

COMPUTATION BOOK

NAME

Radiative Beta Decay Photon Detector IV

Course _____

#22-157 • Made in Mexico



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03/29/2010

preparing Cd absorber for Am source

$\sim \frac{1}{2}$ mm thick Cd foil (probably $\frac{1}{16}$ ')

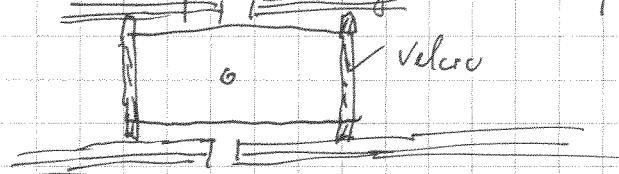
make tube $\frac{1}{2}$ " diameter

two layers + 3rd layer overlap of $\approx \frac{1}{4}$ "

make two tubes, one is $1\frac{1}{2}$ " long, other is $1\frac{1}{2}'' - \frac{1}{32}$ " long
make a gap of $\frac{1}{16}$ " using O rings

using 1" wide captor tape, after removing O-rings
2 layers of Captor

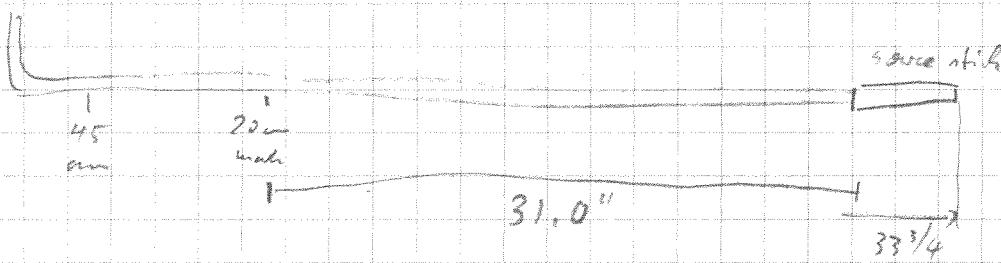
used Velcro Strip at end of source clip to center source



We��e Cs 137 source position



Ran with tape measure reading 20cm at end
of receiving tube. From 20cm mark to end
of tube measuring 85.7 cm. Source at
85.2 cm from end of tube



active source
 856.5 cm
 \Rightarrow source is at 857 cm
 $\pm 1\text{ cm}$

An source



20
m

$32\frac{1}{2} + \frac{1}{64}$

827
mm

A m
source
↓

Series 425

proton detector pulser calibration

pulser 50 ns rise time, 50 ns fall time

preamp outside of tube; capacitor instead of detector
by passing fiber optic

external trigger

amplified signal \rightarrow attenuator \rightarrow SDS feedthrough \rightarrow card 1, ch 8

Lum 0 pulses 5.000 100 arb / sec
 $\sim 10,600$ events

Lum 1 pulses 9.000 to ~ event 5100 arb

10700

17600

23600

32500

37100

42200

47200

52500

57900

note: since same time we are
 $(3200/6330)$ out of sync by 100 events

sw, 10 to mm²

end of run with 800 sec

53W/53W [this is 5300/5300]

10500/105W

March 29, 2010

mm³ pulser into fan-in fan-out
 (bypassing preamplifier)
 invert signal at pulser

start with 0.200	5400 / 5400
0.300	11400 / 11500
0.500	16800 / 17,000
1.000	23500 / 23,300
2.000	31600
3.000	36,000
4.000	40,700
5.000	48,500 / 48,900 events

mm 4 through preamp.
 and through fiber
 "complete electronics"

start	0.2	5100 / 5100
	0.3	10200 / 10200
	0.5	15200 / 15200
	1.0	20300 / 20300
	2.0	25600 / 25600
	3.0	30800 / 30800
	4.0	35900 / 35900
	5.0	41400 / 41400
	9.0	60000
	8	60000
	7.0	46,600
	6.0	51700
	5.5	56800 / 52800
	4.5	63500 / 63500

An inverse position dependent const., det. 4

Note: pos. 2 can be set to no. 3 in ± 0.2 mm.

pot	combs/10000				
0.0 cm	145				
1.0	124				
2.0	113				
3.0	110				
4.0	122				
5.0	143				
6.0	129				
7.0	166		12.0	1301/1290	
8.0	163		12.2	1909/1825	
9.0	211		12.4	2647/2310	
10.0	328		12.5	3074/3037	- 3200 @ 12.55
11.0	506		12.6	3555/3573	
12.0	1435		12.7	4113/4033	
13.0	5650		12.8	4283/4320	
14.0	6523		13.0	5231/5272	
15.0	6482		26.8	6868/7002/6635	
16.0	6395		27.0	6888/6779	
17.0	6497		27.2	6442/6488	
18.0	6581		27.4	5042	27.4 4767/4604
19.0	6683		27.6	4453	27.5 3113/3036
20.0	6574		27.8	387	27.6 1827/1856
21.0	6691		28.0	275/317/291	
22.0	6675		28.2	254	
23.0	6781		28.4	366	
24.0	6758		28.6	801	28.6 5027/508
25.0	6845		28.8	4034	28.7 1861/1770
26.0	6887		29.0	6741	28.8 3591/3577
27.0	6981		29.2	6890	28.9 5026/5774
28.0	257		29.4	6968/6930	29.0 6379/6458
29.0	6853				
30.0	7003				
31.0	6975				
32.0	6744		32.0	6780	
33.0	2367		32.2	6200	
34.0	669		32.4	5229	
35.0	400		32.6	4177	
36.0	340		32.8	3154	
37.0	280		33.0	2442	
38.0	189/190		33.2	1926	
39.0	131		33.4	1086/1136/1133	centered 12.85 + 10.1
			33.6	439	= 22.65

