

21:50 HV 500 → 600 V (except L7=0)  
 22:40 HV 600 → 700 V ( )  
 Sep 25, '84  
 5:00 HV 700 → 500 V ( )  
 10:10 • Increase the flow rate to 11.23 lpm by slightly opening the flow valve (the pressure at the exit of the flow pump) ~ 0.2 MPa

• Cold head heater Power 50 → 40%

Broken ~~Factory~~ buffer amplifiers in two MACRO FAN-OUT modules are replaced. → OK.

8:00. • When we tried to increase the flow rate of xenon, the circulation pump suddenly stopped and could not be restarted immediately. This is probably due to heat-up of the pump. We decided leave it until cooled down.

• Main CAMAC crate sometimes shows "alarm" and goes down.

Current Status

Circulation OFF  
 Inner Vessel Pressure 0.143 MPa  
 Heater POWER 100%  
 Cold head Temp -107.7 ~ -106

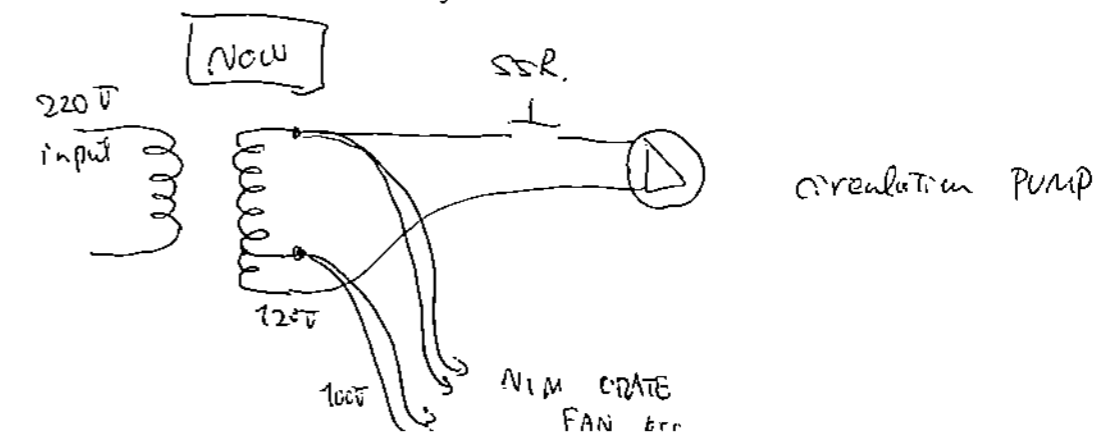
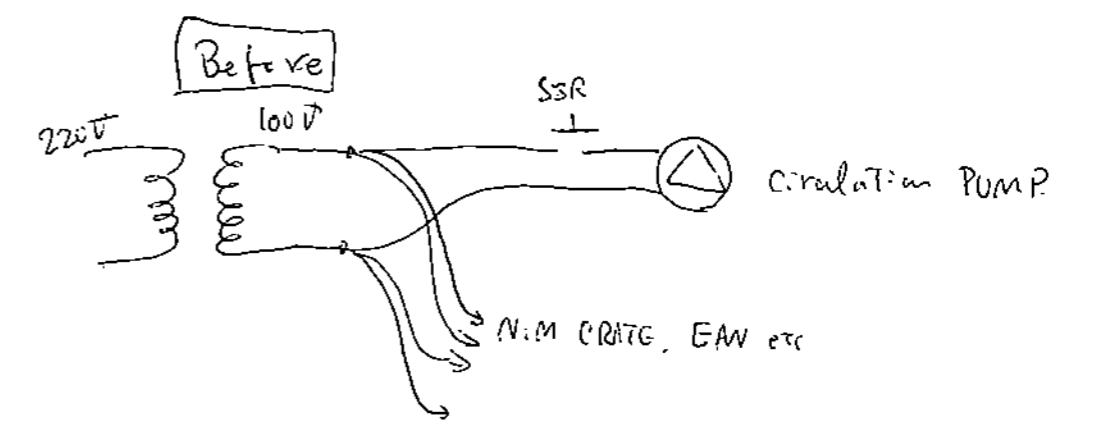
~9:00 HV trip in F25, T20 ⇒ applied again

10:20 HV trip: BT5, BT22, T20, F25, BT4, BT6, BT19, T9, BK18, F10  
 (0-2-9) (0-6-5) (0-7-3) 1-1-6 (0-1-5) (0-3-5) (0-7-5) (0-1-3) (0-14-9) 1-1-7  
 R15, BT8  
 (0-4-0) (0-0-5)

11:20 Connections problems with HV mainframes; cannot change the ENABLE. ~~Switched~~ Switched off and on again. Restored communication but BT1, BT10, T20, BK18, F25, F10, ~~BT19, T9~~ still tripping

11:20 Circulation Pump Problem solved anyhow

It was found that circulation pump failure in this morning was not due to ~~power~~ heat-up but to input voltage shortage (probably). When we connected the pump to 120V output of the transformer it started to work. Power cable connection is modified to supply >100V to the pump as shown below



25/Sep/04

11:30 Current Status of Circulation

Circulation ON	9.4 l/min
Tuner Vessel Pressure	0.133 MPa
Heater Power	40 - 45 %
Cold head Temp	-107 °C

12:00 <sup>LeCroy</sup> HV mainframes switched off and on again.

Try to set

BK18, T9, BT1, BT19, R15, F25 to 700 V

Connection restored.

12:15 HV channels turned on.

12:35 20 minutes after PMT burn-in. All PMTs (but L7) on, HV channels

look like stable now.

15:10 <sup>LeCroy</sup> HV mainframes switched off and on again. applied 800 V again.

R15 HV trip applied 700 V again.

17:40 HV trip: (BT10) → applied again  
T8  
R15

T8 007 00  
R15 040 700

18:00 PMTs (and FANOUT) signals checked. (output to ADC)

Almost PMTs are ok, except for some differences in gain.

All signal channels have a low frequency noise (~10 kHz ~20 mV peak-to-peak)

These PMTs show the following problems:

HV off: T8, BT10, L7, R15

Bad connection: L1, R17, T18, BK18  
(or impedance mismatch)

Particularly low Gain: L6, BT6,  
L12, T12, R12, BT12  
T17, L17, BT17,

particularly low Gain (continued)

F1, F34,  
T23, L23,  
R24

45

Moreover we found the following problems for FANOUTs

FANOUT (G8-6/8/11/16/17/22/25/27) impedance mismatch.

FANOUT (G8-12/13/14/15/18/19/20/21) off.

FANOUT (G1-25 to 32) high freq. noise ~ 30 MHz 5 mV peak-to-peak

15:00 Current status of circulation

Circulation speed	12 l/min	(The flow control valve is fully open)
Tuner Vessel Pressure	0.137 MPa	
Heater Power	73 - 74 %	
Cold Head Temp	-108 °C	

Fixed: this FANOUT was not connected to the back plane properly.  
But 30 MHz noise in all channels is still present

Sep 26 2004

2:46 HV trip in L10 (input 1-2)

→ we had to reboot the mainframe to make this channel "able" again.

All CAWAC modules including converter (except LeCroy, etc.) moved to 10 MHz CAWAC rate

LeCroy discriminators are operated in local mode

Threshold is manually set to ~~8 mV~~ (some as in Phillips disc)

26/Sept

10:30 Perseid run for list #7772

Broad perseid (ABC run) 56, 144-146, 154, 221, 238, 240  
 242, 249, 251-253, 262, 263, 265  
 269, 272-283

No. data 91, 92, 220 → mini-cond?

we checked LED intensity

- LED #
- 1 low
  - 2 high
  - 3 low
  - 4 no light
  - 5 no light
  - 6 high
  - 7 no light
  - 8 low

⇒ pair 2-6 is the best  
 from the view point of  
 intensity  
 stability? → should be checked

4:36 Fix the broad perseid channels (by Wintorn)

Channel	Current Status	Perseid RMS Level
56	LF (144-146) check or do copy run (BROAD → ABC) suspectious	5.8
774		5.6
746		4.3
754		5.0
242		2.7
251		25.1 → very bad
253		1.3
262		2.3
272		
277		75 ~ 70 ← very bad

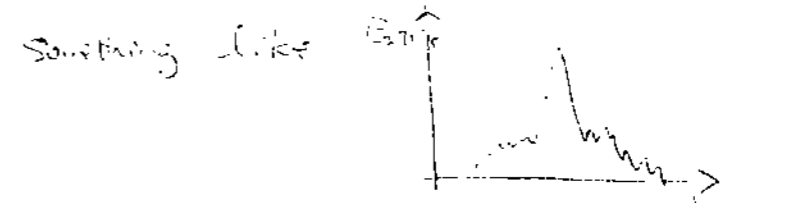
Channel	Offset	Diagnosis	Priority	Status
212		✓ 504	Priority due to	OK
213		✓ 412		OK
214		33		
217				

Ch 104 no data very bad. Broad perseid similar to

Ch 212-271

Ch 64 this larger perseid main value (~350) than others

Ch 104, 272-277 have non-gaussian perseid distributions



Perseid RMS less than 5.0 may be terrible

11:07

we found that one of the points was for the wide lead (Sec 73 Ch 91, 92) was not sorted well (from OPAL data) from OPAL data

The point is selected and the channels 91, 92 are fixed

11:35

Mini-Cond for Ch 220 is explained

The channel should be on now (not fully checked yet) → check to be OK 12:10

11:36

Channels to be fixed (perseid)

- Ch 212
  - 214
  - 251
  - 272
  - 273
  - 274
  - 275
  - 276
  - 277
- COSSMIC RAY TRIGGER COUNTER

These all have broad (very bad) perseid distributions

Beam tuning is started because of these perseid distributions are rather broad.

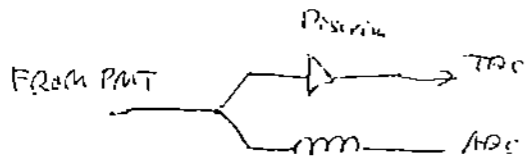
26-Sep-2004

15:08

HV for CR counters, turned ON.  
See log for 19/sep for the HV values.

15:40

Broad distribution of cosmic-RAT trigger counters are found to be due to impedance unmatching through passive splitter. This is not due to NOISE.



Possible solution is to replace the splitter to

MACRO FAN-OUT.

⇒ Replaced to MACRO FAN-OUT (16:37)  
OK "noise" reduced successfully

ch 146	} to be fixed.
154	
251	
(56)	

21:32

channels w/ broad pedestal

ADC ch 39	RMS	replaced mini card. seems O.K.
81	~47	} <del>was</del> become O.K. after unplug & plug ADC input card.
83	25	
144	~4	
145	~4	
146	~8	
154	~5	
251	~32	

pedestals w/ large offset.

ADC ch		ADC ch	
128	: ~200 ch	152	: ~400 ch
129	: ~340 ch	212	} 460 ch
130	: 220 ch	213	
131	: 220 ch	214	
132	: :	216	
133	: :	217	
134	: 360 ch	220	400 ch
140	} 220 ch		
141			
142			
143			

~~22:50~~ 22:50

pedestal ~~was~~

channels w/ broad pedestal

ADC #	RMS	
L7 HV off ← 56	~12 ch	appeared after <del>re-</del> re-connecting ADC input cards.
120	~5 ch	
144	} problem w/ splitter and ADC (cable or Burnidg)	
145		
146		
154		
251		problem of FANOUT

27. Sep '04

2:45 HV trip BT1 (HV-ch 0-2-1)

Broad pedestal channels

56:	L7 HV off	
120:	disappeared (connection problem?)	
144	} <del>the cable between Burnidg and splitter</del>	
145		
146		Delay cable
154		
251	<del>was</del> FANOUT	

### Noisy channels problem almost fixed

- Delay cable (144, 145, 146, 154)
- ⇒ we changed the pm location in Burnidy connector

ADC-ch	144	⇒	148
	145	⇒	149
	146	⇒	150
	154	⇒	157

- New delay cables (148-150, 157) are ~~not~~ better, but still noisy

This change should be reflected on database

↑ done 27/sep/04 15:00

- Noisy FANOUT channel
- ⇒ Buffer amp. is to be replaced

⌊ Found that ground cable connection was bad  
Fixed and now noise disappears

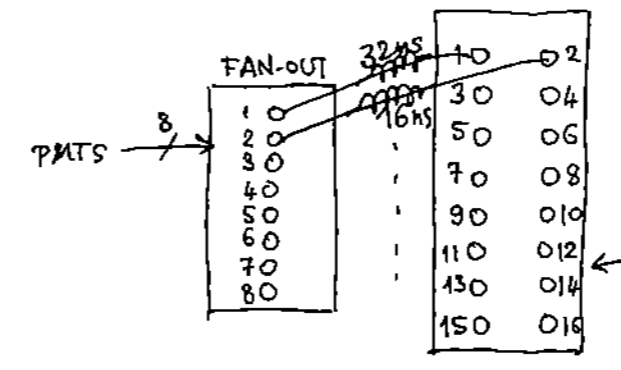
- We roughly optimized the parameters for flashing LED

- LED 2 & 6
- attenuator 8dB + inverter
- CAEN driver setting (~~94, 96, 98, 101, 103, 105~~)  
97, 99, 101, 103, 105, 107

⇒ should be optimized more precisely after solving the problem of offline analyzer.

### Discriminators

- Cabled according to the scheme shown 20 pages above.
- Delay cables from G5-13 to G8-32 fan-outs → discriminators (8:15) (Phillips discr.)



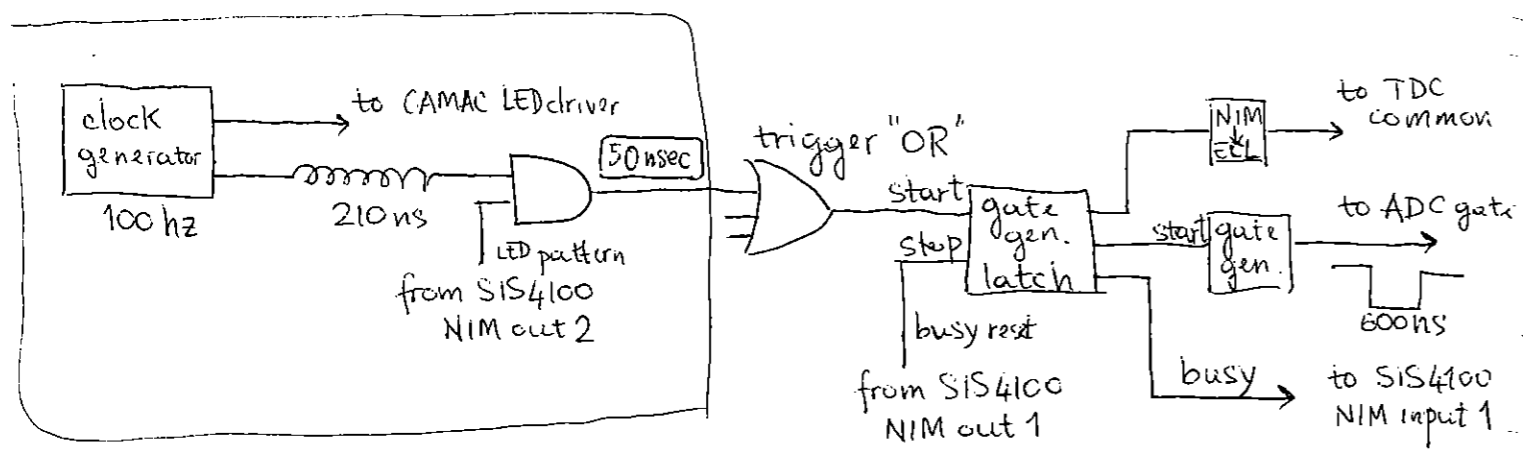
Be careful! Discriminator channels on the left side are odd-numbered according to the front panel of the board, ~~as they range from 1 to 16~~ (as they range from 0 to 15). In our case instead the channel number (see 20 pages above) range from 0 to 15.

