6/18

Back from vacation

according to Kyle last week wasn't terribly productive

MCP was placed in chamber w/ ^{241}Am 1.054 nCi @ 1/1/2010
Voltages were applied → signal seen in anode
(all 4 outputs of wire matrix)

Morning, chamber was pumped down
to 5×10^{-6} torr (is ion gauge working?)

Detector was biased up to 2050 V
through 100 V increments every 5 min to 1000 V
then 50 V increments " " to 2050 V

Voltages and currents are recorded on back of page. See table]

at full voltage current is 0.020×10^{-9} A

6/18
1604 Detector was unbiased (500 V every 2 minutes)
(1/4 then 1/4 → etc) as per Kyles direction

1612 Start pumpdown procedure
- close turbo valve & turn off turbo
- after turbo slows down ~~at~~ slowly open needle valve
- ~~As soon as it opens,~~ Leave at smallest open (when need just barely moves)
- wait

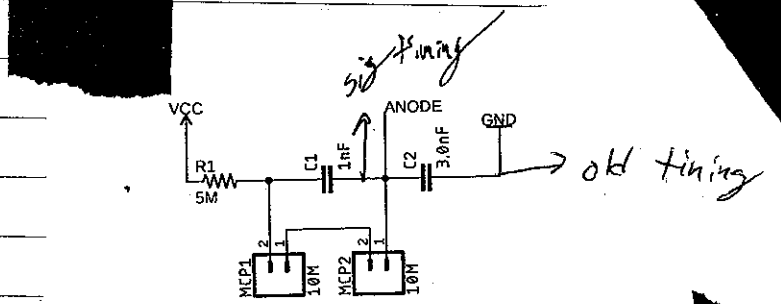
Kyle and I opened the chamber
moved the timing signal from guard to the correct location and took pictures
see Fig 2 for circuit diagram

7/2

6/18 voltage bump

V	I (uA)	U	I (uA)
100	0	1850	19
200	1	1900	19
300	2	1952	19
402	4	2003	20
500	5	2052	21
601	6		
700	6		
794	8		
901	7		
1000	9		
1050	10		
1100	11		
1152	11		
1204	11		
1250	12		
1301	12		
1352	13		
1402	14		
1452	15		
1500	15		
1550	16		
1600	16		
1647	16		
1698	16		
1751	17		
1801	18		

Table 1



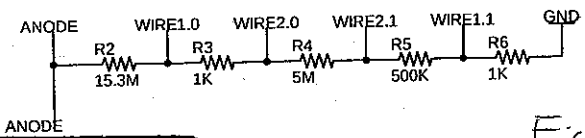


Fig1
circuit diagram of Wolfio's mcp

7/24 Back from LANL

- Not much has happened, electronics have been hooked up & the gate/delay GUI was finished by Kyle.

Rev. there still isn't a timing s.g.

All four sig are amplified 100 gain and delayed 100ns before going to QDC

After 10x amplification they're duplicated and passed into discriminators,

These four signals are fanned to tdc and an OR.

The output of the OR goes to a gate generator.

This gate is used to trigger USB counter and then delayed 100ns and is used to trigger the tdc and ADC

Modules used

QDC - CAEN V792 add 0x33330000 replaced when dekoss ~~0x66660000~~ in slot 5

TDC - CAEN V 725 add 0x88880000

QDC had thresholds set at 33, 67, 62, 69
- suppress range → true
- Small thresholds → true

TDC is trigged by common stop

~~For electronics modules,~~

7/26

~~To calibrate~~

options are online

Info on DAQ setup

the modules to read data are configured in hira/config/daqconfig.tcl

Both in hiraStartd

- The file to load all the defs is ~~daq-hcs~~/MCP.tcl which has all 32 ADC & QDC channels enumerated
- The win file is win/TMCO.win

7/26

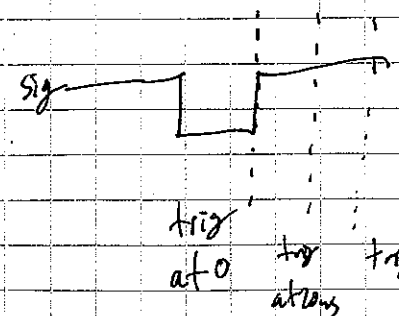
TDC Calibration

A pulser pocket spokee is passed to descriminater to generate a 50 ns logic gate,

that logic sig is fanned out.

- 4 copies directly to tdc
- one to trigger VME USB controller
- one is delayed by x ns and used to trigger the TDC.

By taking multiple runs one can calibrate the tdc (DC it's common stop)



MCP run log

7/26/ 9pm → vacuum ~ 4×10^{-7} torr

run 103
- Data with pedestals subtracted

104
- junk

105
- junk (has some TDC data w/ trig delayed 20 ns)

RUN - 106 MCP_TDC_Cal
- TDC trigg delayed 20 ns

RUN - 107
- TDC trig del 40 ns

RUN - 108
- TDC trig del 60 ns

RUN - 109
TDC trig del 80 ns

RUN - 110
TDC trig del 100 ns

Looking at real data, TDC seems to span 40 channels

RUN - 111
Data possibly missing ADC0 Biased to 1900 V
Am 241

RUN - 112
TDC trig delay 0 ns (10 ns)

RUN - 113
TDC trig delay 30 ns (131 ns)

RUN 114 (52 ns)
TDC trig delay 50 ns (~~73 ns~~)

RUN-115
TDC trig delay 70 ns (73 ns)

PEDESTAL → CHANGE ON ADC ch6 33 → 232

RUN 116 Data — No Recorded Data
upped bias to 1950V and can see something in ADC 0 but orders of mag less than other channels

This is a detector issue
sig 0 ns 200-400 mV
others run ~ 2-300 mV

Also maybe a pedestal issue, snapping ch 0/1 greatly mirrors previous behavior but to a lesser extent

Talk to Kyle about tomorrow

7/26

Delay (ns)	ch0	ch1	ch2	ch3
20	189.1	183.4	183.5	182.4
41	323	315.2	311.8	312.4
62	457.1	447.1	440.4	442.6
83	590.7	578.6	568.6	572.4
104	725.4	711.2	697.7	703.3
125	860.3	844	827.3	834.4
146	996.7	978.2	958.1	966.9
167	1135	1114	1090	1101

TDC Calibration

ch0 0.1556 x - 9.1647
ch1 0.1582 x - 8.7489
ch2 0.1623 x - 9.524
ch3 0.1602 x - 8.954

7/27 RUN - 116 MCP_TDC_Cal
tdc delay 120 ns (125 ns)

RUN - 117
tdc delay 140 ns (146 ns)

Run - 118
tdc delay 160 ns (167 ns)

Run - 119
tdc delay 150 ns (157 ns)

Run - 120
tdc delay 130 ns (136 ns)

Run - 121
tdc delay 110 ns (115 ns)

Run ~~121~~ 122
tdc delay 90 ns (94 ns)

Run 123
~~for~~ MCP data
Bias - 1950V
ADC 0 still empty (ish) Peak is 100 vs 10,000

7/27 Calibration Check

val ± σ

actual delay	10 ns	30 ns	52 ns	73 ns	94 ns
ch 0	10.59 ± 0.105	31.35 ± 0.094	52.1 ± 0.069	72.99 ± 0.10	93.9 ± 0.0
ch 1	10.64 ± 0.09	31.4 ± 0.11	52.13 ± 0.089	73.1 ± 0.04	93.9 ± 0.0
ch 2	10.7 ± 0.02	31.3 ± 0.029	52.1 ± 0.061	73.09 ± 0.066	93.95 ± 0.0
ch 3	10.58 ± 0.10	31.42 ± 0.10	52.18 ± 0.10	73.1 ± 0.063	93.9 ± 0.0

ch 0
ch 1

7/27

Calibration check

actual delay	115 ns	136 ns	157 ns
ch 0	114.9 ± 0.07	136 ns ± 0.097	157.2 ± 0.1
ch 1	114.9 ± 0.026	136.1 ± 0.033	157.3 ± 0.05
ch 2	114.8 ± 0.100	136 ± 0.101	157.3 ± 0.07
ch 3	114.9 ± 0.069	136 ± 0.098	157.2 ± 0.095

Run 124 mask
Bias: 1960V

Run 125 no mask
Bias: 1950V

Run 126 no mask
Bias: 1975V

Run 127 no mask
Bias: 2000V

Run 128 no mask ~20min
Bias: 1950V

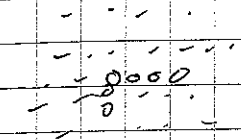
Run 129 no mask ~1hr
Bias: 1950V

Run 130 - junk

Run 131 mask ~4hr
Bias: 1960

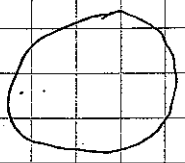
Mask info

Orientation



hole spacing is 3mm

so expect 10-8 holes



8/9

Fanurs and I pulled out the assembly and replaced the broken ceramic screw.

We also replaced the HV screw with a metal one rather than the previous method of forming a connection.

I started pumping down ~ 3pm I will check in the morning.

I changed the ~~Ba~~ numbering scheme so that it's BL (~~back~~ bottom left) when looking at the MCP w/ anode behind it rather than anode w/ MCP behind it.

132 5 min

133 10 min

134 Junk → MCP was remade and repaired (copper was ~~f~~(rifled). numbering scheme is back to normal

8/13 135 1st run w/ no mask

bias 1950V

ch 2 ( ) had no ~~single~~ signal

I think this was due to a bad ~~pre-amp~~ fast amp channel.