03/29/2010 5

at 22.6 cm 100 sec 67619 counts = 676 Hz det 4

Series 426 ²⁴¹Am source at center of detector
with narrow aperture (see earlier pages)

mm 0, 1, 2 only histograms

mm 3 event file to disk ~ 330 Hz each control
note: 60 keV peaks are typically near ch 55 ±
temp: 76.10 / 109.7 / 91.7 / 90.56

end mm 3: 312 sec 102,400 / 100,800 events (2 * 3.3 GB)

mm 4 same again
end mm 4: 357 sec 118,200 / 114,200 events (2 * 3.7 GB)

place nearby Cs source into same position

mm 5 Cs source
end mm 5: 389 sec 106,000 / 102,400 events (2 * 3.3 GB)

mm 6 same again, ~~100 sec~~, ~~40 sec~~, same again the 400 sec each

~~mm 5~~ mm 5 centroids det 1 : 659 width = 34
det 2 : 653 44
det 3 : 658 37

this means that energy scale is non linear from Am to Cs
[ch: 55 / 660; energy: 60 / 660]

19:57 the Am source has been placed back into bore at
location 22.6 cm

3/30/2010

11:53 Start LN₂ fill
13:20 Start pumping on OVC, $3 \cdot 10^{-5}$ torr
13:40 Stop pump, $3 \cdot 10^{-6}$ torr
15:38 Start pump, $1.5 \cdot 10^{-6}$ torr
15:44 Stop pump, ~~8.660~~ $5.8 \cdot 10^{-7}$ torr

3/31/2010

12:30 Start pump, $2.5 \cdot 10^{-5}$ torr12:55 Stop pump, sensor stopped working, $3 \cdot 10^{-7}$?

4/1/2010

13:28 Start pump, $5 \cdot 10^{-5}$ torr13:38 Stop pump, $1 \cdot 10^{-6}$ torr

4/2/2010

13:25 ~~Run 427~~ Series 427 Am 241 ~~1000~~ w/apparatus200s runs every 5mm ~~1000~~ $\pm 1\text{ mm}$

Run	Position	Counts 1/2 (MCT) w.	Counts (Des) 1000s per 4
0	0.0 cm		
1	0.5 cm		
2	0.8 1.0 cm	26600/26600	934
3	1.5 cm		976
4	2.0 cm		1019
5	2.5 cm		996
6	3.0 cm		1014
7	3.5 cm		1048
8	4.0 cm		1127
9	4.5 cm		1036
10	5.0 cm		1093
11	5.5 cm		
12	6.0 cm		1181
13	6.5 cm		1172
14	7.0 cm		1248
15	7.5 cm		1428
16	8.0 cm		1508
17	8.5 cm		1658
18	9.0 cm		1965
19	9.5 cm		2282
20	10.0 cm		2696
21	10.5 cm		3534
22	11.0 cm		4553
23	11.5 cm		5856
24	12.0 cm	8106	
25	12.5 cm	1000 18415	
26	13.0 cm	39435	
27	13.5 cm	61456	
28	14.0 cm	66944	

Run	Position (cm)	Count
29	14.5 cm	66343
30	15.0 cm	66136
31	15.5 cm	67293
32	16.0 cm	67441
33	16.5 cm	67987
34	17.0 cm	68418
35	17.5 cm	68260
36	18.0 cm	68689
37	18.5 cm	69020
38	19.0 cm	69384
39	19.5 cm	69438
40	20.0 cm	69473
41	20.5 cm	69962
42	21.0 cm	69633
43	21.5 cm	69058
44	22.0 cm	69488
45	22.5 cm	69607
46	23.0 cm	69733
47	23.5 cm	70345
48	24.0 cm	70009
49	24.5 cm	70243
50	25.0 cm	70847
51	25.5 cm	70942
52	26.0 cm	70968
53	26.5 cm	70845
54	27.0 cm	70917
55	27.5 cm	59951
56	28.0 cm	3259
57	28.5 cm	2966
58	29.0 cm	43417
59	29.5 cm	70544
60	30.0 cm	70909
61	30.5 cm	71882
62	31.0 cm	70956
63	31.5 cm	70639
64	32.0 cm	70184
65	32.5 cm	62008
66	33.0 cm	37121
67	33.5 cm	17801
68	34.0 cm	8118

17:04 Start pump, $2 \cdot 10^{-5}$ torr

17:28 Stop pump, $1 \cdot 10^{-8}$ torr

18:04 LN₂ fill

18:10 Stop fill

Run	Position	Count
69	32.5 cm	61691
70	32.7 cm	53045
71	32.9 cm	43323
72	33.1 cm	32116
73	33.3 cm	22609
74	33.5 cm	14964
75	12.5 cm	24614
76	12.7 cm	33734
77	12.9 cm	42897
78	13.1 cm	52406
79	13.3 cm	58569
80	13.5 cm	(4183)

← End at 33.174 cm

← End at 12.80 cm

Center at 22.985 cm

19:13 Series 428 Cs source 200s runs
 Counts (Det4, 100s)

Run 0 : Center -5 cm	11184
Run 1 : Center	12579
Run 2 : Center +5cm	11515

4/15/2010

B300 Start pump, $1 \cdot 10^{-4}$ torr
 B:16 Stop pump, $1 \cdot 10^{-6}$ torr

15:30 Series 429 Co 57 101.7 nCi @ 20 cm

Rate: ~~29944~~ 100 channel 200 Hz channel

30 min runs

Run 0 : Checking rates, very noise wall

Run 1 : Lower timing = 0.15%

Run 2 : 0.2%

Run 3 : Raise triggers by 1%

Run 4 : Reset triggers, LT = 0.5%, everything looks good.
 Continue running at these settings overnight.