We decide to use different delay cables to adjacent channels to overcome the problem of cross-talk; left-side channels are plugged by 32 ns cables from fan-outs, right-side by 16 ns. Each cable is labeled on both sides with the address name and the ADC channel of the corresponding PMT.

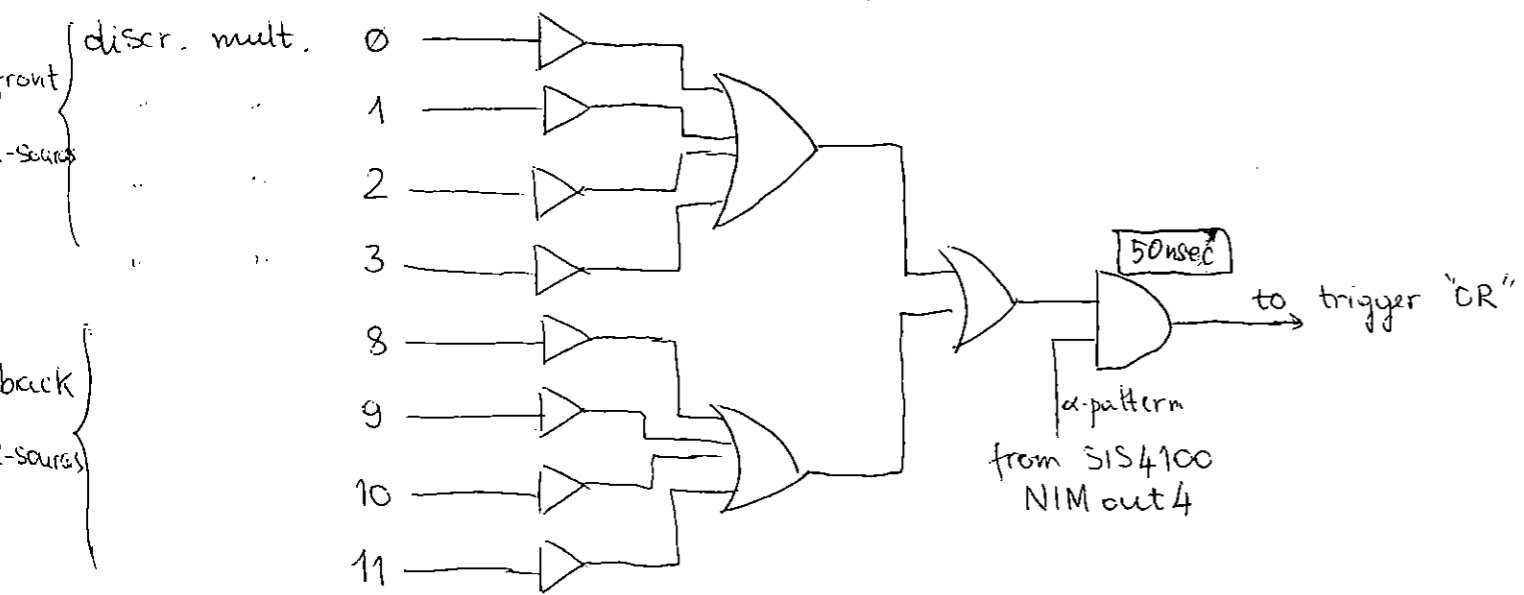


# Trigger electronics

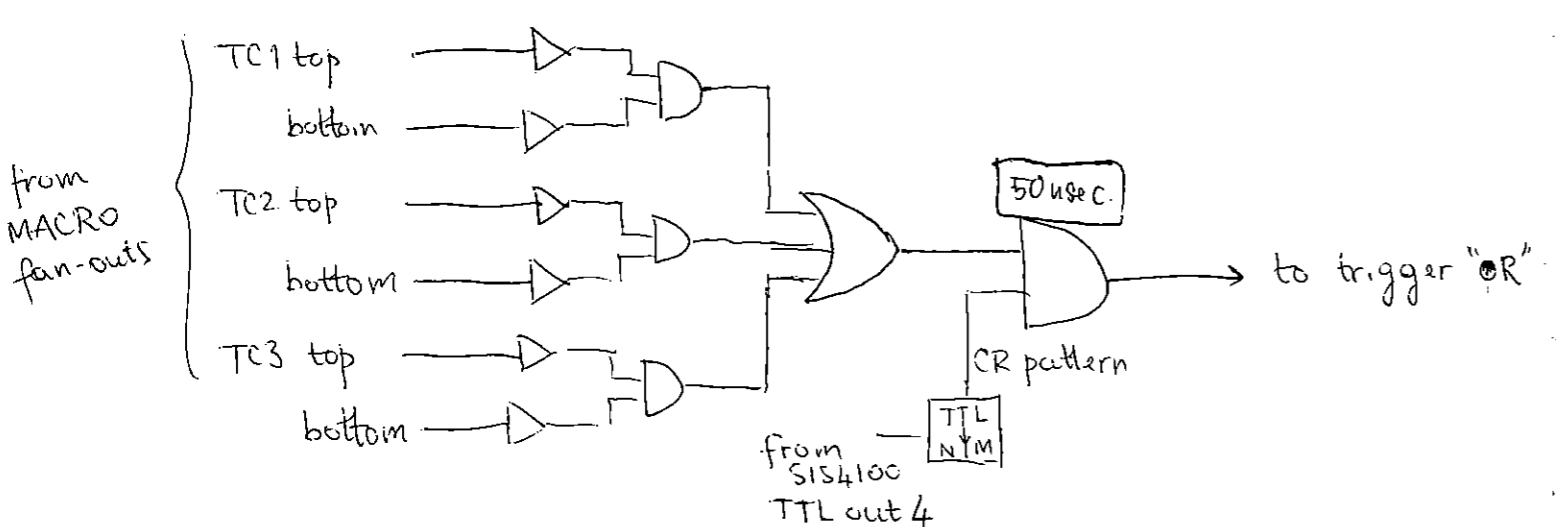
**LED ped** (run-type 0,2,3)



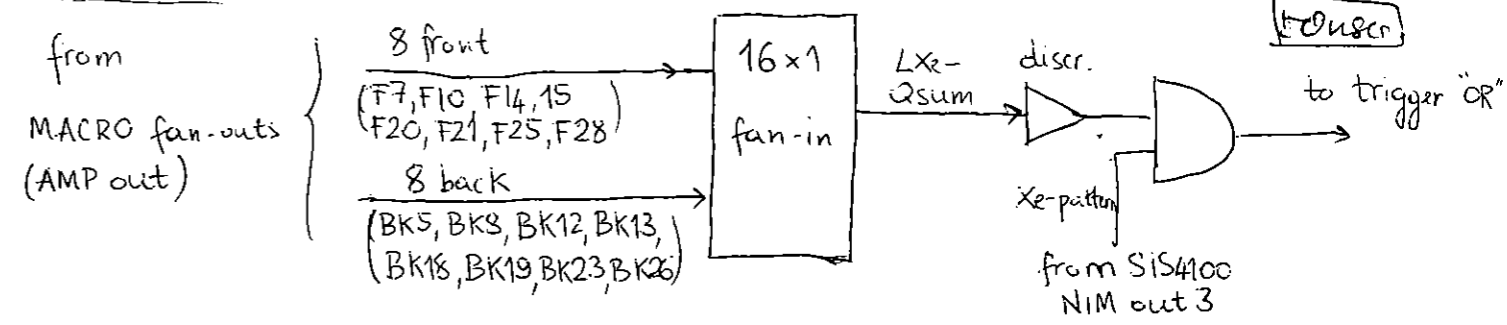
**α** (run-type 4)



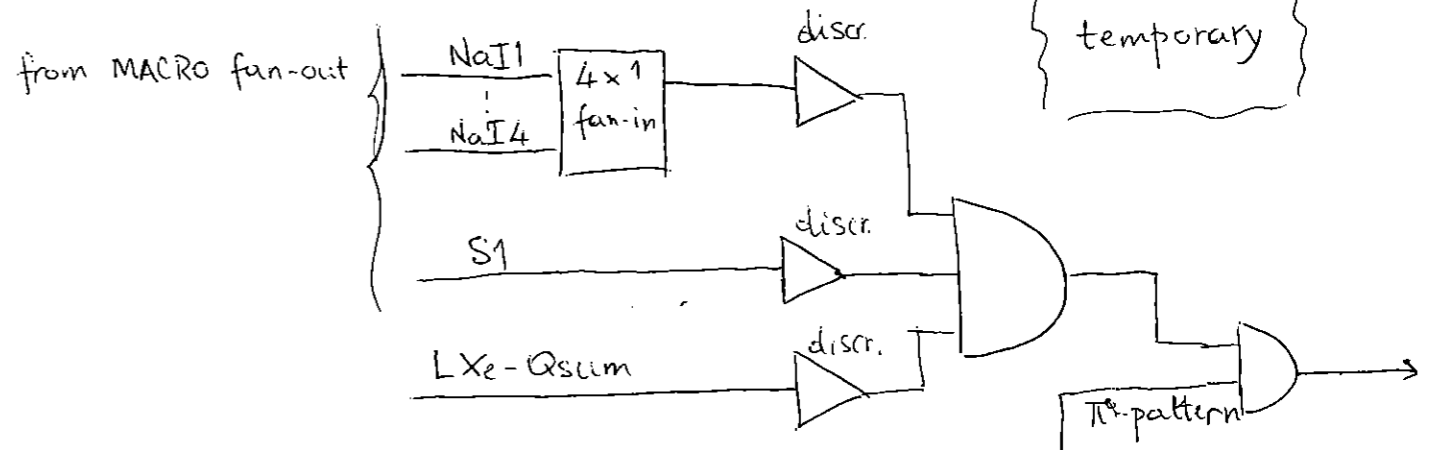
**CR** (run-type 5)



**Xe alone** (run-type 1)



**π<sup>0</sup>** (run-type 6)



- still to be fixed as soon as π<sup>0</sup> events are available
- NaI threshold and timing
- relative phase of S1 and RF
- LXe threshold and timing
- connection to trigger 'OR'

11:10 Fan out G8 (12,13,...) ch1 ground-cable was ~~torn~~ repaired  
BK3 wave form is strange ⇒

R21 hv trip

turn off hv, then applied again

Maybe impedance mismatch or something

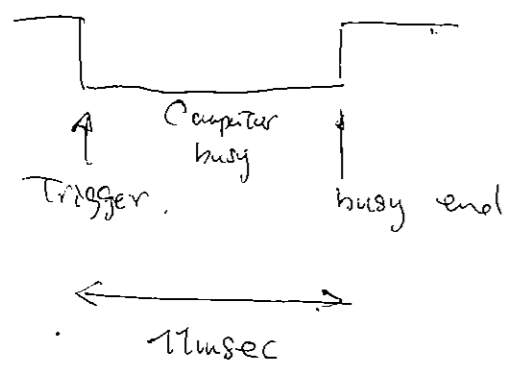
- 11:25 R15 hv trip → applied again
- 11:45 BT10 R21 hv trip
- 12:25 R15 hv trip
- 12:35 T41 hv trip
- 12:40 L10 hv trip
- 15:00 BT10, T41, R15 hv trip

15:70 SAC data base updated for including cable assignment change written @ 6 pages before.

- 17:10 #7784 pedestal
- 17:13 #7785 pedestal
- #7786 pedestal
- 17:18 #7787 LED

18:10. Some Measurement on DAQ latency and analyzer efficiency.

• Flip-Flop output was measured on the oscilloscope during pedestal runs



The period of "computer busy" is about 11µsec for reading all ADC-TACS. Due to this, even if one try to take pedestal/LED

data with 100 Hz trigger, we can only take at 50 Hz

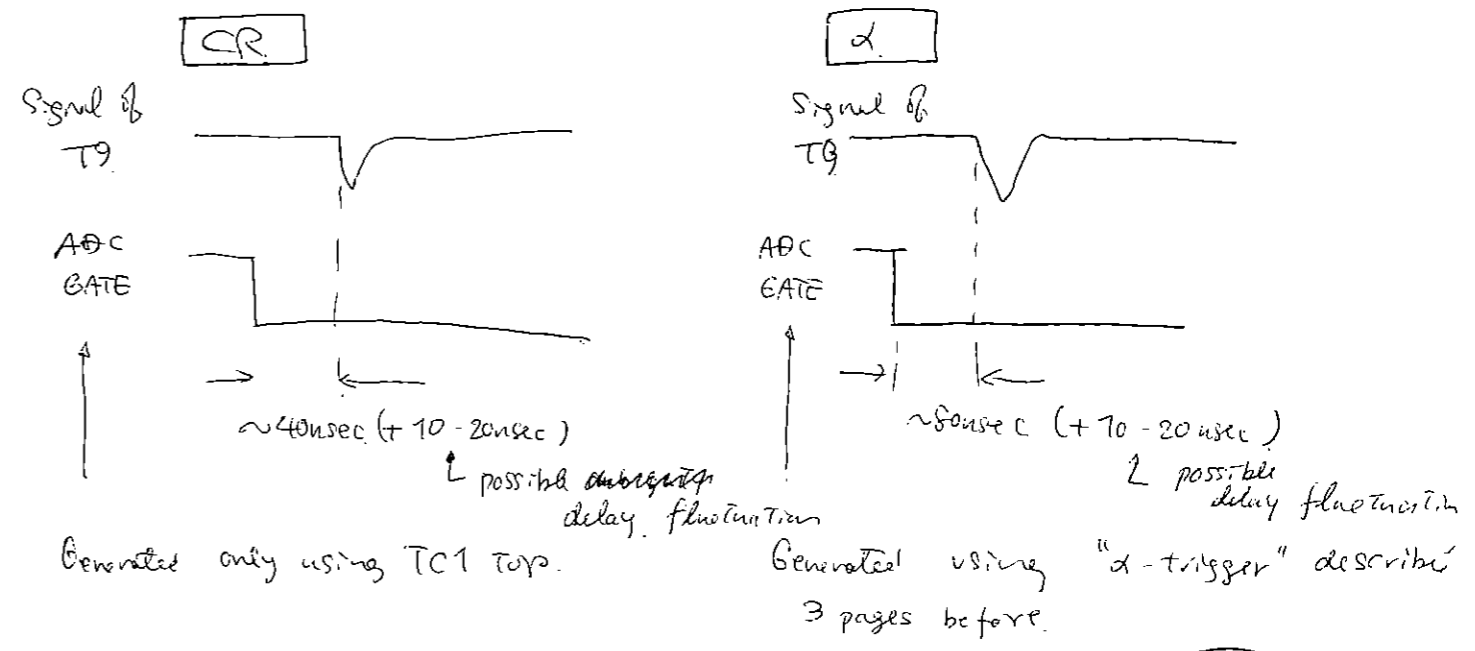
• In LED runs, ROME can analyze only half of events at 50 Hz DAQ speed. As far as we monitor CPU usage on megonln02, it is used only less than 5%. So this ~~problem~~ is maybe due to communication between megonln01 and megonln02.