I ~~removed~~ bypassed the amplifier (only amplifying once before being QPC'd but we're not using the energy anyway.

3pm 136 1950V
- no 2nd amplifier for ch 2 ~1300 hits

The position looks better, especially in the "y" direction. X still has a bit of a double peak, this also contains ch 2 ~yn 8000 hits

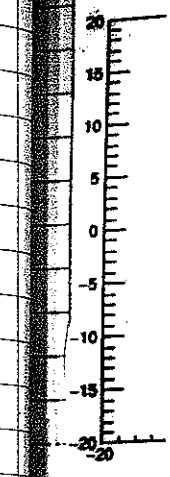
Y looks very good.

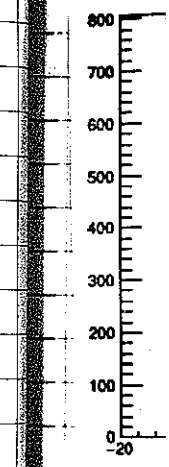
137 - same as before, longer run

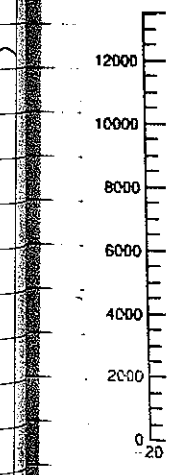
+ roughly circular shape, still a bit of a dead zone.

currently ch 0 is limiting factor for x-dir

138 - 1950V
no mask

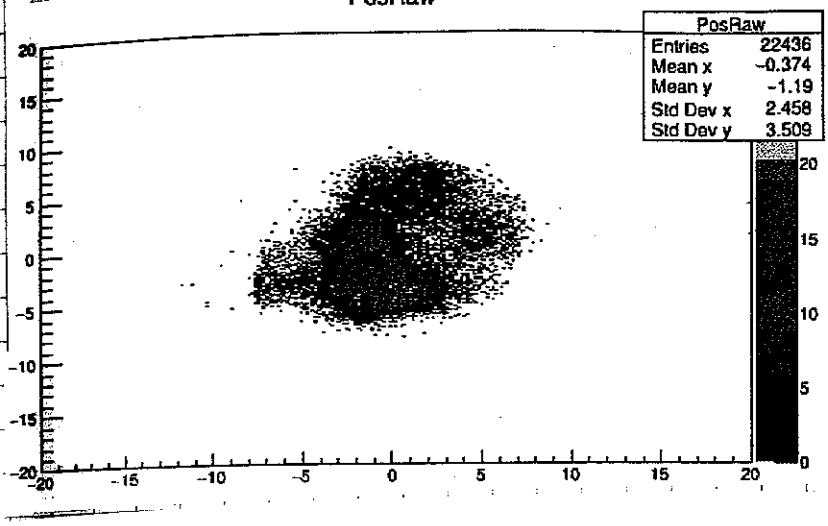






Run 138

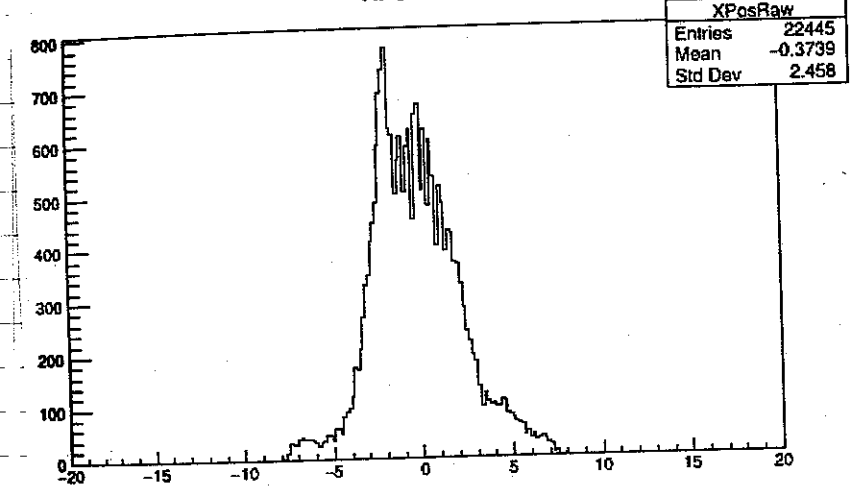
PosRaw



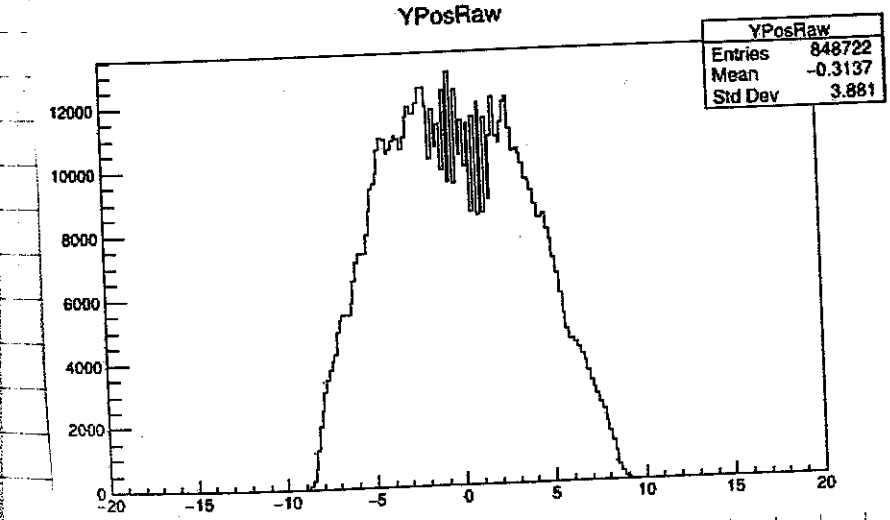
1300 hits

~80,000 hits

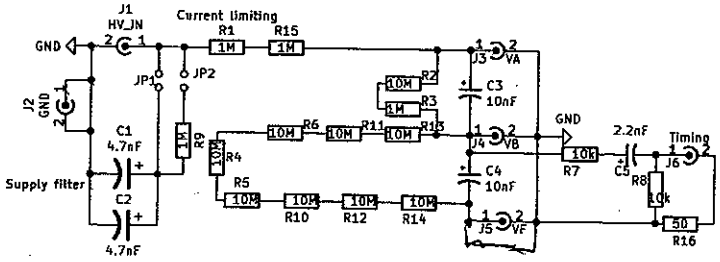
XPosRaw



YPosRaw



x-dir



4/5 circuit diagram

1/17 MCPs have been under vacuum for ~ 36 hrs.

Ion gauge: 3.5×10^{-6} torr

There were some problems getting down to vacuum we believe those were to do the gauges, not the chamber. Vacuum really got better yesterday after I degassed the gauge for an hour. It has been relatively constant since then, but still dropping.

Today, voltage on MCP

Divider board & timing are attached, but anode has no out signal.

Plates in are APD05P8-07
- 24 nA @ 1.7kV and gain of 5.8×10^6 @ 1.7kV

so an R_{eff} = 70 MΩ

The expected current is 48.8 nA @ V_{in} = 2454 V
and 19.9 nA @ V_{in} = 1000 V

V	~~nA~~ μA	(.5 → flickering between)
100	2	
202	3.5	
303	6	
401	7.5	
503	10	
602	11.5	vacuum (torr)
702	13.5	4.4×10^{-6}
801	16	4.6×10^{-6}
1001	20	4.6×10^{-6}

V	uA	torr
1100	22.5	4.6×10^{-6}
1201	23.5	4.6×10^{-6}

@ 1300V HV tripped. Vacuum remained unchanged and no signal on scope.

Re biassing to 1200V, I suspect instantaneous dV was too high.

Re biased up to 1200V with no problem. Stepped upto 1250V and let it sit. HV supply readout shut off after ~ 1 min & wouldn't turn back on. HV was presumably still on as HV light was.

Kyle thinks the guard shaper did something to the NIM Bin. I removed all modules HV supply to test no biassing.

Biased back to 1200

V	uA	torr
1265	~~22.5~~ 23.5	2.9×10^{-6}
1251	24.5	3.2×10^{-6}
1301	25.5	3.4×10^{-6}
1402	28.5	3.6×10^{-6}
1503	30.5	3.7×10^{-6}
1601	32	3.8×10^{-6}
1703	34	3.9×10^{-6}
1807	36.5	3.9×10^{-6}

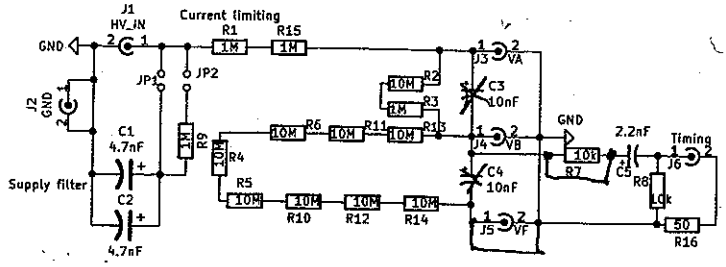
V	mA	tau
1901	39	4×10^{-6}
2005	40.5	4×10^{-6}
2101	43.5	4×10^{-6}
2204	45.5	4×10^{-6}
23		

We didn't see a signal & think there is a problem with the divider board.