4/16/2010

14:05 Start pump, $3 \cdot 10^{-5}$ torr

14:25 Stop pump, $3 \cdot 10^{-8}$ torr

Series 430 Cs 137 source, Voltage calibration

	Run #	Peak	ΔV	Run 2	Peak	ΔV	Run 3	Peak	ΔV
Ch 1	1439.9	647	0.5	1440.4	657	0.2	1440.6	659	0.1
2	1372.1	633	1.1	1373.2	666	-0.2	1373.0	661	0
3	1355.5	645	0.7	1356.2	657	0.2	1356.4	663	0
4	1373.1	617	1.8	1374.9	666	-0.2	1374.7	656	0.1
5	1401.8	637	1.0	1402.8	661	0.0	1402.8	660	0
6	1372.5	636	1.0	1373.5	664	-0.1	1373.4	658	0.1
7	263.9	87	—	1350.0	—	—	263.9	—	—
8	1392.5	645	0.7	1393.2	659	0.1	1393.3	661	0
9	1381.8	627	0.8 1.4	1383.2	674	-0.5	1382.7	657	0.1
10	1372.3	641	0.8	1377.1	663	-0.7 0.1	1377.1	660	0
11	1373.3	637	0.0	1374.3	663	-0.7 0.1	1374.3	662	0
12	1443.1	642	0.8	1443.9	655	0.3	1444.2	659	0.1

Ch Final V

1	1440.7
2	1373.0
3	1356.4
4	1374.8
5	1402.8
6	1373.5
7	263.9
8.	1393.3
9	1382.8
10	1377.1
11	1374.3
12	1444.3

15:47 Series 431 Cs 137 @ 20 cm 30 min runs

4/8/10

- 13:30 Start pump, $3 \cdot 10^{-5}$ torr
 13:40 Stop pump, $5 \cdot 10^{-6}$ torr

4/9/10

- 15:13 Change LN₂ dewer, second dewer half full
 15:16 Start pump, $2 \cdot 10^{-5}$ torr
 15:23 Stop pump, $2 \cdot 10^{-6}$ torr

V3

4/15/2010

- 13:02 Stop RDK II, program froze after 425 runs
 LN₂ dewer empty @ 3:40 am 4/15/2010, second dewer @ $\frac{1}{4}$
 13:07 Start pump, $1.2 \cdot 10^{-2}$ torr
 13:28 Stop Pump, $3 \cdot 10^{-7}$ torr

~18:48 automatic refill in progress \geq 10 mins long

19:50 move source out from ~20.0 to ~15 cm

temperatures: 76.32 / 110.3 / 92.09 / 90.91 K; 4He reservoir probably empty

for pump: 2.9 ± 10^{-5} m/s

get breakdown

det present HV

breakdown.

p 135 previous log:

1	1440.7 V	1483.5 ($1486.5 = 24 \mu A$, $1485.5 = 14 \mu A$, $1484.5 = 2 \mu A$)	1481
2	1373.0 V	1400.5 ($1403.5 = 28 \mu A$)	1401.5
3	1356.4	1395 ($1398 = 26 \mu A$)	1394
4	1374.8	1406 ($1408 = 16 \mu A$, $1409 = 22 \mu A$)	1402
5	1402.8	1433 ($1435 = 12 \mu A$, $1436 = 20 \mu A$)	1431
6	1373.5	1404.5 ($1406.5 = 12 \mu A$)	14025 140.5
7	263.9 Bad		1486
8	1393.3	1430 ($1432 = 24 \mu A$)	1429.5
9	1382.8	1411 1411 ($1413 = 20 \mu A$)	1408
10	1377.1	1408.5 dn ($1410 = 16 \mu A$)	1404.5
11	1374.3	1402.5 ($1404.5 = 14 \mu A$)	1402
12	1444.3	1486.5 ($1488.5 = 22 \mu A$)	1484

* Many breakdowns reduced amplitude from intended

~~* k = det 10 : no breakdown possible over 30V above breakdown - "current rise voltage just before current measurement"~~

4/16/2010

- 13:30 Start pump, $3 \cdot 10^{-6}$ torr
 13:39 Stop pump, $2 \cdot 10^{-7}$ torr
 14:04 New LN₂ dewar

4/17/2010

- 13:03 Start pump $5 \cdot 10^{-5}$ torr
 13:25 Stop pump, $6 \cdot 10^{-8}$ torr

Cylinder sources are 2.675 cm deeper than shielded Am source.

Center at ~~22~~ 23 cm for Am, 20.3 for others

14:55

~~432 A Series 432 voltage calibration, Cs 137 @ 23 cm, 2005
 Faraday bad, first run always start
 Run 0, very high noise, set Timing Lower Th to 0.25 %
 Run 1, still very high, set to 0.5 %
 Run 2, still high on det 16¹³, but ok on others.~~

15:10 Series 432 voltage calibration, Cs 137 @ 23cm, 2005
Timing Lower Th @ 0.5 %