For circumventing these problems, we do:

1. ~~use~~ modify the frontend code in such a way that we do not take TDC data in pedestal/LED runs
2. Move "analyzer (LFramework)" from ~~me~~ megonln02 to megonln01.

→ Now we can take pedestal/LED data at 100 Hz & analysis efficiency of ROME is about 98%.

21:04 ADC timing was checked for  $\alpha$  and Cosmic RAY trigger.



Thus timing is almost OK

- 2.
- 21:10 #7794 pedestal beam off
- 21:11 #7795 LED beam off

Sep 28 '04

- 2:45 #7838 ~~pedestal~~ pedestal beam off
- #7839 LED "

8:30 | ~~APZ~~ F3c APC num. 157 delay cable is dead ⇒ changed to 153  
 T41 APC num 217 " ⇒ changed to 218  
 R40, L41, T40, BK32 (ADC num 212, 215, 216, 220) ~~it is~~  
 Cable between barndee and splitter is bad, it should be made

Check all channels without LED signals on the histograms



28/Sept

42:76 7840  $\alpha$  for test.

Gain calibration is not finished yet.

R40, L41, T40 BK32 (ADC num 212, 215, 216, 220)

cable between barndee and splitter is mended

T41 (ADC 218)  $\Rightarrow$  ADC 219 Delay cable is bad

T40 (ADC 216)  $\Rightarrow$  ADC 218 : ADC 157, 216, 217

consequently 157  $\rightarrow$  153, 216  $\rightarrow$  218, 217  $\rightarrow$  219

2:20 BT70 H.V. trip

12:47 L10 H.V. trip

#7841  $\alpha$  test run  $\leftarrow$  very short

#7842 Pedestal beam off

#7843  $\alpha$  test run beam off

beam started around the end of this run

$\rightarrow$  Delay cable 216 was bad, so

T40 (which was ADC num 216)  $\Rightarrow$  (ADC num 218)

T41 (ADC num: changed from 217 to 218 today)  $\Rightarrow$  219

Change done today:

F30 ADC num 157  $\Rightarrow$  153

Done by modifying Bundy connector input.

T40 216  $\Rightarrow$  218

T41 217  $\Rightarrow$  219

$\Rightarrow$  Database updated

Bad delay cable

ADC num. 157, 216, 217 Don't use it!

Splitter to Bundy cables are newly made, used for

ADC #  
212  
215  
218  
220

PMT ID  
R40  
L41  
T40  
BK32

(had been used R40, ADC 212)

(had been used L41, ADC 215)

(had been used T40, ADC ~~216~~ 218)

(had been used BK32, ADC 220)

(No signal channels)

Fixed bad channel

Cable between splitter to Bundy

Delay cable

R40  
L41  
T40  
BK32  
F30  
T40

bad  
bad  
bad  
bad  
OK  
OK

OK  
OK  
bad  
OK  
bad  
bad

\* Cables between splitter to Bundy, were newly made for R40, L41, T40, and BK32

\* Delay cables for T40, F30, and T41 are changed

\* Do not use delay cables corresponding to ADC # 157, 216, and 217.

There is another channel with no-signal.

ADC # 258. — BK3.

We could not see the signal at the input of FAN-OUT

Should be investigated later!

# HV Adjust

```

edit (online /include /frontend.h LED_N.EVENTS = 1000 => make)
    rom Config.xml <LED> <NEvents> 1000
    ODB <Trees> <Trigger write="yes">
        /LPFramework/LPTXeGainCalib/hvAdjust 1
  
```

restart Trigger Frontend. lpframework.exe

17:20 #17863

pedestal for hv adjust

#17864

//

#17865

Changed definition of spread of pedestal from RMS to sigma  
~~pedestal~~ for LED pedestal for hv adjust

#17866

LED => LED settings was wrong.

change several HV of PMTs whose gain is very low by hand

LED 104, 105, 106, 107, 108, 109

#17867

LED

LED setting 106, 107, 108, 109, 110, 111

17:54 #17868

LED

#17869

LED

LED setting 106, 107, 108, 109, 111, 113

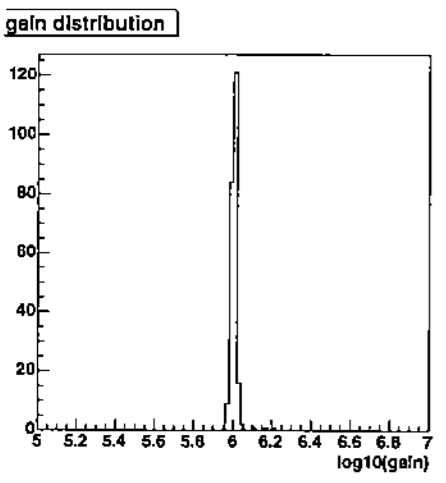
18:15 #17870

LED

adjust to LEG done but { L7 HV not applied  
T9 due to program bug  
Bk3 due to bad signal cable

Problem of program is fixed, but T9 is not adjusted => to be adjusted later.

Bk3 => cable should be repaired



17:51

#17872 LED gain adjust again for T9

Failure because "Trigger" tree was not produced for avoiding ROME crash at the end of a RUN

18:55

#7873 LED gain adjust again

Beam comes back during this RUN

7872, 7873. both couldn't be used for T9. gain adjust on-line.

19:06

Beam tuning is almost finished. But due to neutron background around the electronics, we should avoid staying there with beam on. It is planned to do following things.

- Remove profile chamber, scanner stage with a pill counter
- Set S1 counter in position
- Set hydrogen target in position
- Place degrader in the target chamber

$$2 \times 10 \text{mm} + 2 \times 3.3 \text{mm} = 26.6 \text{mm}$$

same as previous set up

(This time,  $P_{beam} = \frac{100}{12} \text{MeV}$ . Previous 111 MeV)

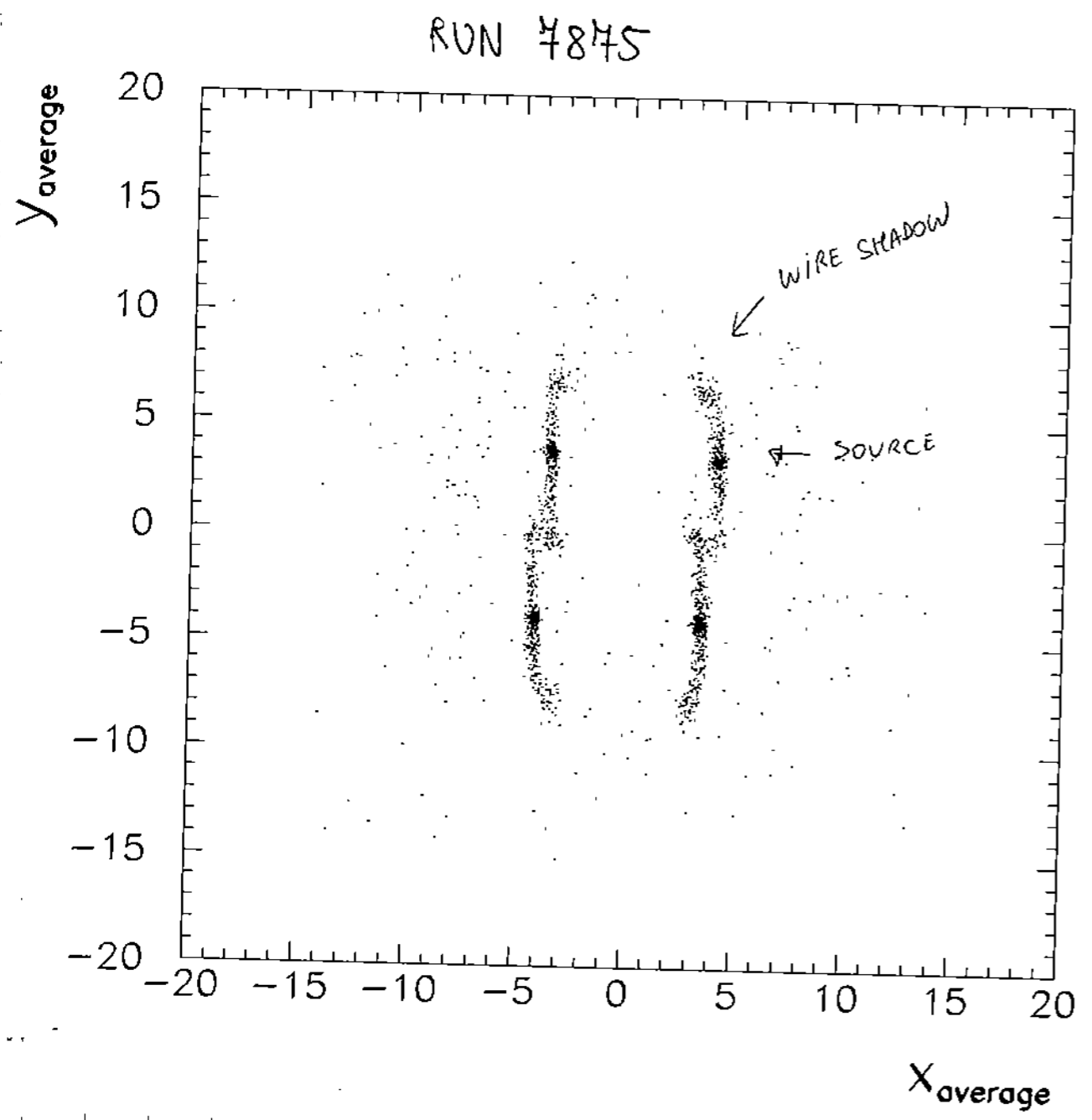
If we need more degrader, we can place behind the S1.

- Fill hydrogen target
- Set up collimators both in front of NaI & Xe
- Set "neutron shield" around NaI & Xe
- Place ~~XXXXXX~~ "neutron shield" in front of the cracks of concrete blocks for reducing neutron background around the electronics.

20:40 RUN 7874 Pedestal

20:45 RUN 7875  $\alpha$ -source run

$\alpha$ -Sources on the wires Seen!!



21:40 # 7876 started a long! ALPHA RUN

23:10 # 7877 PEDESTAL RUN

23:12 # 7878 led RUN

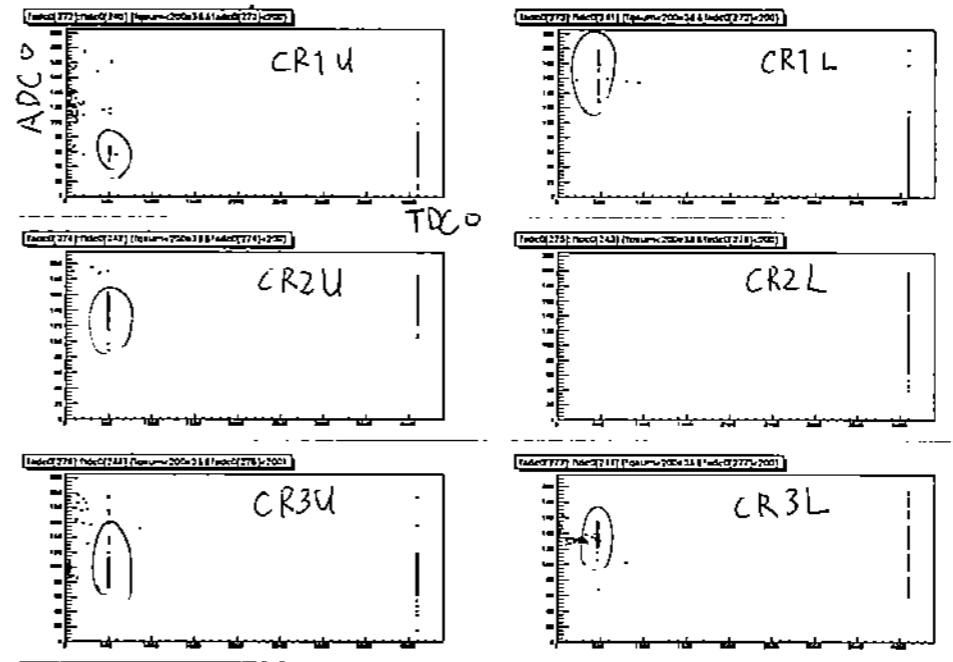
23:45 Alessandro + Giovanni : 2 HV channels tripped :  
0-2-6 : put L10 and  
1-2-6 : put F12

We tried to reset them via web but they still remain in the trip condition.

29 Sep. 2004

~ 01:00 # 7880 cosmic rays run  
9:23 # 7881 pedestal run  
9:30 # 7882 LED  
9:45 # 7883  $\alpha$  run

RUN 7880



TDC for CR2L is not seen.  
Timing should be adjusted

Found that this was due to mis-connection on the front panel. how they are connected correctly 17:50 SM

10:58 #7884 CR end at 12:18 for power control reconnection

769 events

17:50 #7885 CR again!

29/Sept/04

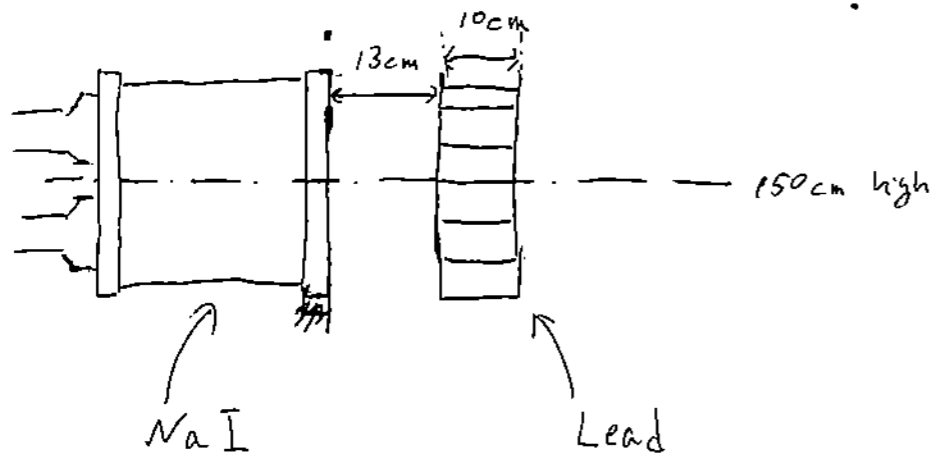
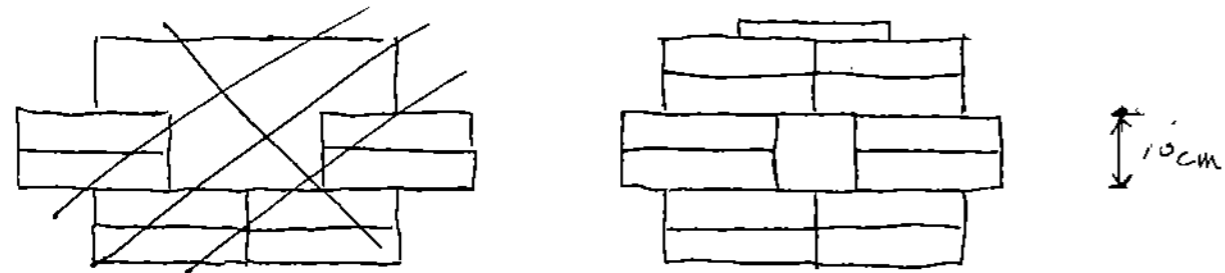
19:20 S4 HV on -1900V.