The signal is probably shorting to ground through C3 and C4, the voltage stabilizing capacitors. This was, in part, due to the 10k resistor between V3 and timing cap.

Those two capacitors were removed, and the 10k resistor shorted.

See modified diagram below



After we started pumping down I realized another mistake. The SOSL is in the wrong place, so the timing signal needs to be terminated externally.

This gives RC ~ 100ns as opposed to 100 MS

Diagram needs to be modified so there's a corresponding τ for voltage stabilization of ~ 1ms or so.

I rented the chamber to check electron connection and found a short between the HV alligator clip and the grounded tab on the mini-rexolds.

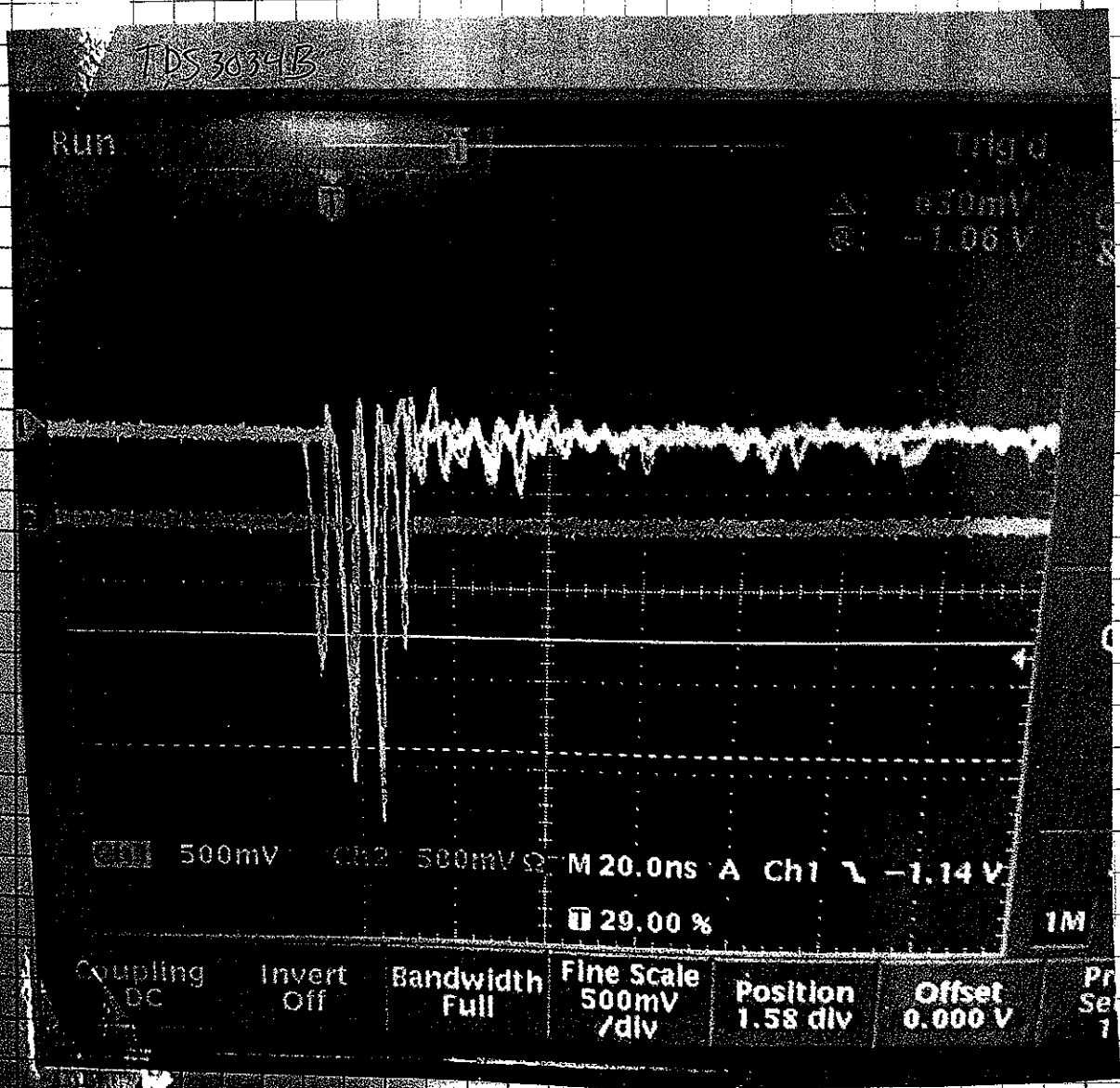
11/8 Rebiassing after change to board

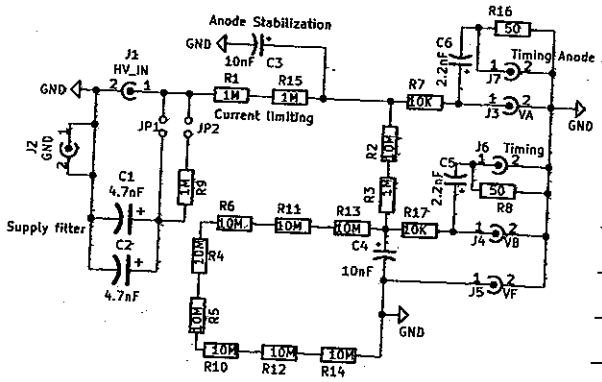
V	MA	torr
402	9	5×10^{-6}
503	11.5	
604	13.5	
802	19.5	
1068	23.5	
1203	29.5	
1302	31.5	
1403	34.5	
1507	37	
1604	40.1	
1704	47.5	
1807	46	
1901	48	

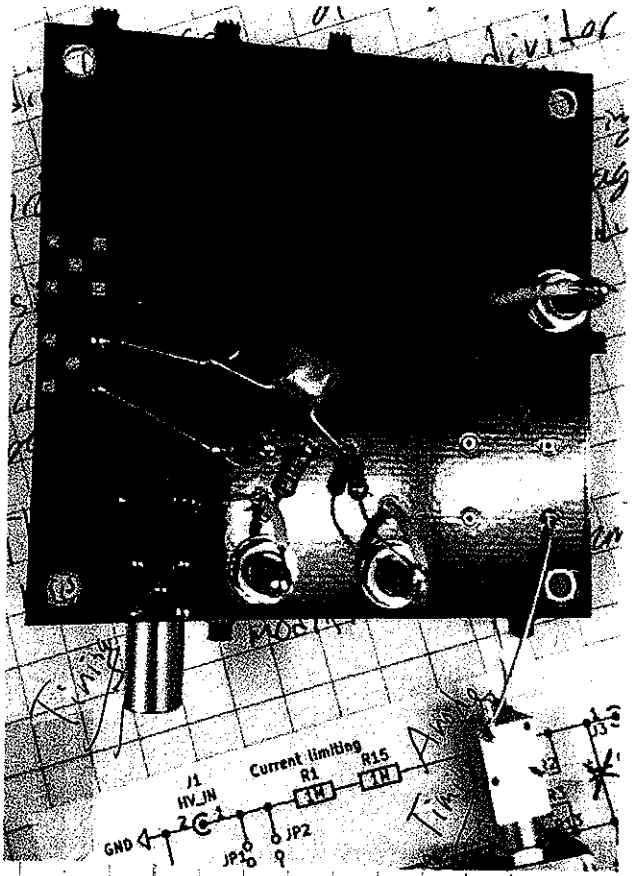
After biasing up we noticed some weird things. First, the signal was the wrong polarity, as well as being incredibly noisy. Pic below is the signal amplified through an Ortec V120A fast pre-amp.

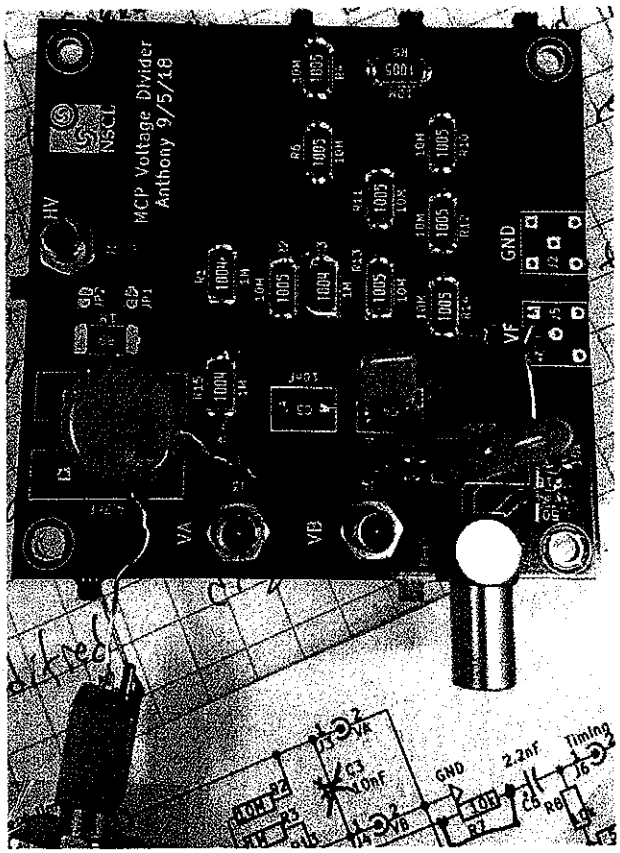
We modified the circuit again, readding the voltage stabilizing capacitors and separating the divider from the timing signal. We also added a timing pickoff for the Anode. See Pg 18 for board & schematic.