Ch	Peaks	ΔV_0	ΔV	V_1	Peak,	ΔV	V_2	Peak ₂	ΔV	V_3	V_3
1	687.5	1490.7	-1.0	1439.7	663	0	1439.7	661	0	1439.7	
2	689.9	1373.0	-1.1	1371.9	655	+0.2	1372.1	661	0	1372.1	
3	684.8	1356.4	-0.9	1355.5	664	-0.1	1355.4	662	0	1355.4	
4	689.6	1374.8	-1.0	1373.8	658	+0.2	1374.0	661	0	1374.0	
5	692.3	1402.8	-1.1	1401.7	664	-0.1	1401.6	655	+0.3	1401.9	
6	687.2	1373.5	-1.0	1372.5	661	0	1372.5	659	+0.1	1372.6	
7	—	263.9	—	1350.0	—	—	263.9	—	—	263.9	
8	685.7	1393.3	-0.9	1392.4	662	0	1392.4	662	0	1392.4	
9	688.5	1382.8	-1.0	1381.8	657	0.2	1382.0	661	0	1382.0	
10	691.8	1377.1	-1.1	1376.0	662	0	1376.0	661	0	1376.0	
11	696.3	1374.3	-1.3	1373.0	652	0.4	1373.4	665	-0.1	1373.3	
12	691.4	1444.3	-1.1	1443.2	666	-0.2	1443.0	661	0	1443.0	

Det 21 still bad 45nA @ 1350V

12

Run 3 10min

Ch	V_3	Peaks ₃	ΔV	V_4	Peaks ₄	ΔV	V_f
1	1439.7	663	-0.1	14139.6	661	0	1439.6
2	1372.1	659	+0.1	1372.2	666	-0.2	1372.1
3	1355.4	661	0	1355.4	659	0	1355.4
4	1373.9	665	-0.1	1373.9	662	0	1373.9
5	1401.7	666	-0.2	1401.7	661	0	1401.7
6	1372.6	664	-0.1	1372.5	658	-0.2 0.1	1372.6
7	263.9	—	—	—	—	—	—
8	1392.4	665	-0.1	1392.3	662	0	1392.3
9	1382.0	664	-0.1	1382.9	653	0.3 0.1	1382.0
10	1376.0	660	0.1	1376.1	661	0	1376.1
11	1373.3	661	0	1373.3	662	0	1373.3
12	1443.0	660	0.1	1443.1	663	0	1443.1

16:15 Series 433 Cs 137 @ 20.3 cm, 30min
Run overnight

04/20/2010 12:40

barber pump is running, reading is $2.3 \times 10^{-2} / 4.9 \times 10^{-2}$
now at 20.3 cm

series 433 run 40 in progress; runs are 1800 sec long
12:49 temp 77.55 / 108.7 / 92.36 / 91.29; ion pump 1.8×10^{-5}

13:05 Start pump, $4 \cdot 10^{-4}$
 $\sim 4 \cdot 10^{-5} / 1.0 \times 10^{-1}$
 13:46 $7 \times 10^{-9} / 5.0 \times 10^{-2}$
 14:10 $8 \cdot 10^{-9}$

14:13 Stop series 433

14:16 Series 434 Cs 137 @ 20.3 cm, 10min, write dat, prints
Double Pb on bottom

15:40 Series 435 Co 57 in shield @ 23cm, 5min

16:43 Stop run ~~433~~, rotat 180° #11

notice that count rates without source too high; change thresholds
in Dual Octopus Cal 2.0:

det	old	new	threshold	new	compts/sec	note
1	1	(3)	4	(1000)	1000/22sec	...
2	2	3		400	36sec	
3	3	4.5		400	30sec	
4	2	3		400	39sec	
5	2	2.4		(400)	28sec	
6	1	3		600	53sec	
7-6				(3400)	52sec	$\sim 65Hz$
7	1	3		0	7sec	note: detector does not hold voltage/noise
8	2	3		400	32sec	
9	-1	+2		400	33sec	
10	2	4		400	33sec	
11	2	4		400	32sec	
12	2	4		400	38sec	
7-12				2400	52sec	$\sim 48Hz$

note: with Cs source ($10\mu C$) on top of detector : $11,000/11,000$ cts/51sec

18:07 insert 101.7 μCi ^{57}Co source at 20.3 cm

rates: $35,200/36,200$ cts/102sec

change threshold det 5 (had very few source events)

rates: $34,800/34,800$ cts/101sec

Note: strange count rate behaviors as function of detector number, which Bill & I noticed today, is probably a threshold effect, where threshold sometimes was below base line or in noise

18:25 start new SERIES 436
only write histograms every 1800 sec
101.7 μCi ^{57}Co source at 20.3 cm (center of BG05)

temperatures: $77.46/109.8/92.24/91.27$; ion pump: 2.8×10^{-5}

4/21/2010

12:43 Stop run
 12:52 Start pump $1 \cdot 10^{-5}$ torr 13:02 Stop pump, $1 \cdot 10^{-7}$ torr
 13:03 ~~PSU~~ Series 437 Ba 133 @ 20.3 cm, 10 min runs, write dat
 Grans

14:05 Switch to Ba 133

14:10 Series 438 Ba 133 @ 20.3 cm, 30 min runs, overnight
 78.48 / 109.0 / 92.36 / 91.46

4/22/2010

12:13 Only 1 run of 438 was taken because the stop ~~button~~ acquire switch was on.

