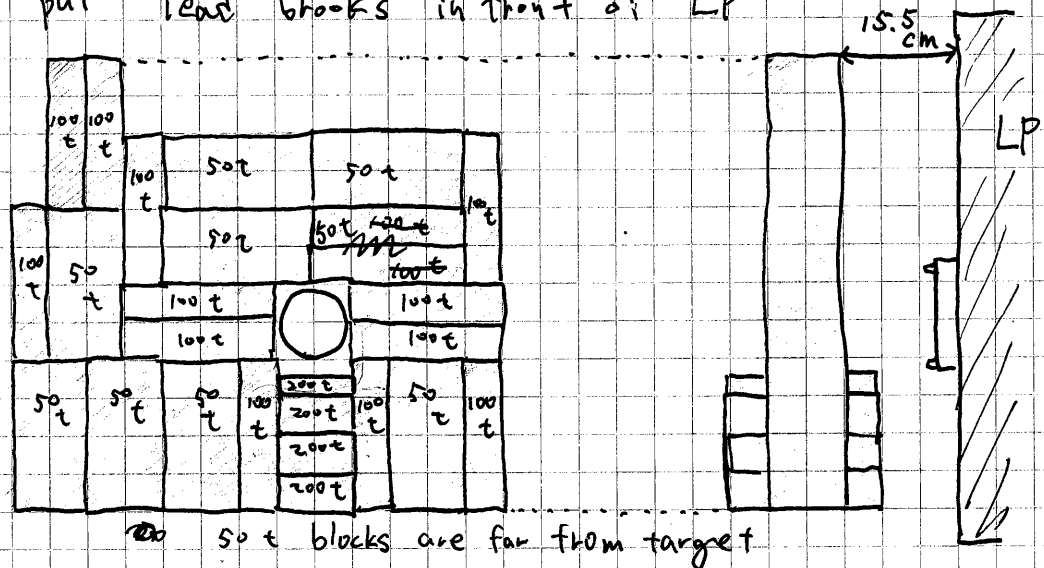
NIM threshold changed to -125mV in Xe- α trigger

5545 Xe- α trig * S1 * NaI Quad \Rightarrow beam off during this run
 proton 1254 μ s

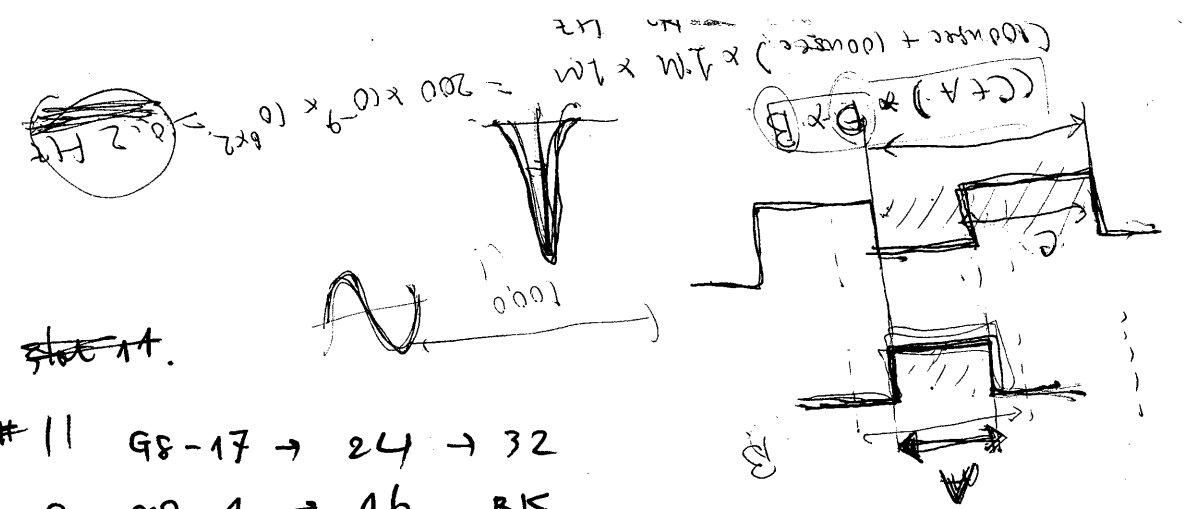
~~# 5546~~
 # 5546 alpha w/ NIM th = -125mV
 \Rightarrow low trigger rate for bottom α
 \Rightarrow threshold set back to -75mV