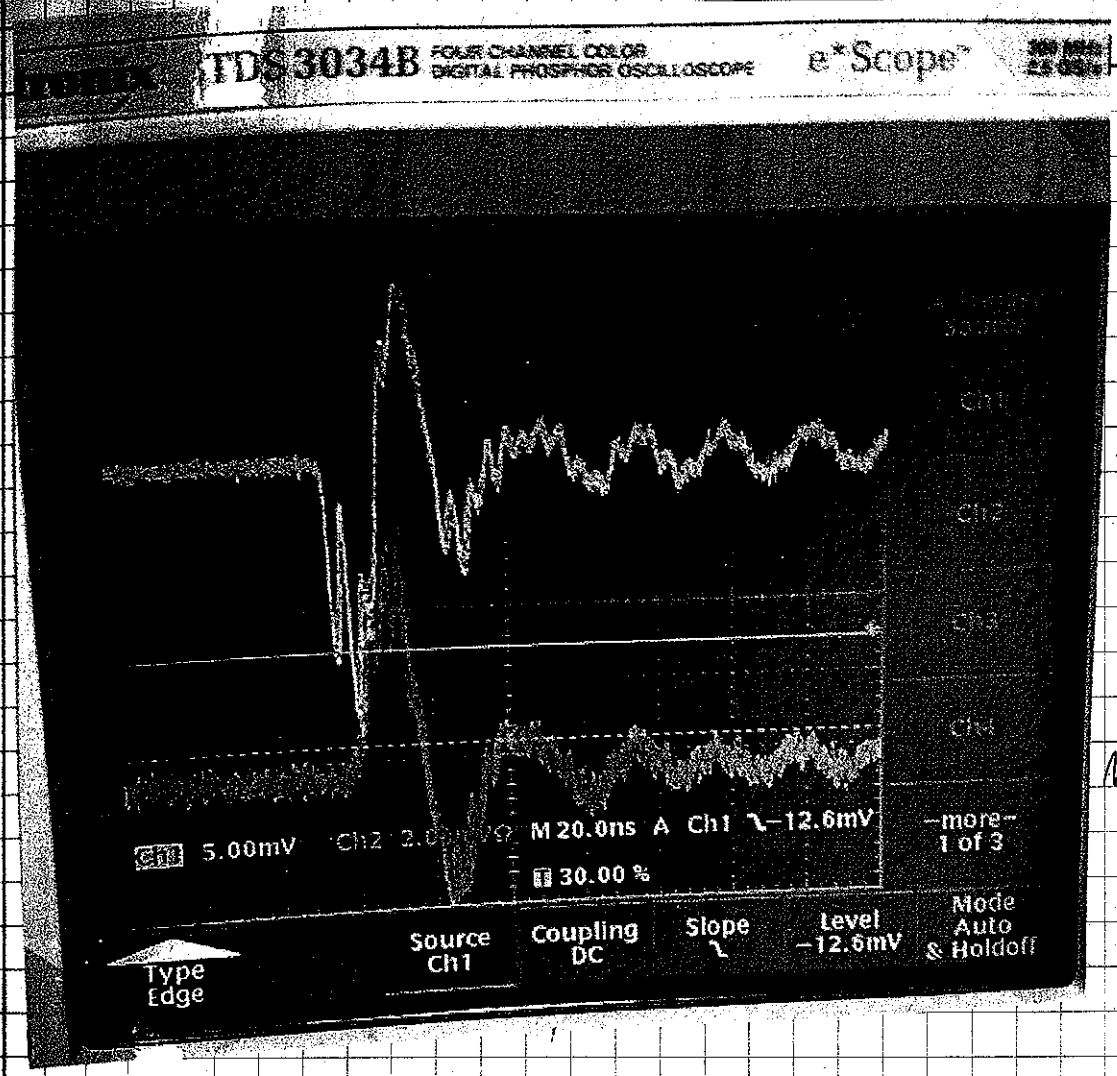
Suspect fast reflection/noise due to lack of grounding at Anode side.




Anode Stabilization
GND
10nF
C3
J1
HV_IN
GND
R1
1M
R15
1M
Current limiting
JP1
JP2
J2
GND
C1
4.7nF
Supply filter
C2
4.7nF
R9
1M
R6
10M
R11
10M
R13
10M
R17
10K
R4
10M
R5
10M
R10
10M
R12
10M
R14
10M
C4
10nF
R2
10M
R3
1M
R7
10K
R16
50
C6
2.2nF
Timing Anode
J7
J3
VA
GND
J6
Timing
C5
2.2nF
50
R8
J4
VB
J5
VF
GND


J1
HV_IN
Current limiting
R1
1M
R15
1M
GND
JP1
JP2


MCP Voltage Divider
Anthony 9/5/18
NSCL
HV
GND
VF
VA
VB
C3
10nF
2.2nF
Timing



Anode

MCP-back

11/9 After biasing up with the modified board we saw both Anode and mcp-back signals. The mcp-back (grounded at both ends) has less fast noise than the anode which is not.

There is a strong oscillatory behavior which I believe is due to the fact that there is only 50 Ω between the ~~capacitor~~ signal in and ground leading to a very long damping constant.

For a typical RLC $\zeta_b = \frac{R}{2}\sqrt{\frac{C}{L}}$

so increasing the resistance, and/or to should help

10/6

To modify, I want to add a 1K resistor between sig in and the cap.

Vit sticking → Also want to modify board so isolate ground planes are actually grounded and remove the potential for a loop.

10/16 The vacuum was 10^{-5} on manifold. Most was spent trying to improve it is now 7.2×10^{-6} see chart

~~Now no~~

New HC biasing

1046

1st (last) signals around 1700 - 1800 on blue ~2mV noise

1900V start of signal on yellow

Picture order on phone.

1. 2400V raw signals, trigger on gate
2. " " " trigger on anode
4. " amplified anode VT120A
3. -Note anode needs to be terminated, or reflecting in back
5. 2400V amplified plate and NSCL test board inverting

Added Cold

Bias up to 2600 V, saw dark current

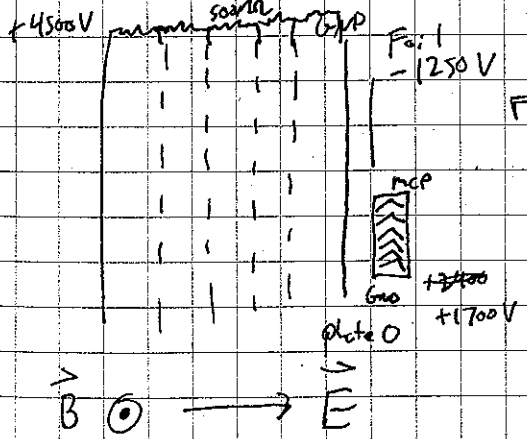
MCP/Anode 2600V 42.5 nA

Foil -1250 V 0.01 nA

Added a trigger on a CFD, one into scope one into TTL converter and rate meter

- started biasing E-field

There were problems biasing, sparking. This is due to the voltage being applied wrong. The plate that the MCP wants to sheild be held at ground and the furthest plate at a high potential. This gives the proper field orientation.



So as the E-field is increased, the particle accelerates, increasing the radius of the cyclotron motion.

So this was corrected for before Thanksgiving (Tues 11/20) night. I left it to pump over night but only reached a vacuum of 7×10^{-5} torr by wed morning when I left. I put the detector into a dry box and left the chamber to pump over break.

Sunday 11/25 night it was at 1.5×10^{-5} torr. Both turbos were functional. I turned on the ion gauge

Done of Dren type { Tues 10am 11/27 vacuum was 5x 10⁻⁷.
the ion gauge had been left on since Sun,

12:30 when I got in the new turbo had tripped.
I vented cleaned it with ethanol and
started pumping down, after putting the MCP
and a Si in.

Si used: TD-24-450-300-S
serial: 26-2704
Bias: +200V

We tested the Si

Bias +100V @ 0.63
signals of ~ 200mV are seen

The chamber continued to pump down really slowly,
much slower than expected and the new turbo was
running hot, even after adding another fan.

Kyle and I replaced the turbo with the
water cooled one from the summer setup.
We also cleaned the hose (it was oily from
the turbo shutting off), removed a hose segment,
and added a right angle piece.

The pumping speed seems more consistant with
pre-break, if marginally slower.