12:17 Start pump, $1 \cdot 10^{-5}$ torr
 12:40 Stop pump, $2 \cdot 10^{-8}$ torr

12:41 Series 439 Ba 133 @ 20.3 cm, 10 min runs, write dat
 79.29 / 109.0 / 92.35 / 91.55

~14:10 stop series with run 9 @ 534 sec (95.66 GB)

14:39 temps: 79.52 / 109.2 / 92.29 / 91.53

remove source ^{133}Ba

15:16 insert ^{133}Cs source
 temps: 79.62 / 109.3 / 92.29 / 91.52

15:18 start Series 440 @ 19.7 cm

^{132}Cs source, 180Vsec run, only histograms

18:16 just realized that I selected "Reset MCA = off", wrong!
 Stop with run 5; set Reset MCA = ON

18:17 start Run 6

22:13 start automatic LN₂ filling

22:17 finish

22:21 temps: 81.42 / 110.1 / 82.87 / 92.21

4/23/2010

~~12:40 Stop run~~

12:50 Start pump, $1 \cdot 10^{-6}$ torr

13:05 Stop pump, $8 \cdot 10^{-8}$ torr

13:06 Series 441 Cs 137 @ 20.3 cm, 10min runs, write out

Moved Herbert's - maybe keep to Data 0024

14:30 Stop run

16:51 Shutting down UV, manual LN₂ fill

16:52 Shutting down computer

16:54 Shut down preamps

4/27/2010

~13:00 turn on power to C7h

13:32 turn on power to preamps

13:33 reboot CPU after software update

watch temperatures are high 95.07 / 105.1 / 93.22 / 98.17

More LN₂ in supply, outlet hose is icy on outside
automatic refill is on Auto

13:50 start pump, $5 \cdot 10^{-3}$ torr

14:03 stop pump, $2 \cdot 10^{-6}$ torr

SERIES 442 Si detector pulser calibration

(second series, first see ...)

full electronics pos pulse gen, pos signal out

- Pulser → preamp → fiber → amp → DAQ

14:30 automatic, refill stat end 14:40 (time is 6.5)
95.04 / 108.8 / 92.24 / 98.19

Pulser Settings BNC PB-4 ↪ as found today
~100 Hz (+) polarity



$t_{rise} = 50 \mu s$

$t_{fall} = 50 \mu s$

$\times 2, \times 5, \times 10$ down
 $\times 10$ up

using $\times 10$ attenuator at end of preamp-jir cable
 to account for noise in preamp at high temperature
 note: did not have to do this in previous runs
 note: the capacitor might have loose before, same
 capacitor used as before

changing electron trigger threshold

from 0.17 to ~~0.10~~ 0.11

SERIES 442

RUN 1: 6.0 on pulse

5.0	5800
4.0	14,300
3.0	20,000
2.0	28,200
1.0	33,500
0.8	39,800
0.6	45,200
0.4	50,800
	56,900

new DISK

run 0 garbage

some peaks don't look right 8

~~try other pulses~~ redo capacitor

Run 2, no running

delete all run.

start fresh / Series 442

run 0	9.0	5200 events
	8.0	10400 events
	7.0	16600
	6.0	22100
	5.0	35700
	4.0	40,500
	3.0	46,700
	2.0	57,800
	1.0	56,900

mm 0 continued

0.8	64,400 est
0.6	to end of +

mm 1 still 0.6

0.6	850V
0.4	18800
0.3	29700
0.2	35200

<u>mm 2</u>	0.2	5000
	0.3	10300
	0.5	19500
	0.7	32100
	0.9	40,000
	1.5	45,200
	2.5	58,100
	3.5	65,600

<u>mm 3</u>	4.5	5,100
	5.5	10,200
	6.5	15,400
	7.5	20,900
	8.5	~26,000
	9.5	31,100

mm 4 is testing

next tag pulser straight into gain in/out
put in factor of 2 attenuation, pulser

<u>mm 4.5</u>	9.9	5200
	8.9	10300
	7.9	15500
	6.9	21,300
	5.9	26,400
	4.9	31,500
	3.9	36,700
	2.9	42,200
	1.9	48,400
	0.9	53,700

18

04/27/10

still pulser directly

<u>run 6</u>	1.0	510v
	3.0	1020v
	6.0	1550v
	9.0	20900

everything except fiber nextpositive pulse again, still has $\frac{1}{2} \times 2$ attenuator in,
same as bare pulser

run 7 is pink

<u>run 8</u>	8.0	15,200 arb
	7.0	23,500 arb
	6.0	28,600
	5.0	37,900
	4.0	47,200
	3.0	52,400
	2.0	57,400
	1.0	64,700
	0.8	69,500
	0.6	74,900
(0.4)	0.5	last no triggers

<u>run 9</u>	0.4	5500
	0.3	10,800
	0.2	16,400

SERIES 443

+9:38 2 min runs for HV turn on 30 m
5 min 80 m

Run 0 dummy

17:48:30 start HV at start of run 1

ramping up, final = 48:50

17:49:60 stop

49:45 start run 2

18:22 temps: 95.08/109.4/97.21/98.15

19:46 notice: still running @ 2 min/run; stop run run 3 & starting 10 min runs
run 60 very short

4/28/2010

12:31 Start pump, $7 \cdot 10^{-3}$ torr

12:40 Argon still rising at about ~~1.5000~~ $1\%/\text{day}$
based on the rate of increase over the last 10 hr

13:12 Stop pump, $1.6 \cdot 10^{-8}$ torr

4/29/2010

13:14 Disk I/O error froze DAD between 12:53 and now

13:23 Start pump, $1.5 \cdot 10^{-6}$ torr

Series 444 Cs 137 @ 20.3 cm, 2 min

H/V Scan from -30 to ~~+20~~ $99.66/109.8/97.59/99.11$

Run 0 "Normal" HV (see pg 12)

Run 1 "Normal" -30V

Ch 9 10V above operational
voltage

Run 2 -25V

Run 3 -20V

Run 4 -15V

Run 5 -10V

Run 6 -5V

Run 7 +0V

Run 8 +5V

Run 9 +10V

Run 10 +11V

Run 11 +12V

Run 12 +13V

Run 13 +14V

Run 14 +15V

Run 15 +16V

Run 16 +17V

Run 17 +18V

Run 18 +19V

Run 19 +20V

14:50 Stop pump, $3.3 \cdot 10^{-8}$ torr

20

04/28/2010

14:52	Break down Voltages	100.0/109.9/97.71/99.27
Ch	V	When current $\geq 10\text{nA}$ for 1min
1	1492.1	
2	1408.2	
3	1415.3	
4	1415.5	
5	1442.5	
6	1414.4	
7		
8	1439.3	
9	1417.9	
10	1416.4	
11	1411.6	
12	1495.1	