20:30 L10 HV trip

20:50 Target cell precooling start

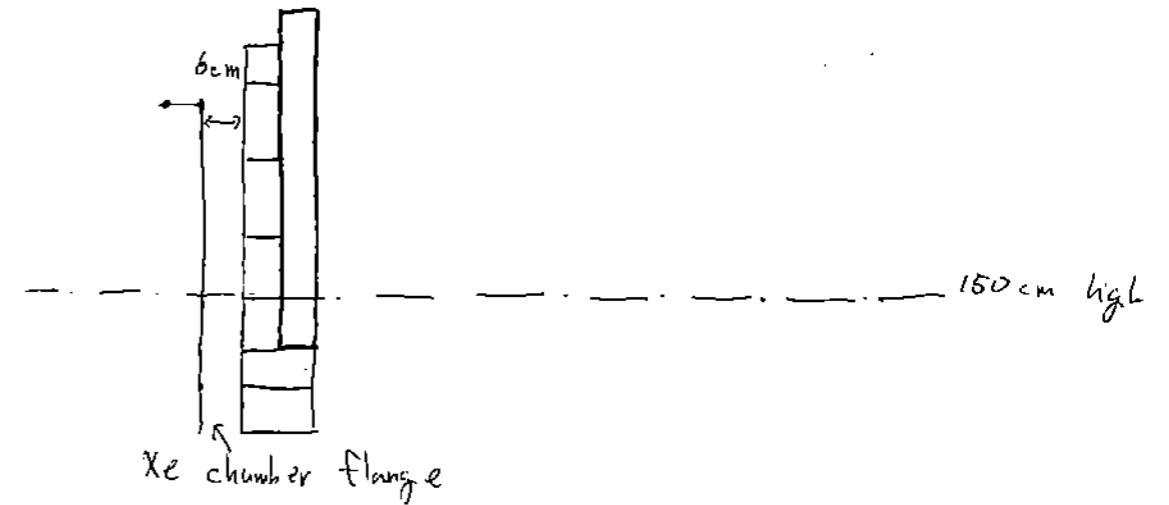
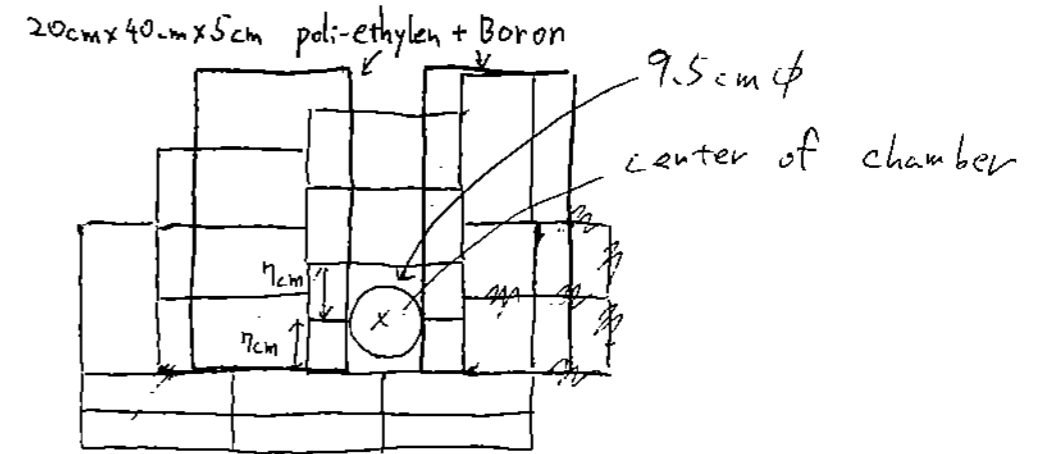
put Lead blocks

NaI & LYSO



LYSO was put between NaI and Lead

Xenon



30/9/04 8 a.m. run 7885 CR STU going in  
~14500 counts

9:50 # 7886 Pedestal run

9:51 # 7887 LED run

10:12 # 7888  $\alpha$  run

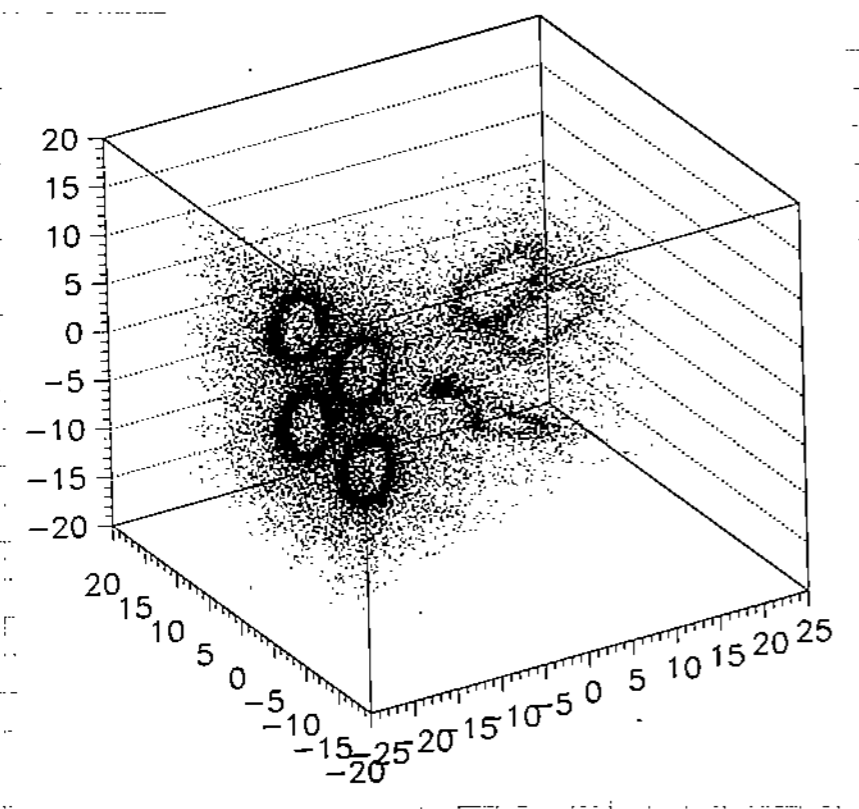
10:30 MACRO FAN-OUT for CR, LYSO, ST is changed because there was no buffer AMPLIFIER for AMP outputs

10:51 End of a run (HV tripped before the end of run)  
BEAM ON for RADIATION SURVEY

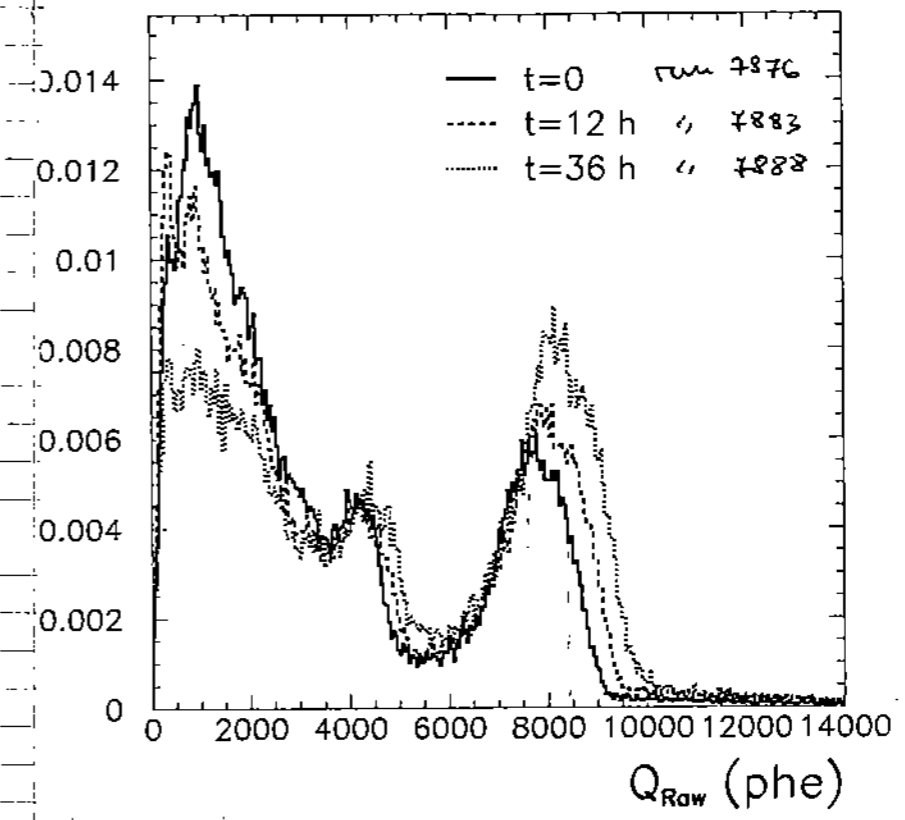
8:55 Target Cell liquification start

12:45 Target Cell liquification finished, 97.4% filled  
TC temp. setting changed to 19K

15:15 Map of the reconstructed  $\alpha$  source from run 7888 (over)



The  $\alpha$ -source peaks are still increasing. PURIFICATION IN PROGRESS

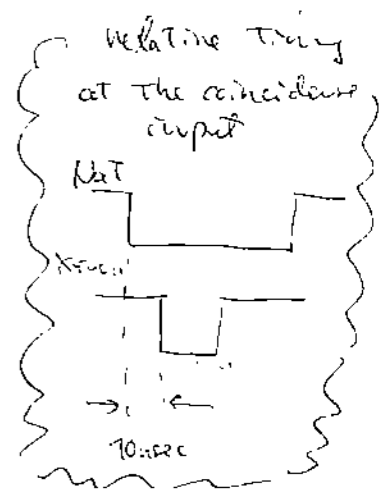
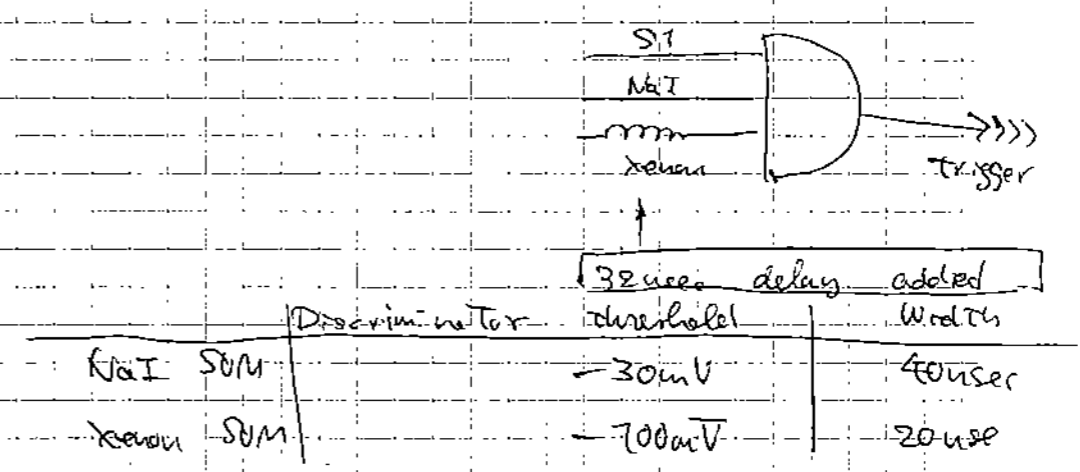


15:35 HV for NaI on +720V

HV module in slot 4 seems to be out of order.

HV for NaI is changed from board 4 - ch. 0 to board 5 - ch. 0.

17:00 NaI & Xenon coincidence timing adjusted



30/Sep/04

#7890

Revised RUN with Beam ON

18:30

S1 constant HV on after Peter adjusting HV for S1. Recommended value of S1 HV is

-1780V

Momentum slit setting (FS41-L & R)

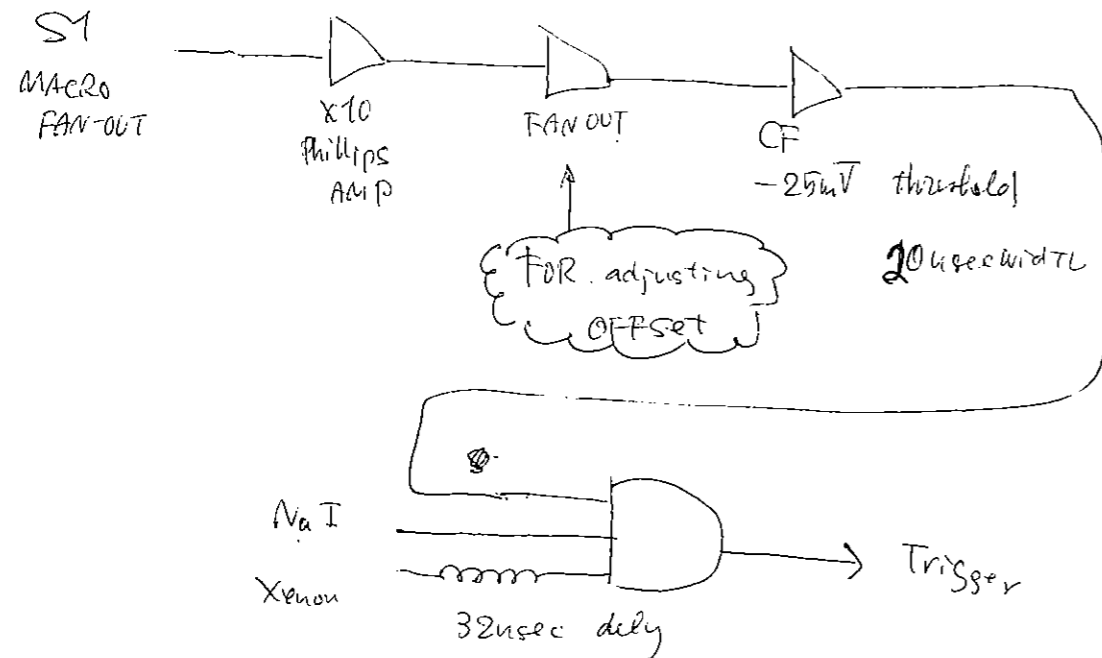
80

(this is a narrow setting. Wide setting is 100)

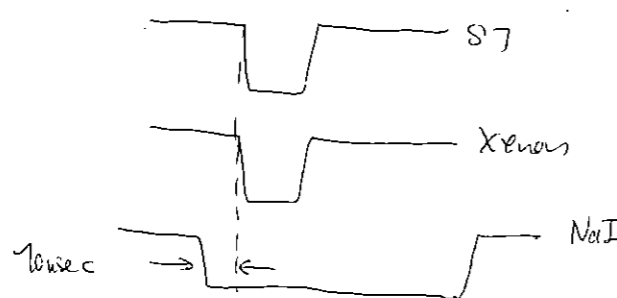
21:00

CF discriminator is installed for S1

S1 signal before the coincidence



Timing at the coincidence was adjusted with



S1 & RF TDCs are not Ready yet,

20:50

RUN 7891  $\pi^0$  RUN test ~ 40,000 wts  
rate ~ 50 Hz

~~XXXXXXXXXXXXXXXXXXXX~~  
we see of too much bkg in LXe  $\Rightarrow$  rise thresh @ 900 mV  
NaI (sketched)  $\Rightarrow$  lower V @ 680 V

21:30

RUN 7892  $\pi^0$  RUN test ~ 23,000 events  
rate ~ 13 Hz

22:10

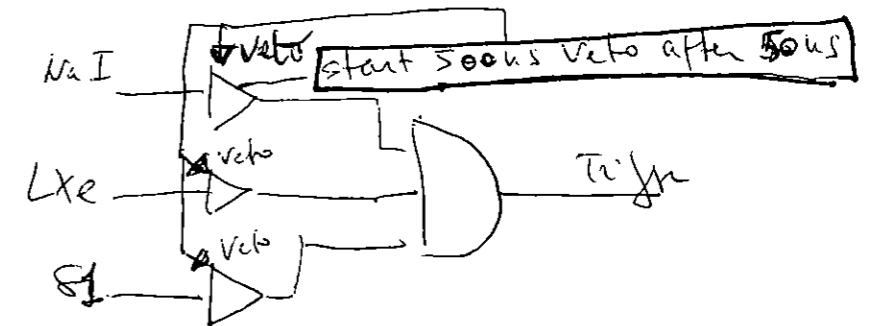
changed threshold of LXe 2 to 800 mV  
changed L150 voltages  
L101 1870  $\rightarrow$  1500 V  
L102 1920  $\rightarrow$  1500 V

RUN 7893  $\pi^0$  run test 19113 events  
rate ~ 5 Hz

1/10 Oct 04

Alessandro / Giovanni / Ryan

The NaI pulse is very large and make the disc. restart  $\Rightarrow$  fake NaI pulses start the coincidence  $\Rightarrow$  modified NaI discrimination: added veto



Run 7894: HV NaI brought up to 700V

$\pi^0$  run: rate  $\sim 5$  Hz

1:05 After correcting the discriminator logic it seems the thresholds on NaI & LXe are too high.