17:40

put lead blocks in front of LP



~~removed lead blocks in front of NaI.~~



status # 11 G8-17 \rightarrow 24 \rightarrow 32

9 G8-1 \rightarrow 16 BK.

8 G7-17 \rightarrow 32

6 G6-17 \rightarrow 32

5 G6-1 \rightarrow 16

3 G5-17 \rightarrow 32

2 G5-13 \rightarrow 16

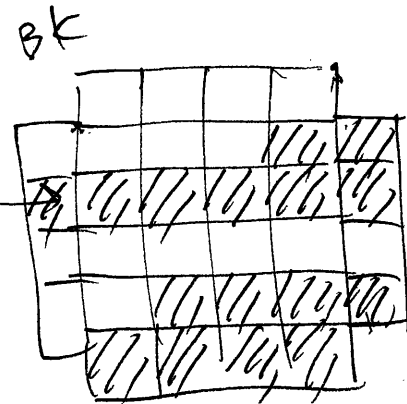
T, L, BT, R
 * 36, 37, 38, 39

T, L, BT, R
 * 34, 33, 24, 29

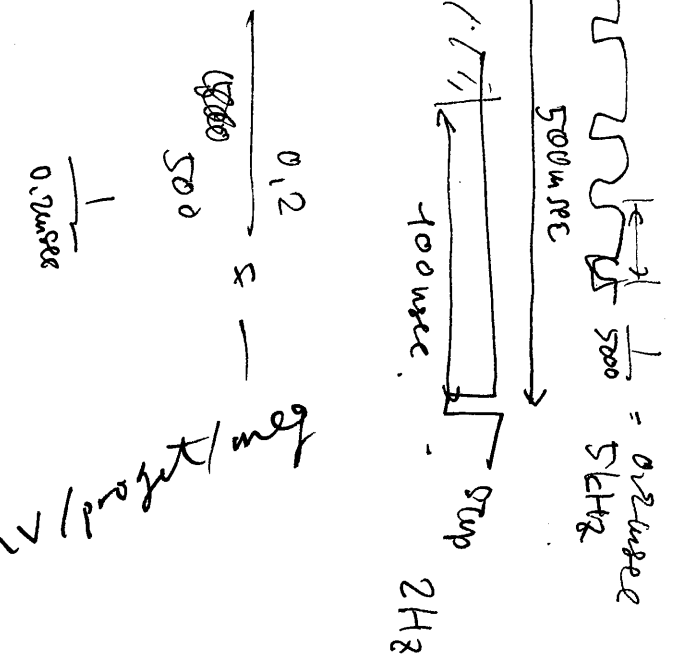
T, L, BT, R
 * 30, 31, 32, 35

T, L, BT, R
 * 26, 27, 28, 18