15:35 HV back to settings on Pg 12

15:38 Begin filling inner dewer

16:02 Stop filling inner dewer

16:17 LN₂ fill

16:20 Series 445 Cs 137 @ 20.3 cm 10 min
 Run 6 Ch 3 @ 1373.9V instead of 1355.4V
 Ch 9 @ 1392.0V instead of 1382.0V

4/30/2010

-
- 13:34 Start pump, $1 \cdot 10^{-2}$ torr
 - 13:40 Fill inner dewer
 - 13:43 Stop fill
 - 14:00 Close pump $3.8 \cdot 10^{-8}$ torr

14:22 Change ch 9 from 1392.0V to 1382.0V, run 132

- 15:00 Open pump $3.6 \cdot 10^{-6}$ torr
- 15:15 Close pump $2 \cdot 10^{-8}$ torr
- 16:15 Open pump $6 \cdot 10^{-8}$ torr
- 16:30 Stop pump $1 \cdot 3 \cdot 10^{-8}$ torr

5-3-2010

12:55 Stop run $76.17/110.0/92.49/91.13$

13:01 Change to Am @ 23cm $76.16/110.0/92.48/91.13$

13:04 Series 446 Cd shielded Am @ 23 cm 30min runs

13:05 Starts pump, $4 \cdot 10^{-5}$ torr

13:30 Stop pump, $2.8 \cdot 10^{-8}$ torr

5/4/2010

13:25 Start pump, $6 \cdot 10^{-6}$ torr

13:37 ~~Run~~ Series 445 stops

13:42 Stop pump, $5 \cdot 10^{-8}$ torr

14:12

~~Run~~ Series 447 Cd shielded Am @ 23cm, 10min, write data
6 runs

15:15 Remove source

15:20 Series 448 No source, rad @ 20.3cm, 30min runs

5/5/2010

13:00 Start pump, $1.4 \cdot 10^{-6}$ torr

13:20 Stop pump, $3.9 \cdot 10^{-8}$ torr

Series 4449 tests to see effectiveness of using
strong external sources to calibrate ~~energy~~
of no-source run.

13:38 Series 449 No source, rad @ 20.3 cm, 10min runs, write

Run 0-5: No source

Run 6: Strong Cs 137 source taped to top, left, bottom, ~~and~~
right for approx 2min each in that order.

14:53 Fill inner Dewer

14:58 Stop fill

15:00 Insert Cs 137 source @ 20.3 cm

$76.18/110.1/92.04/90.78$

15:07 Series 450 Cs 137 @ 20.3cm, 30min runs.