Run log for MCP Test

Run 141 - Junk

Run 142 — MCP: 2406 V, 50 nA; Foil: -1250 V; E-field 5000 V
~45% efficient

start: 19:25
End: 19:35

Run 143 — MCP: 2406 V @ 50 nA; Foil: -1750 V @ 0.02; E-field: 5000 V; Start: 19:40; Stop: 19:49
~35% efficient

Run 144 — MCP: 2406 V @ 50 nA; Foil: -2500 V @ 0.02; E-field: 5000 V; Start: 19:50; Stop: 19:55
~45% efficient

Run 145 — MCP: 2406 V @ 50 nA; Foil: -1250 V @ 0.01; E-field: 4000 V; Start: 19:56; Stop: 20:00
~18% efficient + ms res

Run 146 — MCP: 2406 @ 50 nA; Foil: -1250 V @ 0.01; E-field: 3500 V; Start: 20:01; Stop: 20:05
~20% efficient + ms res

Run 147 — MCP: 2406 @ 50 nA; Foil: -1250 V @ 0.01; E-field: 3000 V; Start: 20:06; Stop: 20:08
~ efficient

MCP sparked off

no out — Run 148
MCP: 2000V
Foil: -1280V
E: 0V
start: 12:45
stop: 12:48

Run 149
MCP: 2160V
Foil: -1250V
E: 1600V
start: 12:47
stop: 12:50

Run 150
MCP: 2100V
Foil: -1280V
E: 2000V
start: 12:50
stop: 12:52

Run 151
~~~50% eff~~
~52% eff
MCP: 2100V
Foil: -1250
E: 3000
start: 12:53
stop: 12:54

Run 152
~~~52% eff~~
~55%
MCP: 2100V
Foil: -1250V
E: 3500V
start: 12:55
stop: 12:57

lights on briefly → Run 153
Drone mz
MCP: 2100V
Foil: -1250V
E: 4000V
~~start~~: 12:57
stop: 12:59

Run 154
~11%
MCP: 2000V
Foil: -12:50V
E: 4500V
start: 13:00
stop: 13:02

Run 155
~~[illegible]~~
eff
MCP: 2100V
Foil: -1250
E: 9000V
Start: 13:02
Stop: 13:04

Run 156
Junk

Run 157 — MCP: 2100V; Foil: −1250V; E: 0V — start: 15:15; stop: 15:19

Run 158 — MCP: 2100V; Foil: −1250V; E: 1600V — start: 15:20; stop: 15:25

3 peaks in MCP spectra

Run 159 — MCP: 2100V; Foil: −1250V; E: 1500V — start: 15:25; stop: 15:30

2 peaks in MCP

Run 160 — MCP: 2100V; Foil: −1250V; E: 2000V — start: 15:33; stop: 15:38

Run 161 — MCP: 2100V; Foil: −1250V; E: 2500V — start: 15:; stop: 15:44

Anode: 810ps
MCP: 880ps

Run 162 — MCP: 2100V; Foil: −1250; E: 3000V — start 15:44; stop 15:47

Run 163 — MCP: 2100V; Foil: −1250V; E: 3500V — start: 15:51; stop 15:53

Run 164 — MCP: 2100V; Foil: −1250V; E: 4000V — start: 15:53; stop: 15:55

Run 165 — MCP: 2100V; Foil: −1250V; E: 4500V — start 15:55; stop: 15:57

250

Plan B ramp E field in 100 15k V steps

in 10 min runs

All Si @ 200V

Run 166 MCP: 2204V @ 45uA Start: 15:05
Foil: -1250V @ 1uA Stop: 15:15
E: 0V

Run 167 MCP: 2204 V @ 46uA Start: 15:16
Foil: -1250V @ 1uA Stop: 15:26
E: 1600V

Run 168 MCP: 2204 @ 48uA Start: 15:29
Foil: -1250V @ 0.01 Stop: 15:39
E: 1650V

Run 169 MCP 2204 V @ 46uA Start: 15:46
Foil -1250V @ 0.01 Stop: 15:56
E: 1500V

Run 170 MCP 2204V @ 45uA Start: 15:58
Foil -1250V @ 0.01 Stop: 16:08
E 1750V

Run 171 MCP 2204 @ 45uA Start: 16:37
Foil -1250 @ 0.01 Stop: 16:47
E 2000V

Run 172 MCP 2204 @ Start: 18:04
Foil -1250 @ Stop: 17:14
E 2250V

Run 173 MCP Start 17:28
Foil Stop 17:38
E: 2500V

Run 174 MCP Start: 17:51
Foil stop 18:01
E: 2750V

MCP Start: 18:13
Foil Stop: 18:23
E: 3050V

Run 175 MCP Foil E: 3250V — start 18:24, stop 18:34

Run 176 MCP Foil E: 3500V — 70% — start: ~~18:24~~ 18:36, Stop 18:46

Run 178 MCP Foil E: 3750V — 70% — start 18:46, stop 18:56

Run 128 MCP Foil E: 4000V — 60% — Start 18:56, Stop 19:06

Run 179 MCP Foil E: 4250V — start: 19:07, stop: 19:17

Run 180 MCP Foil E: 4800V — start 19:17, stop: 19:27

Run 181 MCP Foil E: 4250V — start 19:28, stop:

Run 182 ?

Efficiency

no change to E field

	Run #	MCP	Foil	E	Start	St…
	~~Run 183~~ 183	2004V	-1250	0V	13:59	14…
	184					
~~[illegible]~~ 18.5%	185	2004V	-1250	500 V	14:06	14:…
44.4%	186	2004V	-1250	1000 V	14:13	14:…
71.8%	187	2004V	-1250	1500 V	14:22	14:…

Run 188

189

190

Swapped HV

191

1 =
2 =

Run #	…
192	
193	
194	

"Smearing"

Run #	MCP	Foil	E	Start	Stop	Efficiency
188	2004 V	-1250	2000 V	14:32	14:38	75.6 %
Adam	started	biasing	Downstream	mcp		
189	2004 V	-1250	2500 V	14:40	14:55	5%
Both	plates	are	biased			
190	U 2004 V	~~-1250~~ -1050	2000 V	15:04	15:15	
	D 2300 V	~~-1250~~ -1050	3500 V			
Swapped HV supply for D foil						
191	U 2004	-1250	2000 V	15:8		
	D 2300 V	-1250	3500 V			

Junk

The plateau has walked for Downstream MCP as the B+ field has lessened.
I played around

2500 V ~ 80% efficiency
3500 V ~ 34% eff
2000 V ~ 53% "
1750 V ~ 51% "

~~Run~~ 1 ⇒ Down
~~Run~~ 2 ⇒ up

Run#	MCP1	MCP2	Foil 1	Foil 2	E-1	E-2	Eff 1	Eff 2	start	sto
192	2303	2105	-1250	-1250	2000 V	2000	51%	80%	15:42	15:5
193	"	"	"	"	"	"	"		15:58	16:1
194	"	"	"	"	"	"	"		16:17	16:2

Stop

14:0 "Smearing" in 20 plot occurs when lights are turned on. As long as they stay on (or off), it's fine

14:11

14:19

14:29

Start	Stop	Run #	MCP 1	MCP 2	Foil 1	Foil 2	E 1	E 2	Eff 1	Eff 2
14:06	14:36	195	2305	2106	-1250v	-1250v	2000v	2000v	49.7%	81.1%
14:39	15:00	196 switched per U & D Anode & Body	2305	2106	-1250	-1250	2000	2000	42%	41%
15:26		197	2406	2105	"	"	"	"		

0 Ano
1 Bo
2
3

MNU Setup

141.219.60.147

VME crate

location			
04	03 -	QDC	0x6666
	04 5 -	QDC	0x BBBB
	05 6 -	TDC	0xAAAA
	0 3 -	scaler	0x3333

TDC channel map

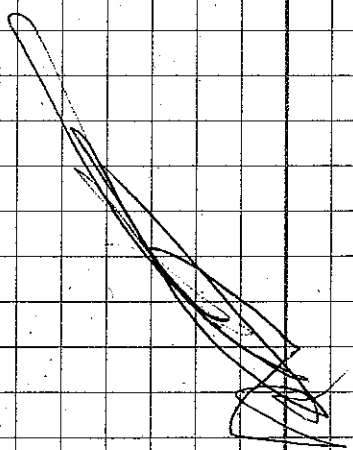
0 - Anode US
1 - ~~Anode DS~~ Back US
2 - Anode DS
3 - Back DS
4 - Fast plastic
5 - Ref (fast plastic)

QDC 1

0 Anode US
1 Back US
2
3

Scaler Map

0	US MCP Anode
1	DS MCP Anode
2	US or DS
3	US/DS Coincidence
4	Fast Plastic
5	Live trigger
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	



BEAM TUNING

28 MeV $^{64}Cu^{7+}$ (No foil)

Run 1201 Cu 28MeV

MCP US: 2306 @ 40nA MCP DS: 2109 @ 37nA
Foil US: -1250V Foil DS: -1250V FP: -800V
E US: 2000V E DS: 2000V @ 0.28mA

Run #	start	stop	MCP US	Foil US	E US	MCP DS	Foil DS	E DS
1201	12:35	12:37	2306V	-1250V	500V	2109V	-1250V	2000V
1202	12:38		2306V	-1250V	0V	2109V	-1250V	2000V
1203			2306V	0V	0V	2109V	-1250V	2000V
1204			"	-1250V	1000V	"	"	"
1205			"	-1250V	1500V	"	"	"

Raised MCP US Threshold (Anode

1206		"	"	"	"	"	"
1207		"	"	1500	"	"	"
1208		"	"	2000	"	"	"
1209		"	"	2500V	"	"	"
1210		"	"	3000V	"	"	"
1211		"	"	3500V	"	"	"
1212		"	"	4000V	"	"	"

Run #	MCP US	Foil US	E US	MCP DS	Foil DS	E DS	
1213	2306V	-1250V	2000V	2109V	-1250V	500V	
1214	"	"	"	"	"	1000V	
1215	"	"	"	"	"	1500V	
1216	"	"	"	"	"	2000V	
1217	"	"	"	"	"	2500V	
1218	"	"	"	"	"	3000V	
1219	"	"	"	"	"	3500V	
1220	1998	1963	"	"	"	3000V	Back to nominal