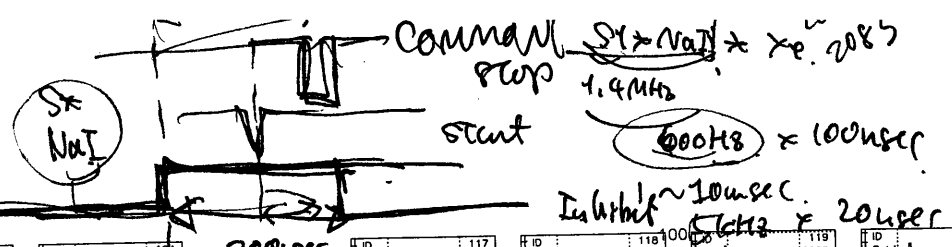
L25, T25, R25, BT25



NaI α Quad threshold

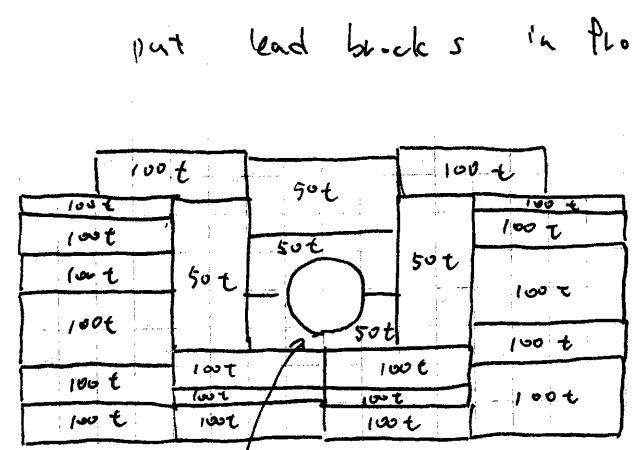
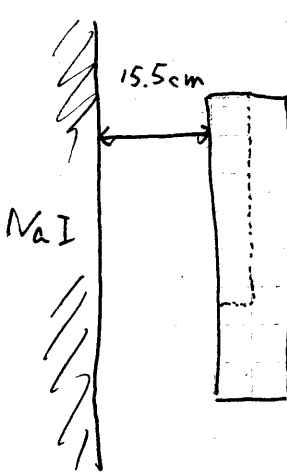
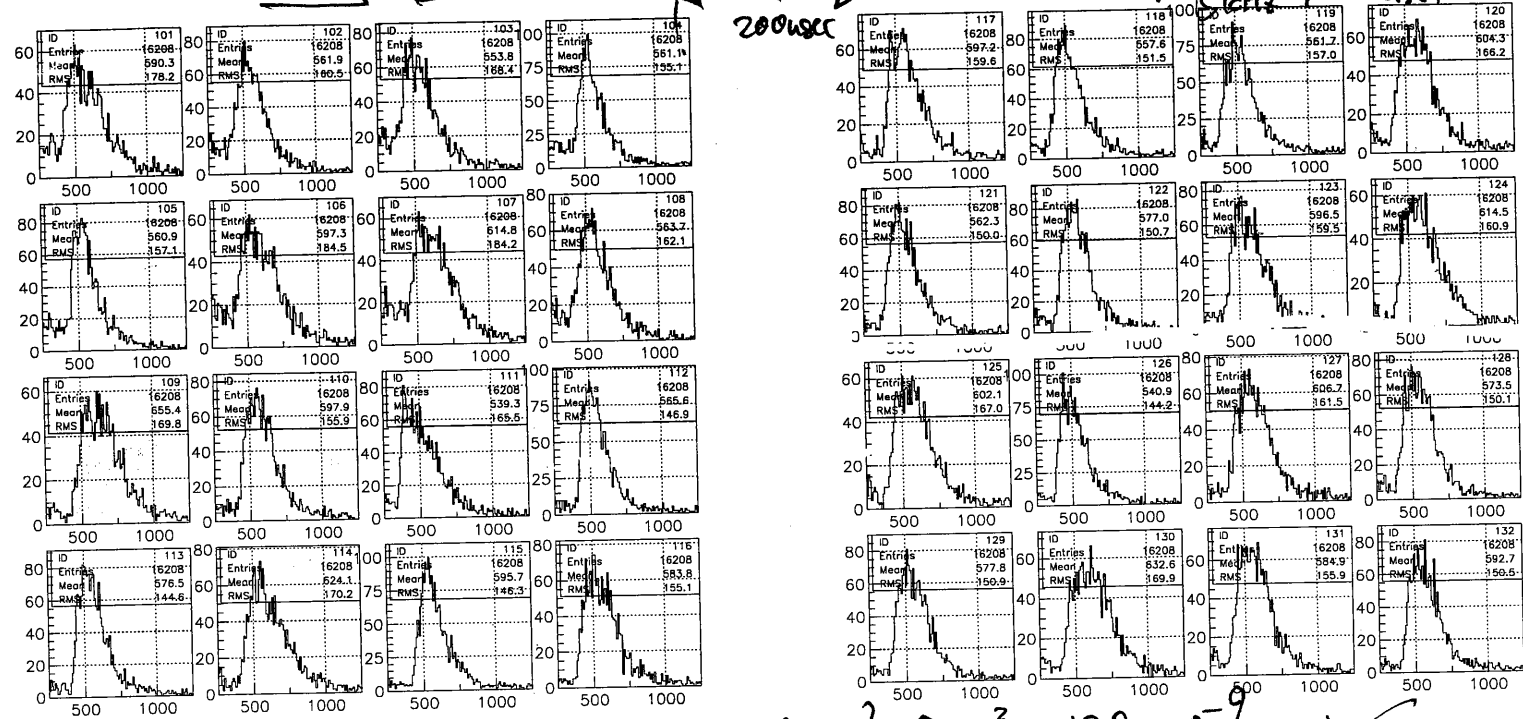


Computer ms j.
DAQ a 3311.
neto.



17/10/2003

17:00 • fixed FAL about S1 histogram.



50t blocks are close to target

RUN #5396. NaI, Cosmic.

$$6 \times 10^2 \times 5 \times 10^3 \times 120 \times 10^{-9}$$

- 19:14 #5547 pedestal with beam
- 19:16 #5548 LED with beam
- 19:25 #5549 & with beam