15:09 LN₂ fill

5/6/2010

12:40 Stop run

13:05 Start pump, $3'10^{-6}$

13:32 Stop pump, $1.8 \cdot 10^{-8}$

Series 451 Test of synchronizing using external trigger, 100s

Triggering on detector 4

Run 1: Trig 2.0, Gain 8

Run 2: Trig 1.0, Gain 8

Run 3: Trig 1.0, Gain 16

Run 4: Trig 0.5, Gain 32

Run 5: Trig 1.5, Gain 32

13:42 Series 451 Cs137@20.3cm, 5min runs, synchronized external trigger

write out

Run 0: Trigger on Det 1

Run 1: Trigger on Det 2

Run 2: " 3

Run 3: " 4

Run 4: " 5

Run 5: " 6

Run 6: " 7

Run 7: " 8

Run 8: " 9

Run 9: " 10

Run 10: " 11

Run 11: " 12

13:57 Replace LN₂ dewar

Run 11: Trigger on all channels, no external trigger, not synchronized
10 min

15:00 Series 452 Cs137@20.3cm, 20 min runs

10

17:49 Stop run to insert transfer disk

17:51 Resume series 452

18:08 Stop run #18

remove source for photographing

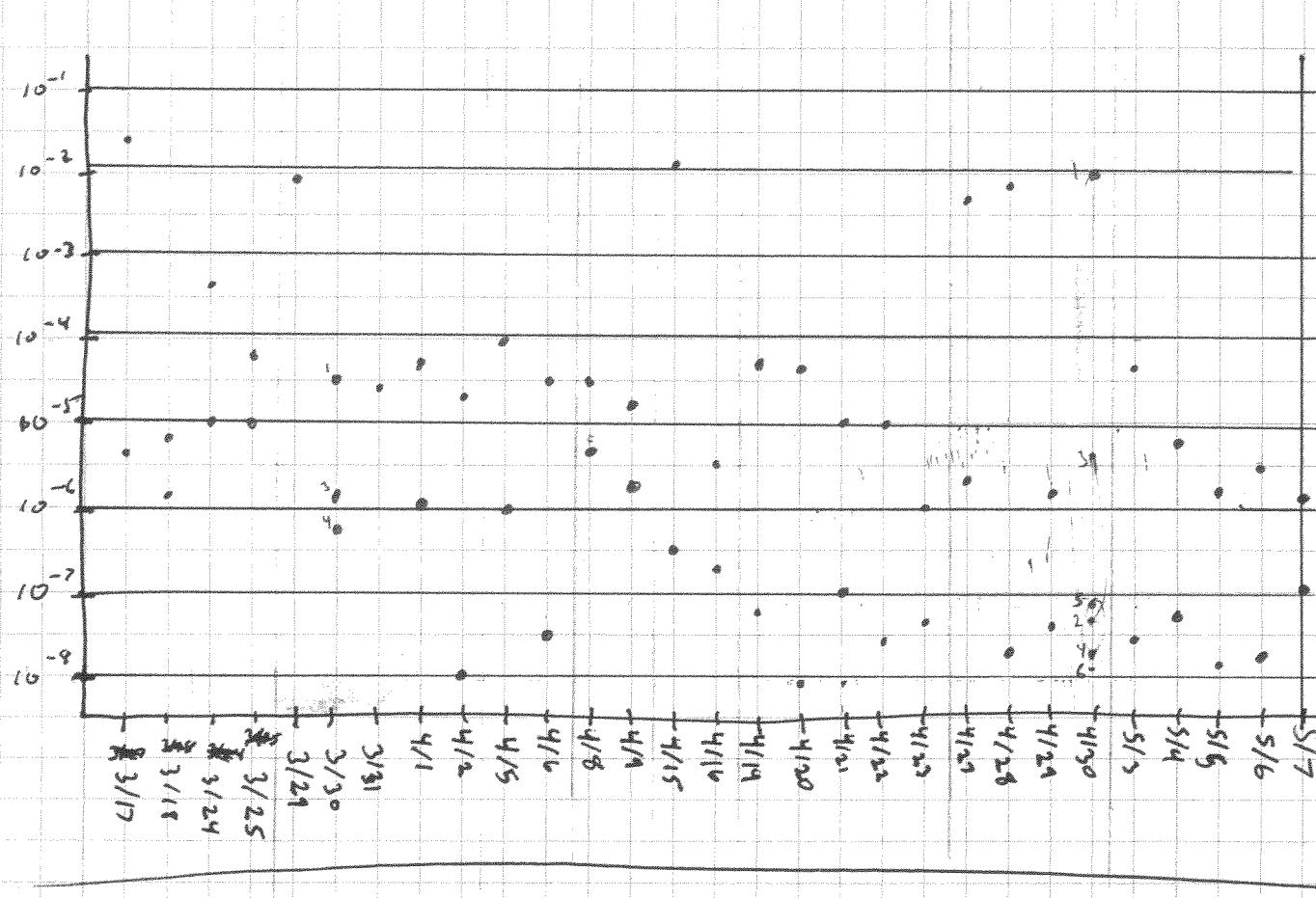
18:22 Replace source back into tube at 20.3cm

18:25 resume series 452, run 19

I managed to screw up access to the HV program

(I think I disconnected, software, USB channel)
probably needs reboot

NC Pressure v Time

5/7/2010

13:10 Stop run, restart computer

13:34 Start pump $1.7 \cdot 10^{-6}$ 14:03 Stop pump $1.1 \cdot 10^{-7}$

14:12 Series 453 Cs 137@ 20.3 cm, trigger on single channel

Timing lower Th = 0.5%, write data, ~~the data~~

Run 0: Trigger on all with T on ch 1, 5min, unsynchronized

Run 1: Trigger on ch 1, 60 min, synchronized

Run 2: Trigger on all, T on ch 5, 5 min, unsynchronized

Run 3: Trigger on ch 5, 60 min, Synchronized

Run 4: Trigger on all T on ch 9, 5 min, unsynchronized

Run 5: Trigger on ch 9, 60 min, Synchronized

17:46 Series 454 Cs 137@ 20.3 cm, 30 min

5/10/2010

13:20 Start pump, $2 \cdot 10^{-4}$ torr

13:24 Run stops

13:32 Insert - Co-57 @ 20.3 cm
 $76.25 / 108.7 / 91.95 / 90.65$

13:37 Series 455 Co-57 @ 20.3 cm, 30min

14:33 Stop pump, $1.6 \cdot 10^{-8}$ torr

5/11/2010

12:40 Start pump, $6 \cdot 10^{-5}$ torr

13:10 New LN2 dewar

13:25 Stop pump, $1.6 \cdot 10^{-8}$ torr

Series 9456 test cal triggering levels for Co-57, ch 2

Run 0 Gain 32, 1.5 OK

13:35

Series 456 Co-57 @ 20.3 cm, write data

Run 0 : 5min trigger on all, T on ch 2

Run 1 : 1hr trigger on 2, synchronized

Run 2 : 5min trigger on all, T on ch 6

Run 3 : 1hr. trigger on 6, synchronized

Run 4 : 5min trigger on all, T on ch 10

Run 5 : 1hr trigger on 10, synchronized

Series 457 Co-57 @ 20.3 cm, 30min runs

5/12/2010

12:50 Start pump, $6 \cdot 10^{-6}$ torr

12:53 Insert - Ba 133 @ 20.3 cm
 $76.19 / 109.3 / 91.54 / 90.33$

13:25 Series 458 Ba 133 @ 20.3 cm, 30 min runs

13:30 Stop pump, $1.8 \cdot 10^{-8}$ torr

~~Stop pump~~

5/14/2010

13:30 Start pump, $9 \cdot 10^{-5}$ torr
 13:40 ~~Fill~~ inner dewer
 14:05 LN₂ fill
 15:00 Stop pump, $2 \cdot 10^{-8}$ torr

5/17/2010

13:10 Start pump, $5.5 \cdot 10^{-3}$ torr
 13:50 Stop pump, $2.6 \cdot 10^{-8}$ torr

1:53 Series 459 BaB3 @ 20.3 cm, 10 min runs, cont'd data

2:56 Series 460 BaB3 @ 20.3 cm, 30 min runs

5/18/2010

LN₂ ran out @ about 14:30.
 13:45 Starts pump, $6 \cdot 10^{-5}$ torr

~16:00 Pump failed ~~on~~, vent to air

16:50 Replaced pump, pumping on OVC
 17:35 52 torr
 17:50 28 torr
 18:00 17 torr
 18:10 13 torr