28mA

Changed Z crossing in Anode

1221

1/17/19

MCD distance ~50 cm

$^{16}O^{6+}$ 300 K pps, Tandem Voltage 4.5, 32 MeV

US MCP = 1999, 42 nA DS MCP = 2106, 40 nA
US E-field = 2000 DS E-field = 2000
US Foil = 1250 DS Foil = 1250

FP = 700 V, 0.7 mA

The US Anode has no signal, so I have used US MCP signal as in the COL gate instead

Run 1221: ^{16}O with regular voltages on MCPs + E-field

1222: Junk

Row	MCP US	MCP E-field	MCP fill	MCP DS	DS E-field	DS fill
1222	1999	500	1250	2104	2000	1250
1224	"	1000	"	"	"	"
1225	"	1500	"	"	"	"
1226	"	2000	"	"	"	"
1227	"	2500	"	"	"	"
1228 - Same	1229	"	3000	"	"	"
1230	"	3500	"	"	"	"
1231	"	4000	"	"	"	"
1232	1999	2000	1250	2104	500	1250
1233	"	"	"	"	1000	"
1234	"	"	"	"	1500	"
1235	"	"	"	"	2000	"
1236	"	"	"	"	2500	"
1237	"	"	"	"	3000	"
1238	"	"	"	"	3500	"
1239	"	"	"	"	4000	"
1240	1999	2000	1250	2104	2000	1250

Preamp Testing

Ortec, 20 coarse gain, 1 μs shaping

Goal: measure gain of the preamps, as well as S/N using the cable driver and no cable driver.

All tests are 1 V pulse through .4438 pF cap which is 10 MeV, si-equiv or ~ 70 MeV in PIO

Preamp ID	V_{PA} (V)	N_{PA} (p-p) (mV)	V_{PA+SD} (V)	N_{PA+SD} (mV)	V_{SH} (V)	N_{SH} (mV)
3678	1.4	~~80~~ mV (5mV)	4.9	20	7.6	4
3631	1.4	80 (5)	4.9	20	7.6	4
3630	1.4				7.2	4
3632	1.4					
3633	1.4					
3626	—					
3627	1.4					
3628	1.4					
3629	1.4					

Odd behavior in 3678 first works, then has large -4 V DC offset and a sinusoidal noise w/ T ~ 5-10 ms. After testing rest of preamps it was works again

Similar problem with 3626

After talking to bill pulsed the test input with 1V neg. → 200 mV positive w/ fall time ~10 μs

Testing termination

0: High imp
1: 50 Ω
2: 75 Ω
3: 100 Ω
4: 150 Ω
5: 250 Ω

Preamp ramp

Amptek no modifications.

Run 0 0 - 4 Volts, 11 steps, 10 s per
- only .4 V on scale

Run 1 0 - 1 Volt 11 step 10 s ea
Have up to 0.5 V on scale

Run 2 0-4 V 11 step w/ 0.5 atten @ 5s
Bad!

Run 3 0-4V 11 step w/ 0.5 atten @ 5s
up to ~ 1 V on scale

Run 4 0-1 V 11 step w/ 0.5 atten @ 5s
~~up to 1V on scale~~ All on scale

~~change all~~

Run 5 ~~of~~ 0-1V 11 step w/ 0.5 atten
up to 0.7 on scale

X Changed location of attenuation to between shaper and ADC

Change gain of preamp ~~for~~ by factor of 2
added 0.6pf cap
so gain ~ 51 mV/MeV

measured gain w/ ~~Fe~~ 60 (0 MeV is ~ 49 mV/MeV
noise ~ 260 mV for 4800 mV pulse

after PD and shaper,

Peak is ~ 2.8 V
noise is ~ 7 mV p-p

shape starts to deform
~ 2.2 V

Run 6 ~ Junk

Crosses out of dynamic range ~ 1.5 V

Run 8 0-4 Volts 11 steps @ 5 sec

Run 9 0-1 volts 11 steps @ 5 sec

Run 10 0-3 volts 11 steps @ 5 sec

Run 6-8 are junk

Run 9 0-4 V 11 steps @ 5 sec

Run 10 0-1 V 11 steps @ 5 sec

Run 11 0-2 V 11 steps @ 5 sec

Added attenuator between shaper and ADC w/ 0.5 attenuation

Run 12 0-4 V 11 steps @ 5 sec

This hits range of shaper

Run 13 0-4 V 11 steps @ 5 sec

moved atten to between PD and shaper (still $\frac{1}{2}$)

signal still clips in shaper, but around 3.5 V which is above dynamic range of ADC (~3 V)

Run 14 0-4 V 11 steps @ 5 sec

atten = 0.3

at 50 mV/MeV, PD starts clipping at

3.1 V → 31 MeV

Run 16 → 6 units

for 50 mV/MeV preamp

PD atten clips @ 3.1 V
and shaper w/ ½ attenuation between
PD & shaper peaks @ ~ 4 V

Run 16 0-3 V 11 steps w/ atten abac @ 5sec
removed ~~gains~~ ped

Run 17 0-3 V 11 step w/ @ 5 sec
get up to 4.7V

Changed pulser to better simulate our data

Flat pulse, with 200 ns rise time,
100 ns width and 100 ns fall time

dso added 280 MΩ resistor to reduce
τ → 175 ns

Noise tests @ 1V

175 ns fall

no atten sig @ 3.3V p-p noise ~ 10 mV

½ atten sig @ 1.75 V p-p noise ~ 5 mV

Run 35 for 77

Run 18 1V input with ½ atten between PD and shaper
and ½V input
and 1.75 V input

Lowered τ to 77 μs (100 MΩ)

sec

Run 19 1V, ½V, 1.75V with ½ atten between PD & shaper

P-P 6mV noise sig = 1.65V

Lowered τ to 40 μs (50 MΩ)
still atten = ½

sig = 1.65 p-p noise = 6mV

Run 20 1V, ½V, 1.75V with ½ atten

Lowered τ to 24.8 μs (30 MΩ)

sig = 1.65V P-P noise = 7mV

Run 21 1V, ½V, 1.75V w/ ½ atten

Setup for full test, atten = 0.3

Pulser will be 0.1V and multiples of 0.5 to ~~3.5V~~ 4V
starting with 25 μs fall time

Run 22 0.1 → 4V pulsers

	Esi	Channel	Fwhm	
region 0	10	946.48	5.73	⇒ Fwhm (MeV)
1	20	1944.6	5.9	57.3 KeV (Si)
2	24	2462.00	5.85	~ 480 KeV (Isobutane)

τ = 77 ns again
P/Z looks same as 25 ns

Run 23 0.1V - 4V pulser

E(Si)	ch	Fwhm
10	1061	2.7
20	~~2088.3~~	2.8
30	3118.5	3.3

Fwhm(Si) 102.7 KeV/ch
27.7 KeV
↓
230 KeV (150)

Hooked up Indiana style 80mV/MeV

with 1V pulser
p-p noise 6mV signal ~ 1.70 V
(for after shaper)

Add ½ atten between PA and shaper
p-p noise 4mV signal 850mV

Run 24 0.1V - 4V pulser w/ 0.5V steps

E(Si)	ch	Fwhm
10	926.8	2.39
20	1819.6	2.47
30	2719.5	1.68

~89.29 ch/10KeV) ~112 eV/ch
~26.9 KeV

Run

Populated a box with pre-amps in ch

3, 6, 11, 16

2, 7, 12, 17 7 indexed

2, 6, 10, 14

Pulser Run

Run 25 .1 and $\frac{1}{2}$V steps up to 4V

using anetek test board, pulse driver, and attenuator 1/10 between PD and shaper

6/1 / 7/21

2/11/19 Start of e15507

Stack order: tdc1 . gdc1 adc1 onecycle (delay) adc2

Run 26: Sb125 calibration source on top of the reentrant can.

Run 27: Co-60 Calibration source near bottom of case

Run 28 Pulser run of IC preamps

Values: 0.01, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 0.44, 0.666, 0.66

JUNK! Gains were off and range was wrong

Run 29 Pulser of IC Preamps

V-pulser	E(130)
0.01	2.87
0.1	28.7
0.2	57.4
0.3	86.1
0.4	114.8
0.5	143.6
0.6	172.3
0.7	201.1
0.56	
0.88	

Attenuation before ADC, splitter w/ 50Ω terminator
ADC channel is 704.6
w/o is 849.6

3K

.202K

2.060 MeV

[illegible]

Run 30 IC pulser 0.1 to 0.8 V 7 steps @ 3 sec

0.1, 0.25, 0.332, 0.448, 0.564, 0.68, 0.796

Run 31 IC pulser 0.1 to 1.5 V 15 steps @ 5 sec

Run 32 Junk

Changed attenuations for ^{76}Ge beam

Run 33 IC pulser 0 - 0.5 V 11 steps @ 3 sec

Scalers

0	IC 1
1	IC 2
2	IC 3
3	IC 4
4	IC 5
5	IC 6
6	IC -
7	IC 8
8	IC
9	MC
10	MC
11	MC
12	MC
13	Δ
14	E
15	γ
16	Ran
17	Ma
18	B

Source	
0	IC
1	IC R
2	IC 3
3	IC 4
4	IC 5
5	IC 6
6	IC 7
7	IC 8
8	IC OR
9	MCP DS Anode
10	MCP DS Back
11	MCP US Anode
12	MCP US Back
13	ΔE
14	E
15	X
16	Raw Master
17	Master
18	Busy

TDC	
0	Master Trig (Ref)
1	MCP DS Anode
2	MCP DS Back
3	IC 1
4	IC 2
5	IC 3
6	IC 4
7	IC 5
8	IC 6
9	IC 7
10	IC 8
11	ΔE
12	E
13	MCP US Back
14	MCP US Anode
15	X

long time levels around ~ ^{76}Ge.

nuclei	energy (keV)	$T_{1/2}$
^{72}Ge	691	0.4 μs
^{71}Ge	198	20 ms

Stat of UMW Experiment

01 - USB controller
02 - V785 ADC 0x3333
03 - 1190 A TDC 0x 1B030 B
04 V820 scaler 0x2222

Added detectors to chamber & attached IC
Pressurized to 150oh and then shut
control valve.