LXe 800 mV  $\rightarrow$  400 mV

NaI 30 mV  $\rightarrow$  15 mV

3:00 Run 7895: ~~run~~  $\pi^0$  run: Rate  $\sim 9$  Hz

stopped at 3:00: 36823 evts

see picture

3:20 shutter closed

3:40 # 7896 Pedestal run

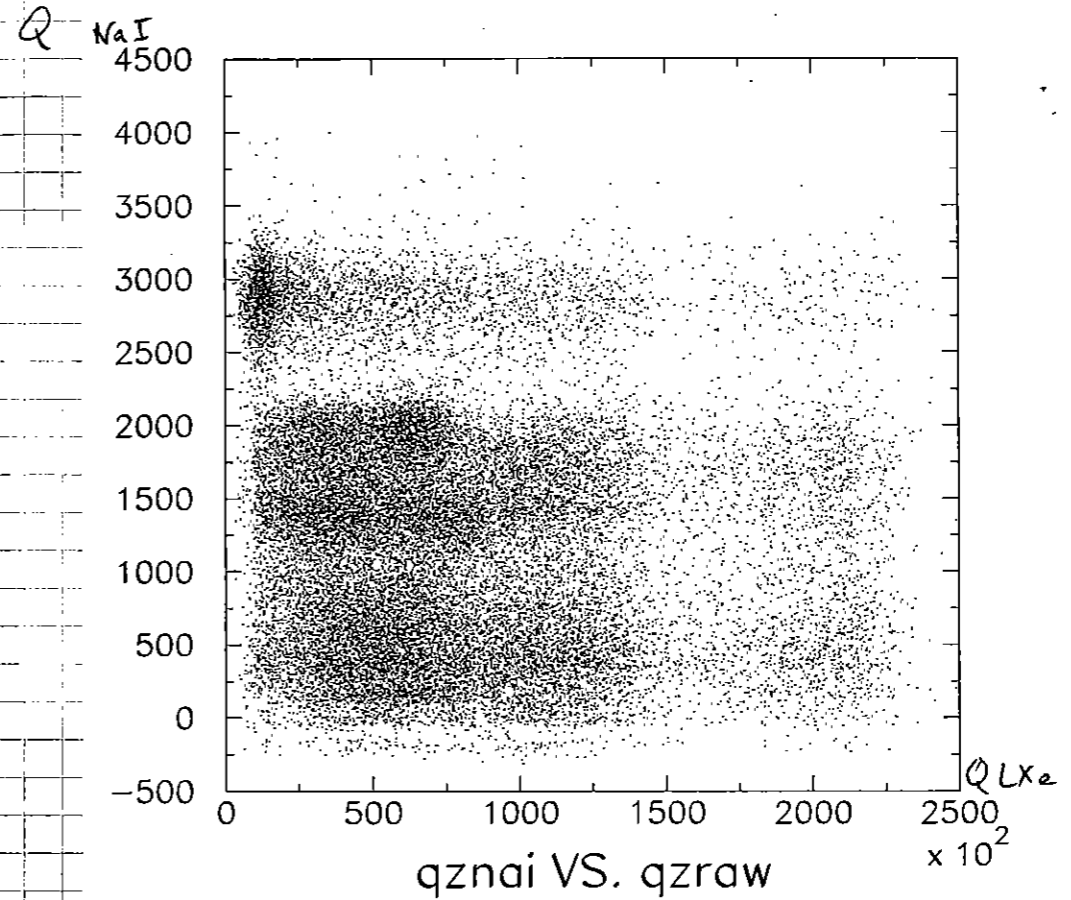
# 7897 LED run

# 7898  $\alpha$  run (23453 events)

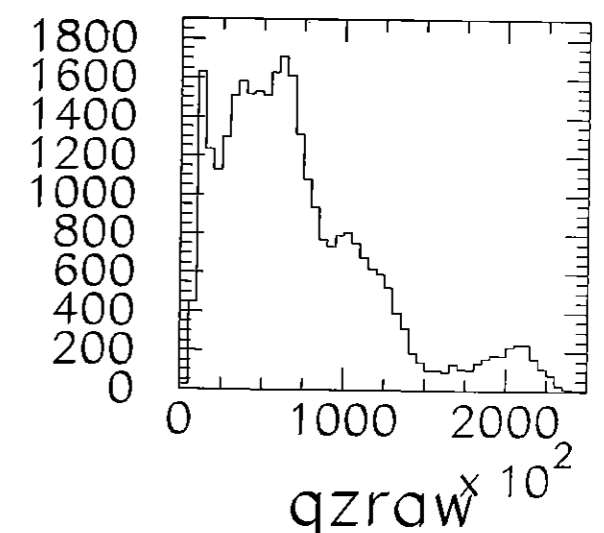
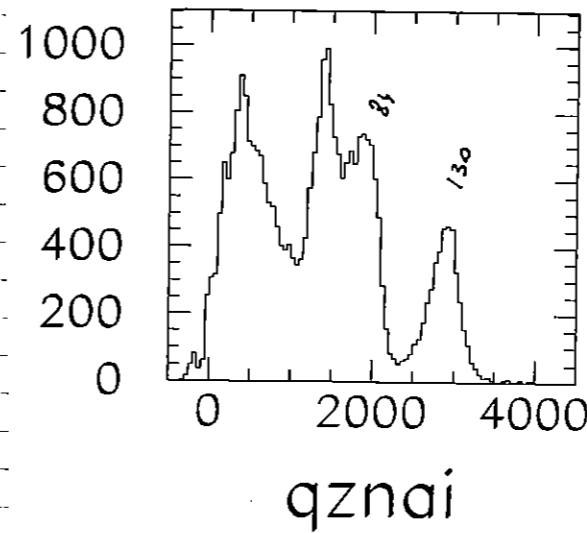
4:10 # 7899  $\alpha$  run BB opened at  $\sim 4:20$

4:50 stopped run; # evts = 47085

Run # 7895



The two  $\gamma$  (54, 83) peaks are not evident in LXe ???



Run # 7895

Projections of the above 2d hist

12:05 BT21 HV trip

LED #2 was not illuminating so much  
 LED adjustment

			step-1	2	3	4	5	6
LED 2	8dB att		124	125	126	127	129	131
LED 6	8dB att		106	107	108	109	111	113

12:40 HV key switch of H002 has been set to LOCAL  
 => changed to REMOTE  
 restart SCFE

{ 0DB from config.sml /LPF framework /LPT Xe gain calib/ hv Adjust 1  
 <Trues> <Trigger write=yes>  
 <LED> <NEvents> 1000

12:44 #7909 pedestal for gain adjust  
 #7912 LED for gain adjust  
 #7914 "

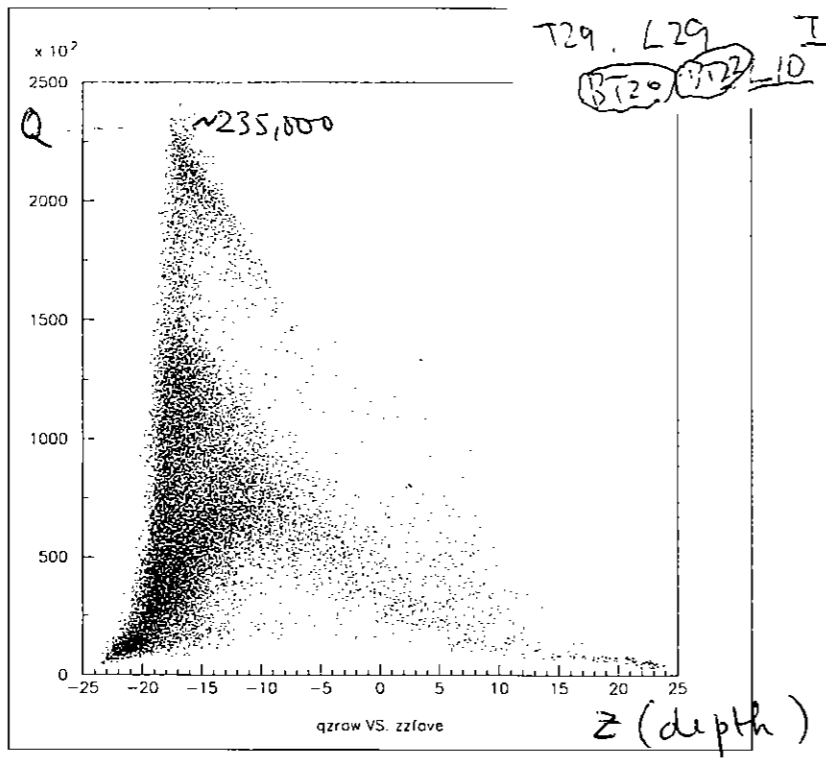
13:09 #7916 LED for gain adjust  
 T 26, 27, 28, 29 +100V

13:18 #7917 LED for gain adjust  
 #7918 "

13:30 To increase the flow rate, inner vessel setting is changed 0.13 MPa to 0.15 MPa

Before changing MINCO -104.3°C Heatm ~ 30%  
 HL low -96.3°C Flow ~ 12 lpm  
 up -102.2°C

T9, BT20, BT21, BT22  
 L25, L26, T26, T28, L28  
 T29, L29, L24, T24  
 T29, L29, T9  
 BT20, BT21, L10



No TP, target had already evaporated

Run #7895  
 LXe purity?

Some time of this period this might be happened.

6:00 Run #7900,  $\pi^0$ , same conditions as 7895  
 6:45 stopped at 6:45: ~ 50,000 evts  
 7:40 L10 HV trip  
 7:58 ~~Run~~ #7901 Pedestal run  
 8:00 #7902 LED run  
 9:20 #7903  $\alpha$  run (beam on)  
 11:06 #7904 pedestal (beam off)  
 11:08 #7905 LED run beam off  
 11:15 #7906  $\alpha$

Target Cell Refrigerator has been stopped because of blowout of fuse.

Target Cell Refrigerator: put a new fuse and repaired (14:30)



1 Oct 04  
13:43

Circulation Control setting is changed

Inner Vessel Upper limit 0.14 → 0.16 MPa  
flow upper limit 13 → 15 lpm

14:26 Flow rate is increased and stabilized

MINCO ~~404~~ -104.2°C      Heater 70-80%  
HL low -95.70°C      Flow 13.32 lpm  
up -100.91°C

ΔT (MINCO) ~ 0  
ΔT (HL low) 0.6°C  
ΔT (HL up) 4.29°C

14:30 Target Cell precooling start.

14:35 We set the target pressure to 0.13 MPa again and monitor the α-peak during pressure-temperature change.

RUN 07922 PED  
7923 LED  
7924 α-source with changing temperature  
T<sub>SH TOP</sub> → INCREASING  
T<sub>HL LOW</sub> → INCREASING  
Pressure → decreasing  
T<sub>SH BOT</sub> → DECREASING

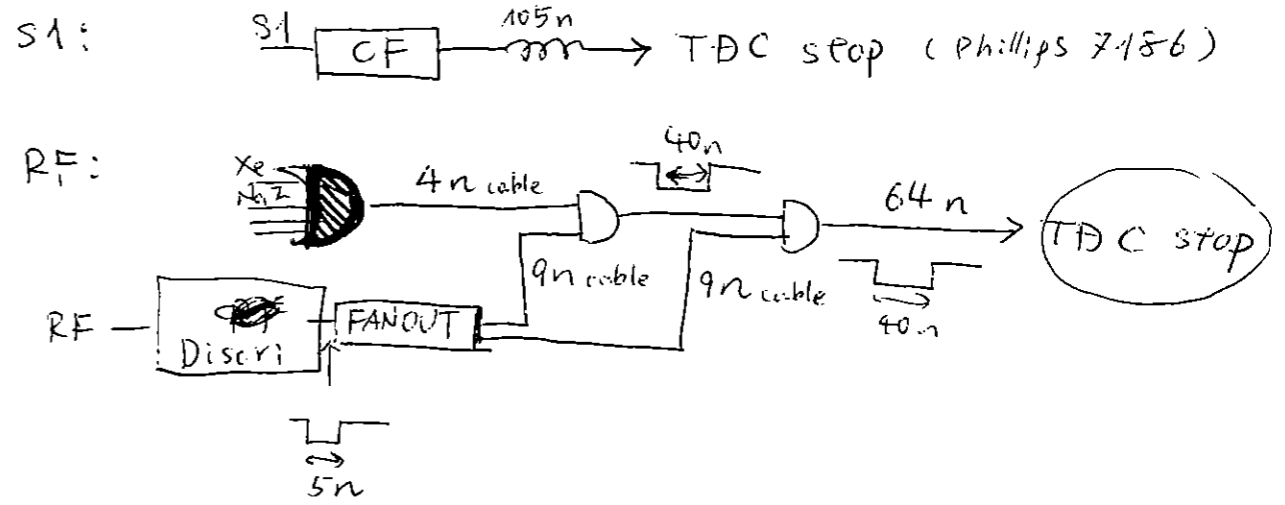
logging ionline/date/logging/2004\_2\_1.txt

temperature changed during run by more than 1.5 degree

16:00 RUN #7924 stopped

16:35 The target pressure is set to 0.150 MPa again

18:50 We ~~set~~ setup the TDC inputs of S1 & RF



20:20 Target cell fully filled (~95%)

20:18 #7925 Pedestal w/ beam ON

20:21 #7926 LED w/ beam ON

20:26 #7927 alpha w/ beam ON

21:01 #7928 π<sup>0</sup> run ⇒ Junk

21:34 #7929 π<sup>0</sup> run (strange NaI spectrum)

21:45 TDC delay cables between discriminator & TDCs are connected. Need careful checks using TDC data. SM.