5/19/2010

11:35 25 torr, turn on turbo
 11:40 0.75 torr
 11:45 $3.5 \cdot 10^{-2}$ torr, Start LN₂ fill
 11:50 $7.0 \cdot 10^{-3}$ torr
 11:55 $5.7 \cdot 10^{-3}$ torr
 12:00 $7.9 \cdot 10^{-3}$ torr
 12:05 1.6 torr, turbo shut off, over heated
 12:10 " torr
 12:15 18 torr
 12:20 LN₂ fill stopped, liquid spilling out, 19 torr, replace LN₂ dewer
 12:25 20 torr

12:30 20 torr, Start turbo
 12:35 2.6 torr 76.92 / 163.2 / 136.1 / 121.5
 12:40 $2.6 \cdot 10^{-2}$ torr
 12:45 $3 \cdot 10^{-3}$ torr 76.96 / 153.0 / 136.6 / 121.5
 12:50 $3 \cdot 10^{-5}$ torr
 12:55 $8.5 \cdot 10^{-6}$ torr
 13:00 $3.6 \cdot 10^{-6}$ torr, Close valve, Stop turbos & scroll pumps
 76.85 / 142.1 / 135.3 / 121.4
 13:02 Start LN₂ fill

13:06 Change to 10 min runs

13:30 76.66 / 129.3 / 133.5 / 121.2
 13:35 Start pump, $1.5 \cdot 10^{-5}$ torr
 13:45 Fill inner diver
 13:58 Stop fill
 14:10 Stop pump $4.9 \cdot 10^{-8}$ torr, LN₂ fill

5/20/2010

12:55 76.24 / 111.2 / 97.34 / 95.83
 13:05 Start pump, $2 \cdot 10^{-5}$ torr
 13:35 Stop pump, $5.8 \cdot 10^{-8}$ torr

5/21/2010

13:35 76.25 / 111.8 / 93.06 / 91.82
 13:45 Start pump, $3 \cdot 10^{-5}$ torr
 14:30 Stop pump, $5 \cdot 10^{-8}$ torr

5/24/2010

13:00 76.24 / 110.6 / 92.63 / 91.38
 13:05 Start pump, $2 \cdot 10^{-7}$ torr
 14:05 Stop pump, $3.2 \cdot 10^{-8}$ torr

Series 461 Dq133 @ 20.7 cm, write data

Run 0 : Trigger on ch11, T on ch 3, 5 min

Run 1 : 1hr, trigger on ch 3, synchronized

Run 2 : ~~5~~ min, trigger on ch11, T on ch 11

Run 3 : 1hr, trigger on ch11, synchronized

Count rate

157.74 ± 0.21 Hz

382.43 ± 1.95 Hz
Trigger rate

16:30 Start LN₂ fill

16:45 Change LN₂ dewer

5/25/2010

11:30 Start pump, $2 \cdot 10^{-5}$ torr

14:30 Stop pump, $24 \cdot 10^{-8}$ torr

5/26/2010

13:05 Start filling inner dewer

13:11 Stop filling inner dewer

13:14 Start pump, $5.6 \cdot 10^{-6}$ torr

13:18 Change source to Cs137 @ 20.3 cm

13:20 Series 462 Cs137 @ 20.3 cm, 10min runs

174.66 ± 1.32 Hz/channel on ch11

Trigger rate 56.787 ± 0.135 Hz/ch

13:50 LN₂ fill

14:05 Stop pump, $1.4 \cdot 10^{-7}$ torr

5/28/2010

RDKIT program not responding (2 blank windows)
last file entry 05/27/2010 4:19 pm

combine series 462 run 161 (reset MCA on, synch off, write off, 600sec)

ini file# says number of cycles are all 0, large to 10000

12:24 LN₂ automatic fill start

After 2 (deleted) dummy runs

Combine series 462 run 161

- 13:20 Start pump, $3 \cdot 10^{-5}$ torr
 14:00 Change LN₂ dewer
 14:05 Stop series 462
 14:07 Move source to ~~34.5~~ 31.5 cm, resume series 462
 14:09 Series 463 Cs 137 @ 31.5 cm, 10 min runs
 14:35 Stop pump, $2.7 \cdot 10^{-8}$ torr

6/1/2010

- 11:45 Start pump, $6.4 \cdot 10^{-3}$ torr
 13:55 Stop pump, $5.0 \cdot 10^{-8}$ torr

6/2/2010

- 13:00 Start pump, $1.1 \cdot 10^{-5}$ torr
 Move rod to 34.5 cm

Series 464 Cs 137, 1cm steps starting @ 34.5 cm, ~~7.5 cm each~~
- Run 0: 34.5 cm 51.62 Hz / detector
Run 1: 33.5 cm
Run 2: 32.5 cm

~~450 s~~
 900 s each

Stop run, Source was up

Run 0: 34.5 cm	52.30 Hz / detector	900 s
Run 1: 33.5 cm	60.83 Hz	900 s
Run 2: 32.5 cm	76.29 Hz	900 s
Run 3: 31.5 cm	85.86 Hz	900 s
Run 4: 30.5 cm	81	450 s
Run 5: 29.5 cm	119.37 Hz	450 s
Run 6: 28.5 cm	133.99 Hz	450 s
Run 7: 27.5 cm	176.20 Hz	450 s
Run 8: 26.5 cm	151.84 Hz	450 s
Run 9: 25.5 cm	158.69 Hz	450 s
Run 10: 24.5 cm	164.38 Hz	450 s
Run 11: 23.5 cm	168.06 Hz	450 s