Gas to IC through 7 side due to connector worn
-out

t(min)	Pressure
0	156.0
0.5	152.2
1	148.8
1.5	143.5 ok?
2	141.7
2.5	138.6
3	
3.5	
4	
4.5	
5	

Data looks the same as before we left.
Still nothing on the leak checker.

Pressures after pumping w/ both IG and pumps

T-20 after pumps for about 15 min

	US IG	DS IG
T-20	4×10^{-5}	2×10^{-4} → Decreased
T=0	2×10^{-5}	1×10^{-4}

This was 1st test. Two months after failing to find a leak. Monday even after Allen's new He leak checker,

Started pumps ~5min ago	US IG	DS IG
11:43	5×10^{-5}	1.8×10^{-4}
12:02	2×10^{-5}	9×10^{-5}
12:20	$\sim 1 \times 10^{-5}$	7×10^{-5}

12:

Added IC w/o connection

after 2nd turbo on.

	US IG	DS IG
13:01	5×10^{-5}	2.5×10^{-4}

We swapped TC3 (TC36) with TC5 (TC

14:05	1.5×10^{-5}	1.2×10^{-4}

Added gas 1 hrs

	USFG	DSFG
15:05	6.8×10^{-5}	2.5×10^{-4}

Added 100 torr gas and some flow trying off.

Seemed to be holding reasonably steady at 50 torr

Both turbos needed to handle FC leak, as soon as 1 turbo turned off, the pressure started climbing on the DSFG

15:14 Turned both Turbos on and quickly got back to base on 2×10^{-4} at chamber

15:23 DSFG at 2×10^{-4}

15:32 DSFG 1.8×10^{-4}

Start test of adding gas

15:34 no gas PSIG 1.7×10^{-4}

14 torr DSFG ~ 3×10^{-4}

25 torr DSFG ~ 4.8×10^{-4} jumped down suddenly

45 torr DSFG ~ 2×10^{-4}

15:44 100 torr ~ 2.5×10^{-4}

flow is at ~30 on Mathson gauge

15:07 100 torr 2.1×10^{-4}

flow is stable at 32.5 on Mathson

2.1×10^{-4}

TC4

16:16 set P to 150 torr flow rate ~30, bouncing

DSIG @ 2.65×10^{-4}

16:22 P at 150 torr flow still bouncing

DSIG @ 2.35×10^{-4}

16:28 Going to 200 torr IC6 tripped

vented IC and turned back turbo on

DSIG at P=0 1.5×10^{-4}

Added 50 torr DSIG went up to ~6×10^{-4} then dropped again

16:34 Back at P=150 torr

DSIG @ 2.6×10^{-4}

Increase P at ~5 torr/10 sec

16:35 P=175 torr

DSIG @ 2.9×10^{-4}

16:38 P=200 torr flow ~30, 1 CS

DSIG @ 3.1×10^{-4}

16:43 IC-6 tripped off again

0	1×10^{-4}	45	
Pin IC	DSIG	IC6	flow
50	2.25×10^{-4}	85	40±10
101	2.15×10^{-4}	95	40±10
125.5	2.3×10^{-4}	100	30±15
150.5	2.4×10^{-4}	100	30±10
175.6	2.7×10^{-4}	100	30±10
201.0	3.1	100	40±5

I believe the DS turbo is not being properly backed. Zubi is going to try replacing the filter

5/21 ~~7:44~~

$2.5 \cdot 10^{-4}$

7:44 pm

5/22

$2.4 \cdot 10^{-4}$

4:10 pm

Switch on U4 attenuator broken, so it was bypassed w/ HEMO Cable

Set IC pressure to 100 torr
DSIG is at 8×10^{-4}
Setting bias to 30V

USIG 30V @ 0.0 nA

DSIG 30V @ 0.0 nA

Forgot to attach HV cables. After fixed

30V @ 0.002×10^{-3} A for both which is consistent w/ expect 12nA Rot IC

Beam was off center of collimator & was activated.

We vented to remove collimator

Set IC pressure to 77+5 = 82 torr

PSIG at 8.5×10^{-4}

Setting voltage to 25 V

USIC: 25V @ 2mA
DSIC: 28V @ 1.5mA

D2 Fast amp not functional

1241 75 torr 25V

17:00

Set IC pressure 150 X 1-1

PSIG at 3.3×10^{-4}

Set HV = 36V

Run #	Beam	P(IC)	P(chamber)	USEC	DSEC
1241	2 12MeV	77 torr	9.5×10^{-4}	25V @ 2mA	27V @ 1.5mA
1242	"	150 torr	$3. \times 10^{-4}$	46V @ 3.5mA	46V @ 3.5mA
1243	"	"	"	"	"

Added trigger to scaler and changed trigger to coincidence between U2 and U3

1244	2 17MeV	150 torr change trigger to U2	3.3×10^{-4}	46V @ 3.5mA	46V @ 3.5mA
1245	"	"	"	"	"
~~1246~~		Switching beam to 016 swapped U2 & U3 as input to discriminator were wrong			
		Triggers on U2			
1246	160 6+ 20MeV	150 torr			
1247	"	100 torr		30V @ 2mA	0V @ 0A
1248	"	50 torr		150 1.5mA	0V @ 0A
		JUNK			
1249	"	"		"	"

Signal noise for 4 channels
w/ 50 terr and 160 ± 28mV

① 4.6 x 20 mV 92mV @ 15mV P-P

② 3.5 x 20mV 70mV @ 10mV

③ 2.5 x 20mV 50mV @ 7mV

④ 3 x 10mV 30mV @ 8mV

We amplified the fast signal from the Stopper on channels U1, D1 and D2. D2 was inverted w/ a

for tuning of F^{7+} $P_{PC} = 5.3.0$ torr @ 50±10 rate

$P_{PS} = 5.6 \times 10^{-4}$

Run #	Beam	PIC	PIPS	Trig
1250	F^{7+} 28nA	30.0		U2
1251	F^{7+} 28n	31.0		U1 +! Busy
↳ JUNK				
1252	F^{7+} 28n	31.0		U1 +! Busy
1253	F^{7+} 28n	31.0		U3 +! Busy
1254	"	31.0		U4 +! Busy
1255	"	"		U1 + U2

2nd IC

1256	F^{7+}	40		D1

6/3/19

Up B Field - 72 to 74 G

D B Field - 66 to 64.5 G

After modifying upstream IC to replace window and add compression fitting the leakrate from 100 torr was ~ 0.5 torr/second

Joe, Dan and Adam confirmed the Gas handling system and tubing leading to IC connections weren't leaking. We the leak checked using combustible gas monitor. We held paper ~~different spots to~~ to roughly isolate different parts of the chamber. To the best of our knowledge the window that was replaced Friday is the problem. I'm going to remove it, visually look for holes and regrease the O-Ring and try a new window.

After replacing the window the leak rate is 10 torr/min after pressurizing to 106 torr this is worse than the 7.3 torr/min at which I left week. Looking w/ the ~~ion~~ combustible gas detector, the leak seems to come from the bottom of the window. Will confirm tomorrow w/ help of Joel Dean

11./Transport Gives that the downstream MCP will have electron travel distance of 6.699 cm with electron E = 3eV, the VMCP at 2150 V, a B-field of 65.25 Gauss, and a foil voltage of 1500 V.

For the Upstream MCP, 6.709 cm with electron E = 3eV, the VMCP at 3000 V, a B-field of 73 Gauss, and a foil voltage of 1500 V.

6/5 Biased Both MCP's up vacuum at 2.8×10^{-6} torr

DS MCP is 2005 V @ 40 nA
US MCP is 1994 V @ 35 nA

2 α sources in chamber 1 will go through DS and then US & the other illuminates just US

Setting Foil and Field voltages to above
DS: E = 2150 V F = -1500 V
US: E = 3000 V F = -1500 V

US set to E = 2452 V because of sparking

Switcher & MCP mapping to Data-U

& MCP: Channel 13, 16, 19, 28

& Switcher: Channel 7, 8, ~~21~~ 11, 26

Starting mcp Test 15:30 6/7

Pressure at 6.85×10^{-6} torr

MCP US 2012V @ 46 mA
MCP DS 2018V @ 36 mA

and stable

Can see alphas in DS MCP verified by turning on/off Foil voltage with E-field at 2150V and 2500V

~~Foil~~

~~with E~~

NO sparking

For DS MCP

E-field	Foil	Rate
2500	-1500	~~250~~ 50 c/sec
2020	0	20 c/sec
2150	-1500	50-60 c/sec
2250	-1500	50-60
2500	11	60-70
2750	11	60-70
2500	0	20-30

US MCP setting for 1 to -750 Volts
There is some ringing of the order
5mV p-p on DS Anode

It can be seen in DS Anode too.
Can also be seen on DS MCP and US MCP

It is possible to trigger over it.