22:08 #7930 π<sup>0</sup> run Xe threshold changed 400 → 600 mV

23:08 run stopped for a check

Alessandro / Giovanni / Wataru

→ trigger configuration was changed during the run !!! ⇒ not good: however one notices the LXe

threshold should be increased because the LXe light seems to increase

Alessandro / Giovanni

2/10/04

00:30 Trigger slightly modified

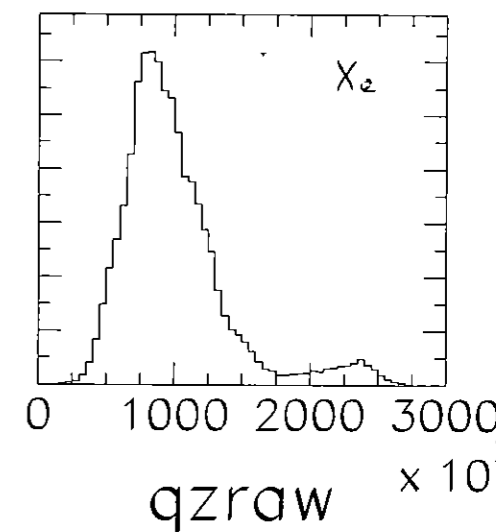
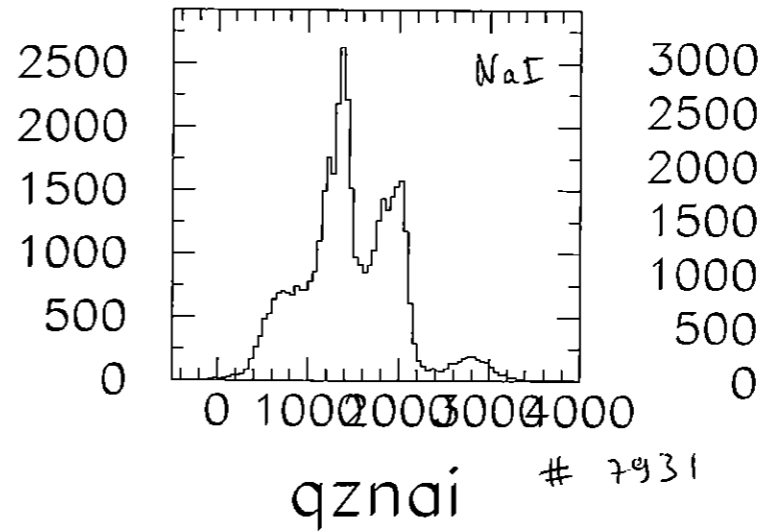
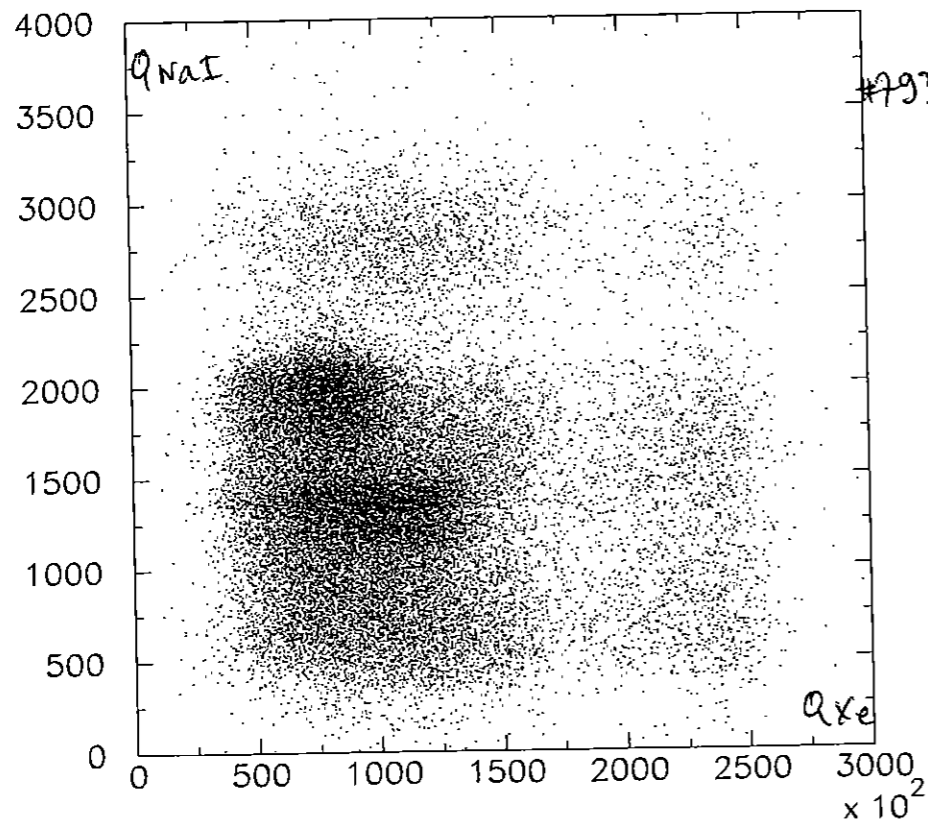
1. 50  $\Omega$  resistor in 2<sup>nd</sup> output of 16 channels  
LXe fan-in forming discriminated LXe signal  $\Rightarrow$  fan-in output reduced by a factor 2

2. LXe Discr. threshold increased to ~~640~~ 600 mV

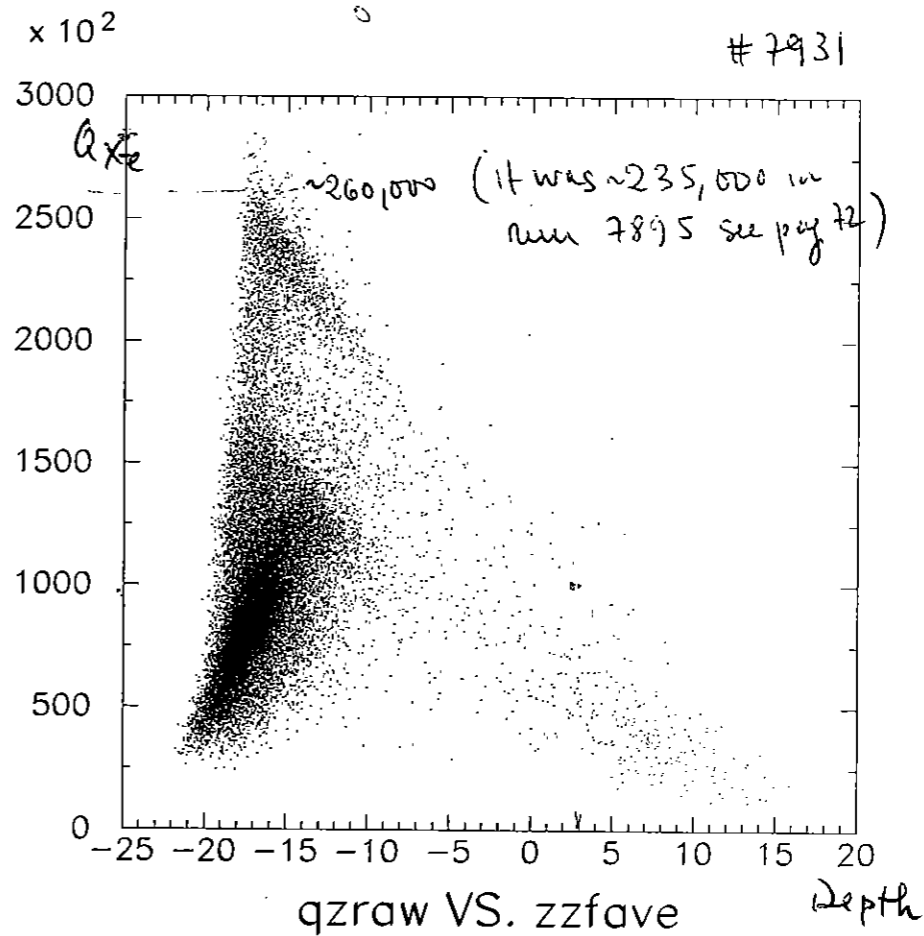
3. Veto width to ~~discriminator~~ discriminator  $\rightarrow$  600  $\mu$ s  
(was 500  $\mu$ s)

00:35 # 7931  $\pi^0$  run rate = 5 Hz, stopped @ 2:10

Same plots of pages 71/72

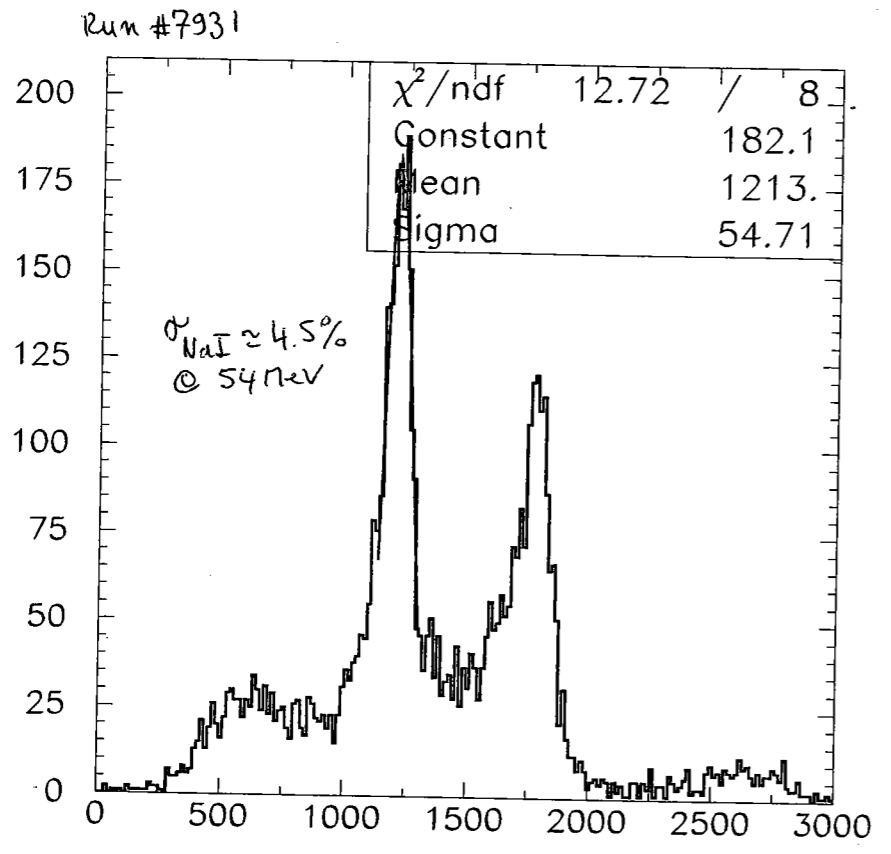


Threshold is a bit high for Xe but change is getting up:  $\frac{Q_{7931}}{Q_{7895}}$  (1 day)  $\sim$  11% more

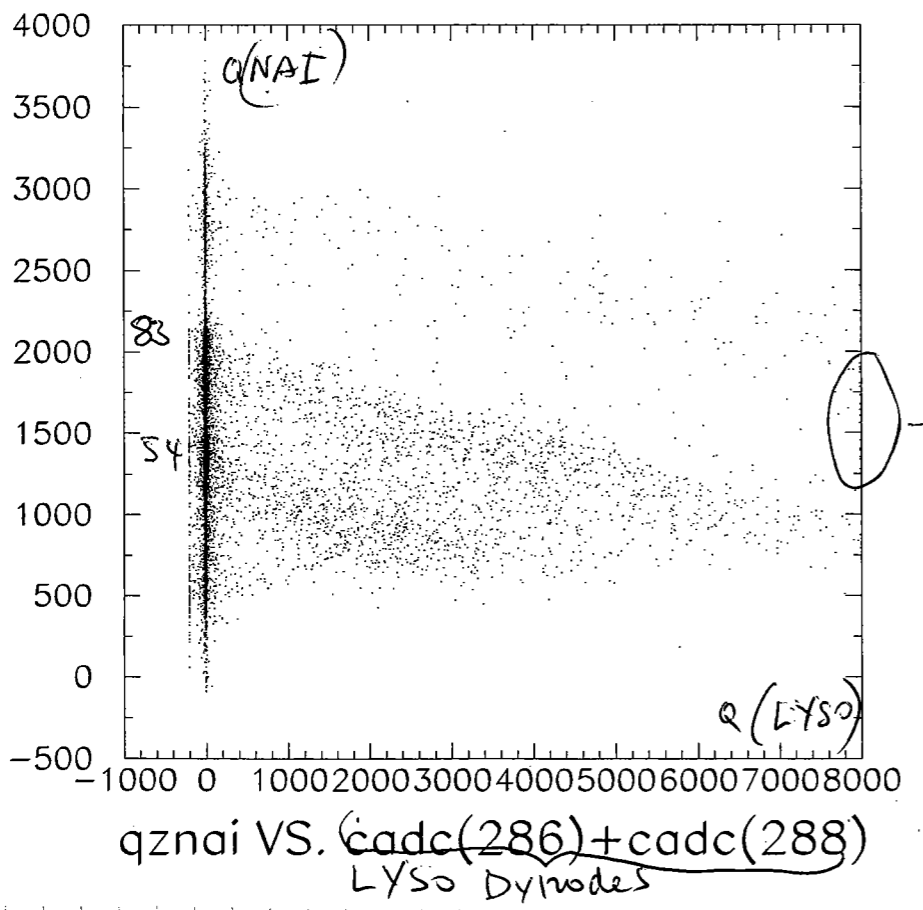


7/7/16

Equalization of the 4 crystals by eye only.



3:45 (a.m.) # 7932 Lyso HV = 1870 - 1920

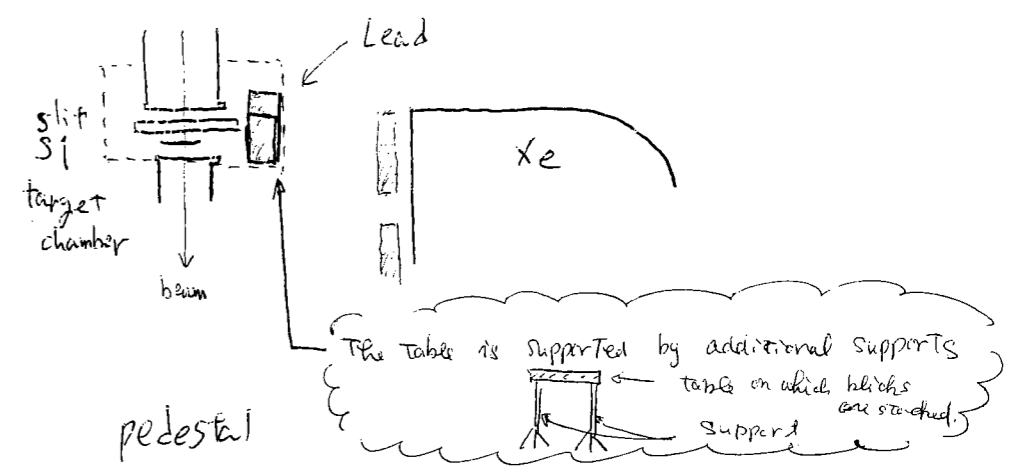


5:00 Start another  $\pi^0$  run, no change in  $\sigma_{NaI}$  conditions:

# 7933  $\pi^0$ , rate  $\approx 7$  Hz

Stop 170323 events

9:00 put 10cm  $\pm$  Lead bricks between slit and Xe



#7934 pedestal

#7935 LED

9:11 #7936  $\alpha$

10:05 #7937  $\pi^0$  rate = 6.8 Hz

13:32 stop 7939 84105 events

← This is a very bad run LED "wiggles".

HV adjust Because 12 PMT's gain have been much lower than 1e6 because of program bug.

Save HV setting 041002-1 hv

beam shutter close

13:35 #7938 pedestal for gain adjust

#7939 LED for gain adjust → LED was unstable } pedestal value were bad

#7940 ~~3~~ pedestal " again

#7941 LED

#7942 LED //

#7943 //

#7944 //

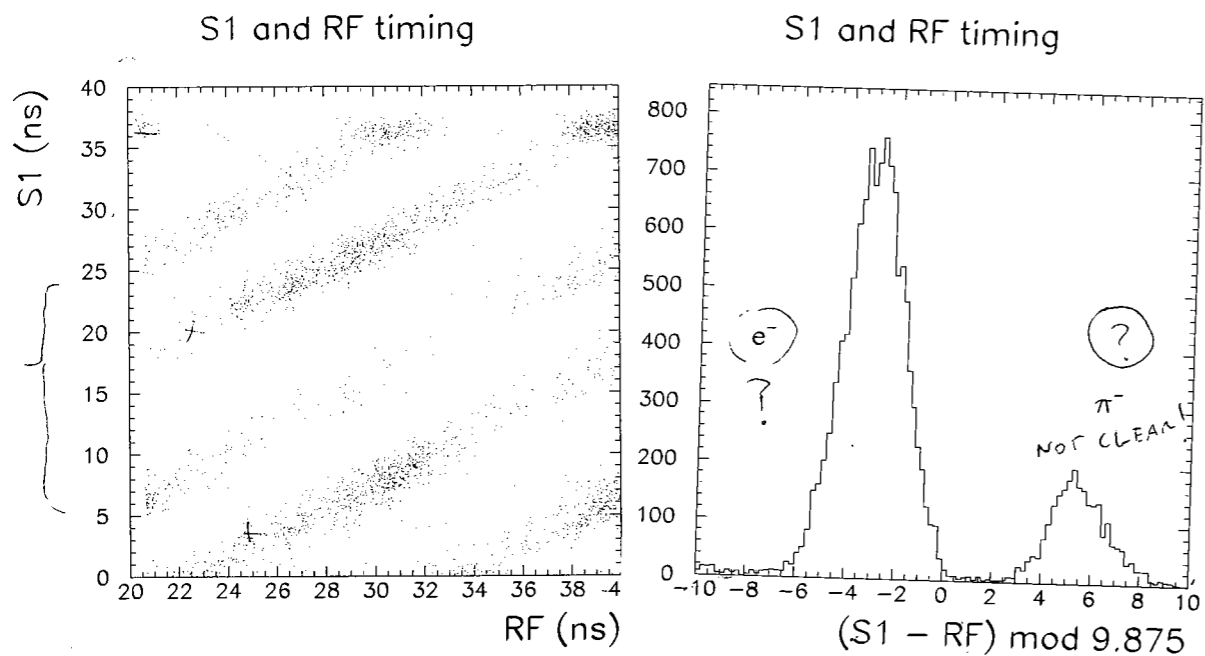
#7945 //

finished ⇒ 041002-2 hv HV settings

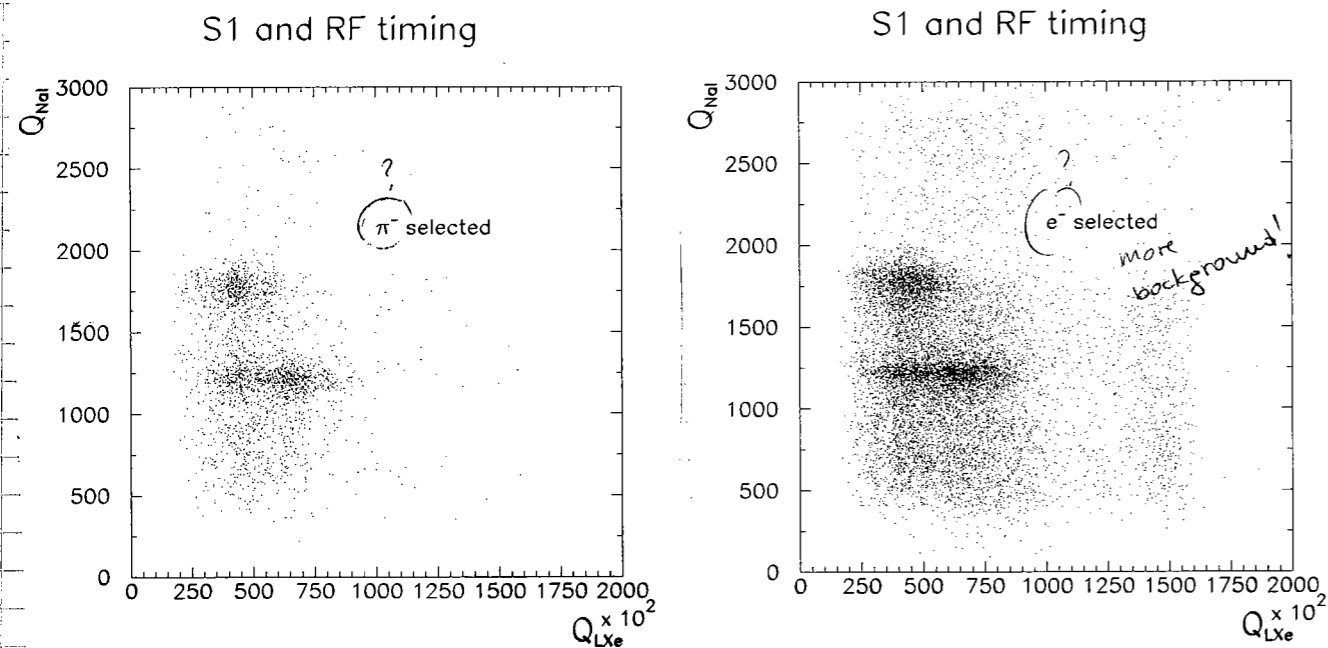
02 / Oct / '04

14:38 #7949 pedestal beam off  
 #7950 LED beam off  
 14:46 #7951  $\alpha$  beam off

15:15 check of RF & S1 (coincidence) timing  
 FROM RUN 7937



$\frac{19.75}{2}$



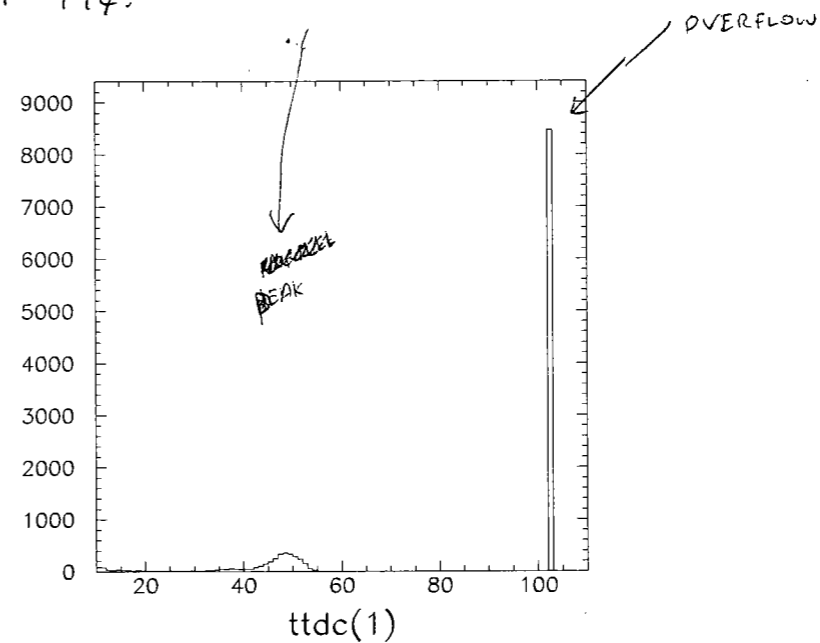
which is  $\pi^-$  and which is  $e^-$ ?

RUN # 7953

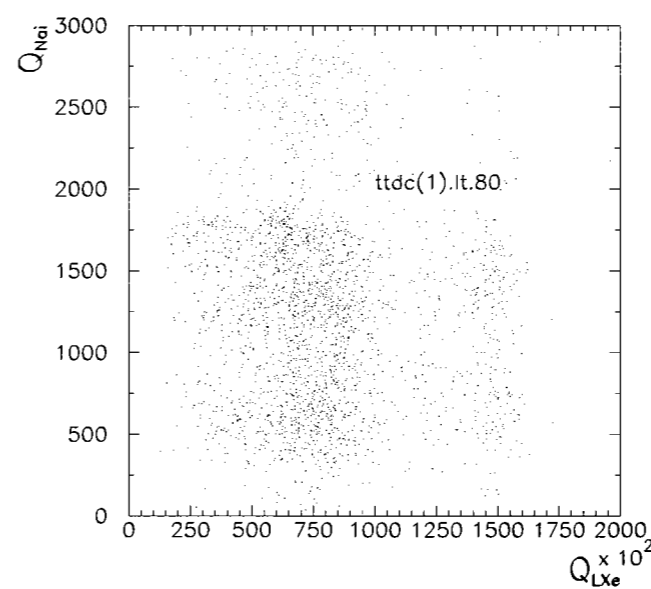
81

15:51  $\alpha$  beam off 16 Hz  
 15:57 open beam shutter trigger rate  $\approx$  35 Hz  
 16:17 close beam shutter 16 Hz

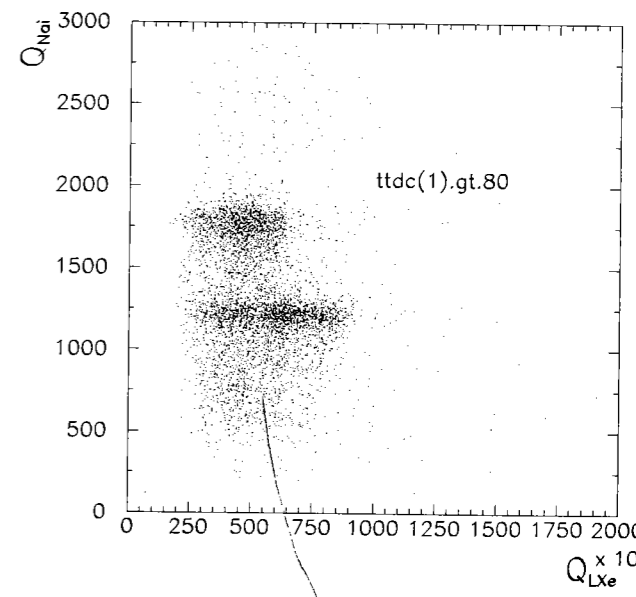
SOME STRANGE BEHAVIOR OF TIMING: i.e. let's look at the  
 PRT F14:



If we select events in the peak:



If we select overflow events



Maybe the timing must be checked. <sup>Correct</sup> the signal stop comes too late  $\Rightarrow$  we must delay the start by  $\sim$  60 ns

badly formed gate ??

19:40 # 7954. - Added ~60 us to the start TDC signal.  
 - Found the start signal of 3 coarse TDC modules disconnected (the ones containing some LXe PMTs + LYSO) => CONNECTED  
 →  $\pi^0$  RUN

21:30 run stopped

The modification to the TDC start did not ~~change~~ solve the problem. Put it back as previously.

22:54 # 7955  $\pi^0$  run

0:23 RUN stopped

~1:20 Acc down No beam. 1:41 "1 STD UNTERBRUCH"  
 Take calibration runs while beam off

1:37 # 7956 Pedestal

1:39 # 7957 LED

1:43 # 7958  $\alpha$

2:15 # 7959 CR

Beam OFF  
 Accelerator down due to BREAKDOWN COCKROFT

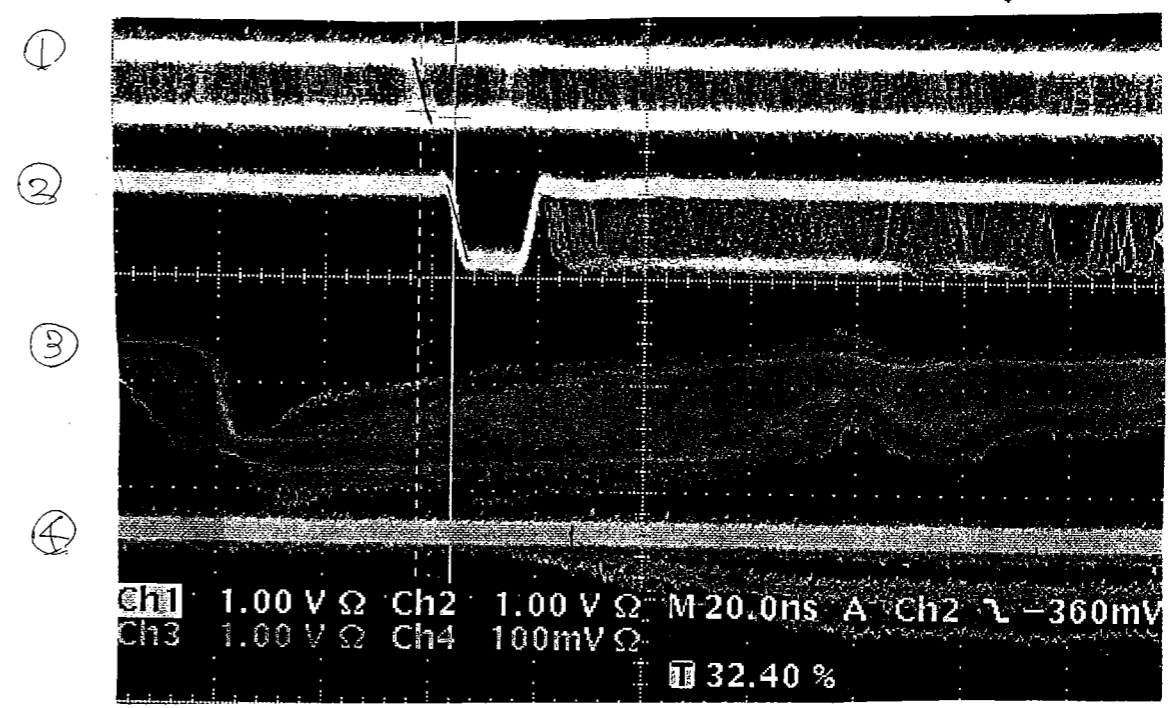
2:25 "2 STD UNTERBRUCH"

4:05 Beam is back.