The amplitude of the ringing is dependent
on the voltage applied.

Setting US Foil to -1250 V for now.
There is dark current. No clear evidence of
alphas. the ringing swamps the signal at
250 V on E-field.

Zibi and I swapped HV cables for US/DS MCPs

US MCP at 200 V and 34 nA
with foil at -1500 V the B sparking p-p is same as
before in ringing

Noise is still there after turning off MCP
~~Foil~~ Voltage.

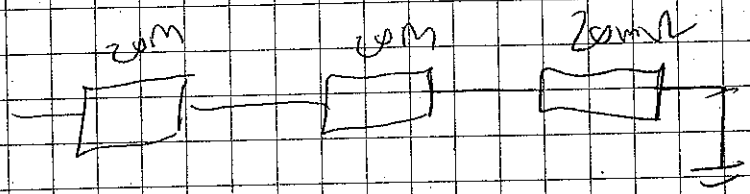
Noise is 30 mHz

6/13 Adding mcp to focal plane

HV config

ed: A is Foil (-V)
B is E-field (+V)

dd: A is MCP (+V) B is empty



Run #34 June 14, 11:00

Ge test with ~~60Co~~ gamma source (1173, 1332)

Run #35 14:05 -

test Ge with 155Eu source

High Voltage configuration

At focal plane

MCP at chA addr ? DC
E-field at chB addr ? DC
Foil at chA addr ? TBD

} on ~~3 dd I believe~~

Run 36

Pulser test of IC channels using 0.9V
0.1, 0.3, 0.5, 0.7 and ~~1.1~~ V with attenuator of 0.3 between cable driver and stripper

To make sure root trees are generated I added the commands to ~~for~~ Chamber.tcl in det.tcl

~~Run 37~~

~~S2 Pulser Ramp (E) 5.5V~~
~~0.5V, 1.0V, 1.5V, ..., 10.0V~~ ~~10.5V~~

Run 41
E Pulser Ramp: 0.5V, 1.0V, ..., 5.0V, ..., 9.5V

Run 43
dE Pulser Ramp: 0.5V, 1.0V, ..., 5.0V, ..., 9.5V

} 6/15 (Sa
6:00pm
Fanurs

Our signal to noise looks worse than expected

From the spectral our we see a peak

at 379.0 w/ FWHM 24.8

Pedestal is at 44.7 w/ FWHM of 4.35

Run 51

P0208 @ 85 MeV/A w/ DS Anode as trigger

Run 55, narrow slits, custom ones added

saw FWHM drop from 392 ps to 81 ps

~~Run 60~~ MCP off in 59, 58, worse in 57

Turned on during run 60

Before Run 65, we fixed the zero cross. on the DS Anode CFD and changed the DS MCP Back delay from 1ns to 2ns.

We also removed all attenuation in Ion chamber

Before Run 69 we noticed the ~~DS~~ US Back was not coming in. The amp blew, we replaced it with an inety fast and normal fast

Between run 73 and 74 we extend the wait to fix the DS

We are going to ramp DS Anode

at 2200V	600 mV	peak
2100V	800 mV	"
~~2200V~~		"
1900V	600 mV	"
1950V	650 mV	"
2000V	750 mV	"
2050V	800 mV	
2100V		
2150V	850 mV	
2200V	1V	

Ramp	DS Anode
~~1950V~~	~2V
2050V	~2V
2000V	~1.5V
1950	~ 600mV
1900	~ 300mV

Returning to new nominal of

USMCP : ~~2200V~~ 2100V
DSMCP : ~~1950V~~ 2000V

The

Tom removed the slits to let in all three charge states are allowed in. for run 90. Time resolution seemed degraded.

Run 91 add Si. Also a pulser run was done for Run 92 we switched the IE and E cables for Run 93 we removed gas from ICs Readded gas & removed Si for run 94

Will ramp voltage over IC voltages.

For run 96 to 111 we scanned the E-field over P10.

we ran nominal IC voltages at 300.5 torr for 112
we ran " " " at 250.8 torr for 113

Run 114 the shapers where set to 5us and we raised the pressure back to 300.9 torr

Run 118 Ion beam at 600 V 300 torr in both ICs. Signals quite small.

Run 119, changed ADC to 4V ADC from 10V

Run 120 Pulser ramp 0 - 0.14 43 steps

Run 121 Pulser ramp 0 - 0.04V 41 steps

Run # 122

Run 123 ~~PXD~~, shaper gain ⇒ 2nd lowest option on the module

We adjusted the gains on shapers

RUN 124

RUN 125 - pulser ramp 0 - 0.02 21 steps

RUN 126 - DATA

NIM BIN (LEFT RACK, MIDDLE ONE) DIDN'T HAVE THE
We unplugged an ECL-NIM & 5 Power supply
to fix it

Entered vault to flush isobutane and
increased flow rate to 100

After we got the beam, we noticed the signals were much higher after flushing gas. We were saturating the Amplifiers.

Run 127 has fragment setting with no ToF

Run 128 has the upstream MCP added

Run 129 lowered beam attenuation to 10

Before 132 we changed shapes on DY4 and DY4

Run 134 Before this run the adc gate was widened.

Runs 136 to 143 where data taken with production settings

We decided to put in the Si after removing the dead layer.

When we biased up the Si detector

dE has current 0.04

E has current 0.22

+6V

After run 148 we entered the vault to remove the Si detectors and reduce the EC pressure to 150 torr, kept ~~pressure~~ voltage @ 600V

dE current 0.04

E current 0.23

Before run 151 the Si was inserted

ΔE 0.04
E 0.24

					Leakage Current	
Run 151	IC voltage	600V	150 torr		0.04	0.24
Run 152	IC voltage	300V	150 torr		—	—
Run 153	IC voltage	300V	300 torr		—	—
Run 154	IC voltage	300V	300 torr		—	—
Run 155	IC voltage	300V	300 torr		—	—
	Key taken away					
Run 156	IC voltage	300V	300 torr		—	—
Run 157	IC voltage	300V	300 torr		—	—
Junk ⇒ Run 158	IC voltage	300V	300 torr		—	—
Run 159	IC voltage	300V	300 torr		—	—
Junk → Run 160	IC Voltage	300V	300 torr		0.04	0.28
Stopped reading after 3 minutes Run 161	IC Voltage	300V	300 torr		—	—
~~Run 162~~						
Junk Run 163	IC Voltage	300V	300 torr		—	—
Run 164	IC Voltage	300V	300 torr		—	—
Run 165	IC Voltage	300V	300 torr		—	—
Junk ~~Run 166~~	~~IC Voltage~~	~~300V~~	~~300 torr~~		—	—
Junk Run 167	IC Voltage	~~300V~~	~~300 torr~~			—

Run 168	IC Voltage	600 V	300 torr	—	—	
Run 169	IC Voltage	600V	300 torr	—	—	~~Pre-Gas~~ Isobutane
Run 170	IC Voltage	600V	300 torr	—	—	- Gas' Head line Valve opened - Gas line Flushed
Run 171	IC Voltage	600V	300 torr	—	—	CF4 Gas
Run 172	IC Voltage	600V	300 torr	—	—	
Run 173	IC Voltage	600V	300 torr			

Run# 174, Ge background run

Between 170 and 171 the leakage current

0.04
0.36

After run 173

dE 0.05
E 0.43

2.7944 x + 17.250

energy kev = 661, 1171, 1332, 1460

Run# 175, Ge with mixed source,

Run# 176, Ge with 125Sb source

Run# 177, Ge with background

Run# 178, Ge with back ground

test = Run 179, exchange bipole and unipolar of Ge shaper

no Ge with mixed bare source

test = Run# 180 return bipole and unipolar back.

Ge with background.

Run# 181 Ge with background.

20:20

beam back.

trig Ge → MEP DS Anode.

gas pressure (CF4) 50 → 300 Torr

Vacuum 7×10^{-5} Torr

Si current { dE 0.05 uA
E 0.41 uA

chiller ✓

GHS ✓

15 min run

#Run 185

#Run 186 increase to bias by 1.5V to compensate leakage current

#Run 187, pulser on IC 0.1V @243 for 1st minute

no Si detector

#Run 188

#Run 189 same with Run 187.

#Run 190

#Run 191

#Run 192

#Run 193

#Run 194

#Run 195

#Run 196

#Run 197

300torr → 150torr ; S_2 put back in

Leakage current: dE 0.06 E 0.45

voltage: dE 46 E 305

#Run 198 N_6 TOC data

#Run 199 torr pressure at 150 torr

200

201 no gas in IC

202 added isobutane at 300 torr

leakage current dE : 0.06

E : 0.47

with gas IC pressure is 1.6×10^{-1} torr

Run

#203 Removed Si
pump 300 torr iso

#207 pulser ramp of IC
0 ... 0.45 V w/ 19 steps
0, 0.025, 0.05, ...

#208 ~~Si dE~~ pulser ramp
junk

#208 Si dE pulser ramp
0 ... 10 V w/ 21 steps
0, 0.5, ..., 10

#209 Si E pulser ramp
0 ... 10 V w/ 21 steps

Run# ~~212~~ 211 Ge with ^{125}Sb source.
triger: Ge

Run# ~~213~~ 212: Ge with background
Adam unplugged the ADC
ribbon cable so last Run min
back

run 213 Ge Background

run 215 Ge background

run 216 Ge background