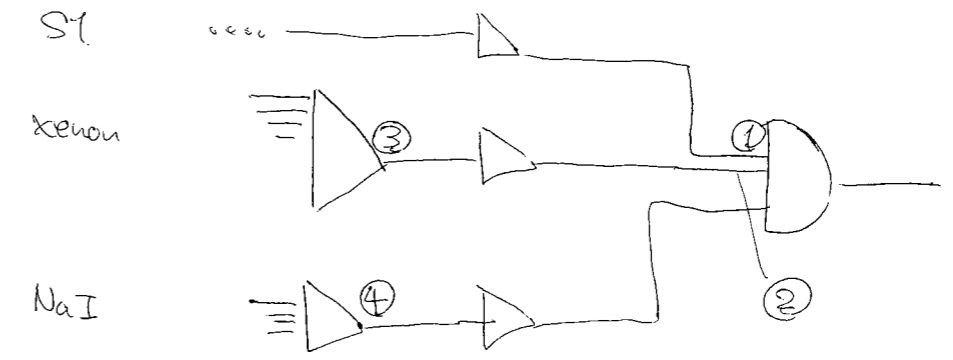
Around the end of # 7959. Trigger rate increased due to beam related background

4:07 # 7959 end

Timing Coincidence at "Xenon Coincidence" checked



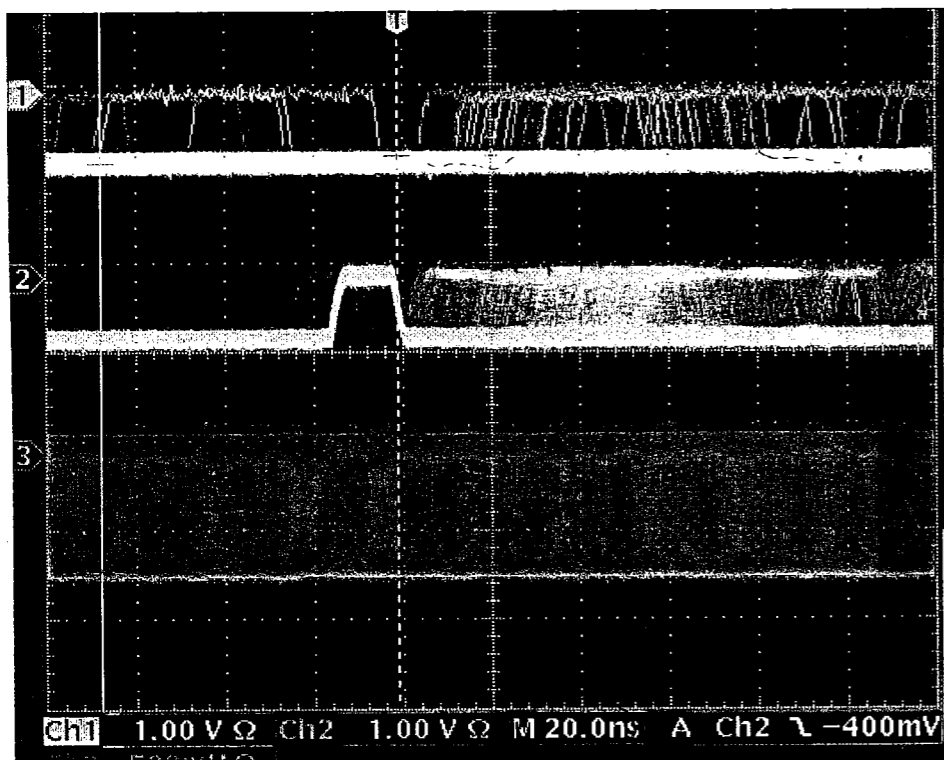
- ① S1 input signal at the coincidence
- ② Xenon input signal at the coincidence
- ③ Xenon FAN-IN/FAN-OUT output
- ④ NaI



It is found that S1 arrived earlier than Xenon  
 ⇒ Timing was not determined by S1  
 and that Xenon and NaI timing difference is about 70 nsec, which is larger than inserted delay of 32 nsec  
 Why is NaI so slow???

3/10/04

Check coincidence timing again at coincidence module input



NaI  
(OUT)

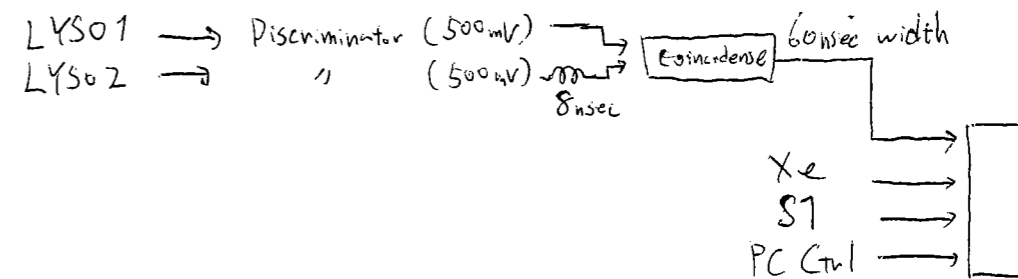
Xe  
(OUT)

S1  
(OUT)

Possible solutions

- ① Shorten NaI signal cables from 64  $\mu$ sec to 32  $\mu$ sec  
 &&  
 Delay Xenon timing at the coincidence by about 20  $\mu$ sec  
 &&  
 Delay S1 " " by about 30  $\mu$ sec
- ② Use LYSO center for trigger instead of NaI.
- ③ Widen Xenon discriminator out pulse width to 80-100  $\mu$ sec.  
 &&  
 Delay S1 timing at the coincidence by about 60  $\mu$ sec
- ④ can be accepted if accidental coincidence is not so large.

Try solution ②



o changed width of output of discriminator for Xe Sum from 20 to 100  $\mu$ sec

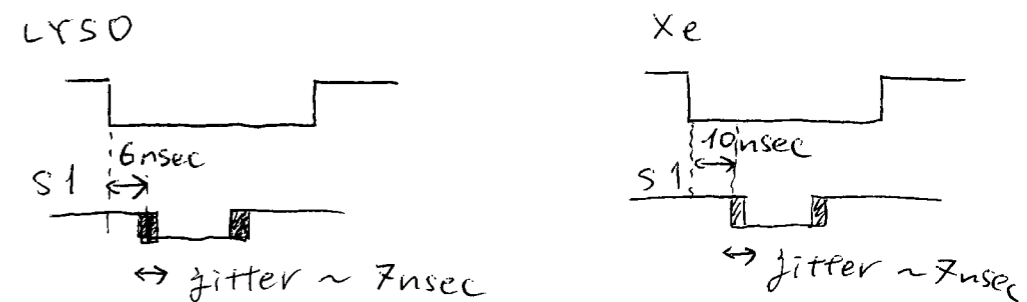
11:39 #7960  $\pi^0$  S1 x Xe x LYSO

13:38 #7961  $\pi^0$  run S1 \* Xe \* LYSO

with modified timing conditions  
Alessandro/Giovanni/Wataru

- Xe cable to coincidence is shortened from 32  $\mu$ sec to 24  $\mu$ sec
- Xe gate width changed to 50  $\mu$ sec (it was 120  $\mu$ sec)

Relative timing at the coincidence



15:20 Run #7962 stopped (same as before)

15:25 #7963 pedestal beam ON

15:44 #7964 LED "

LYSO DY1  $\rightarrow$  ADC  $\phi$  (286)

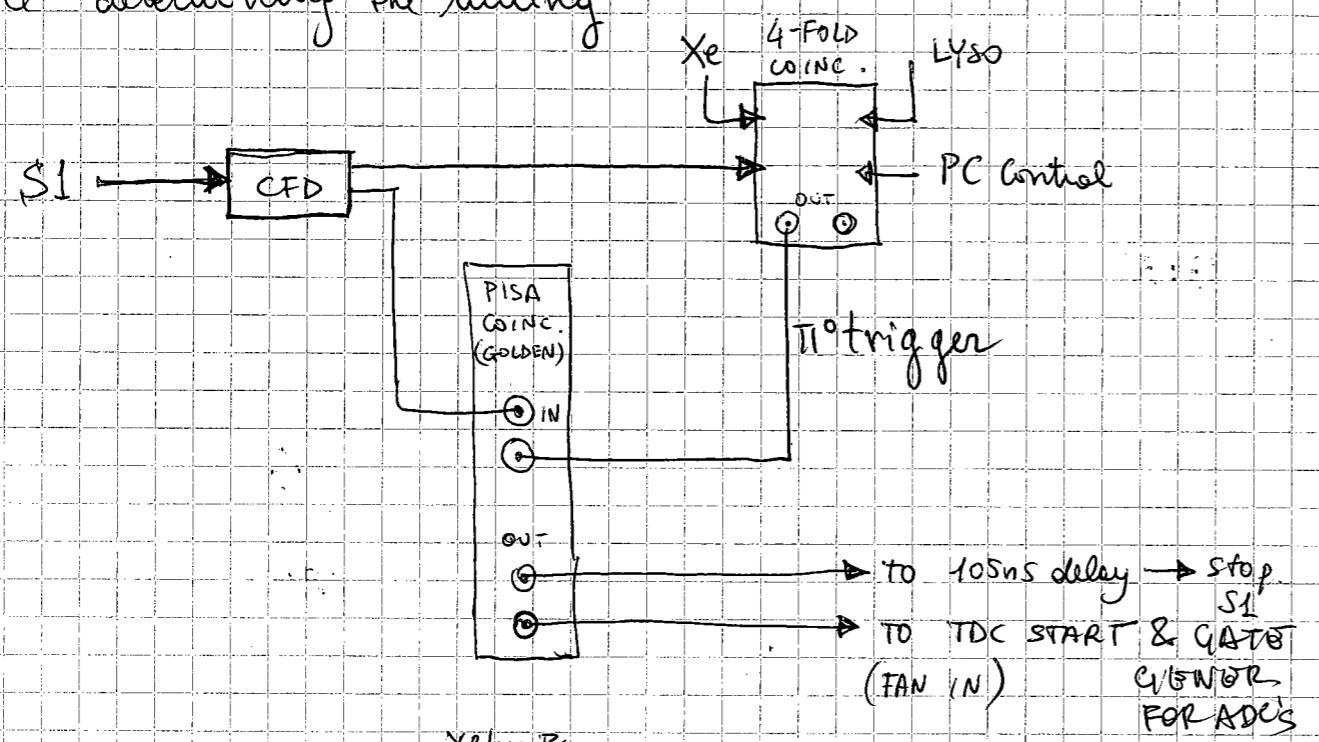
LYSO DY2  $\rightarrow$  ADC  $\phi$  (288)

LYSO1 HV lowered by 50V to have the dy signal in ADC range

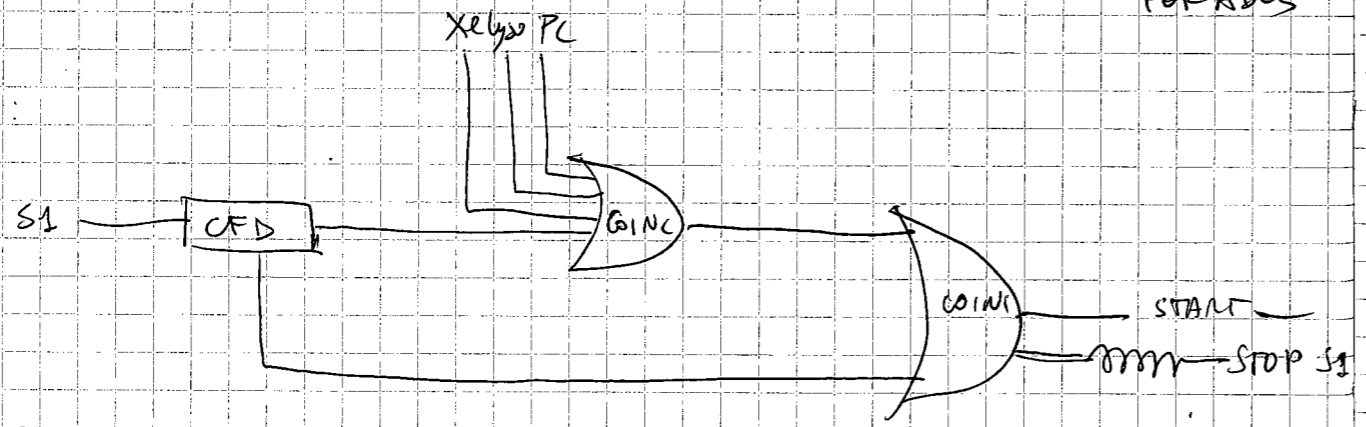
16:48 Run # 7965  $\pi^0$

Giovanni Alessandr

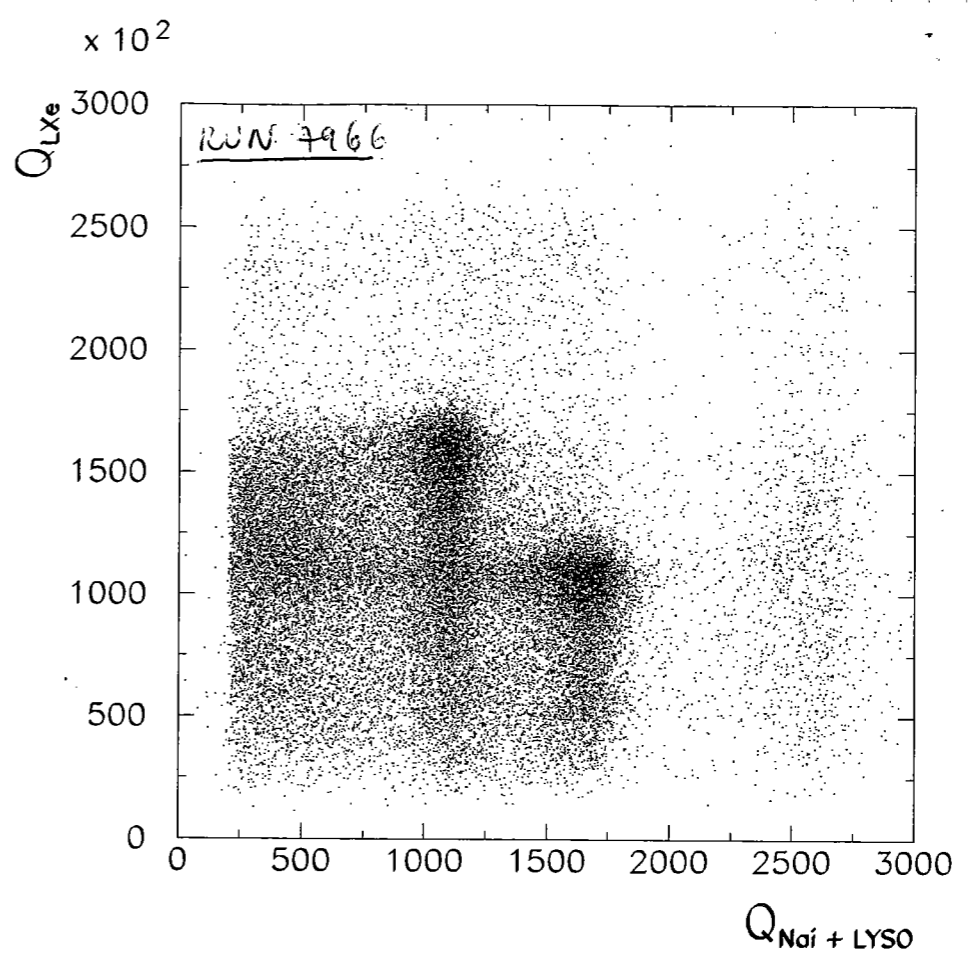
We changed the way the start signal of the TDC is generated, in order to guarantee S1 to be the last, hence determining the timing



OR



19:20 Run 7966 started



—  $2\gamma$ 's visible also in LXe after insertion of LYSO in the coincidence (see top of page 85)

↓  
solution # 2  
page 84

They are visible also in run # 7961

So previous 2 days conclusions were affected by the NaI presence in NaI.

↑  
Coincidence?