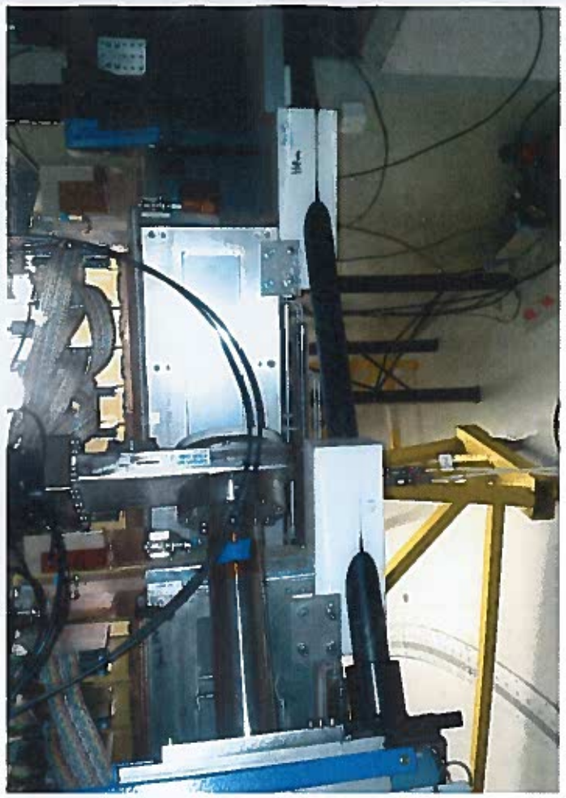
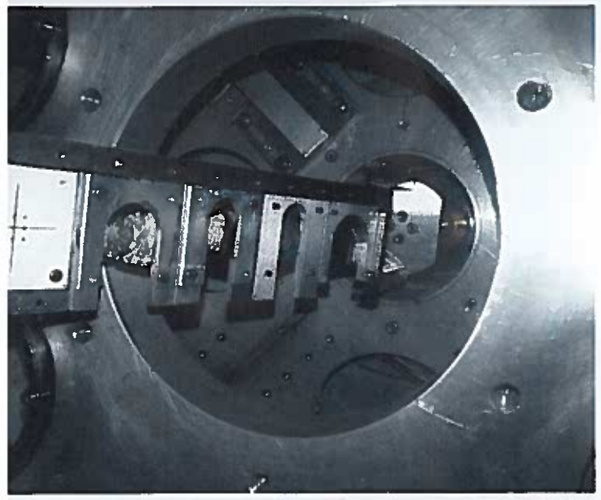
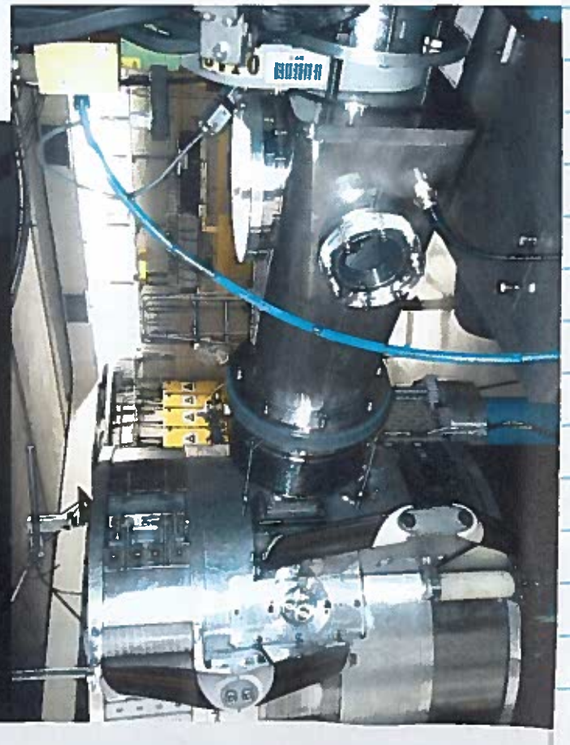
K600 @ 4°

Small angle mode.







Date	17 April 2015
Weekend #	4

Targets	#	Material	Thickness	Thickness measurement method
	1	Empty		
	2	Viewer		
	3	^{24}Mg	~0.23 mg cm^{-2}	
	4	Ni	0.7 mg cm^{-2}	
	5	Pb	~1 mg cm^{-2}	
	6	Zr	0.9 mg cm^{-2}	
	Target perpendicular to beam [°]		−11°	
	Target perpendicular to camera [°]		−13°	

Additional Notes: K600 @ 4°

Beam	Energy [MeV]		
	Pulse selection (yes/no)		
	Injector (SPC1 or SPC2)		
	SSC Transmission	FC 19J	
		FC 1X	
		FC 11X	
		FC 4P	
		FC 4S	
		FC Target	

Additional Notes:

Not needed

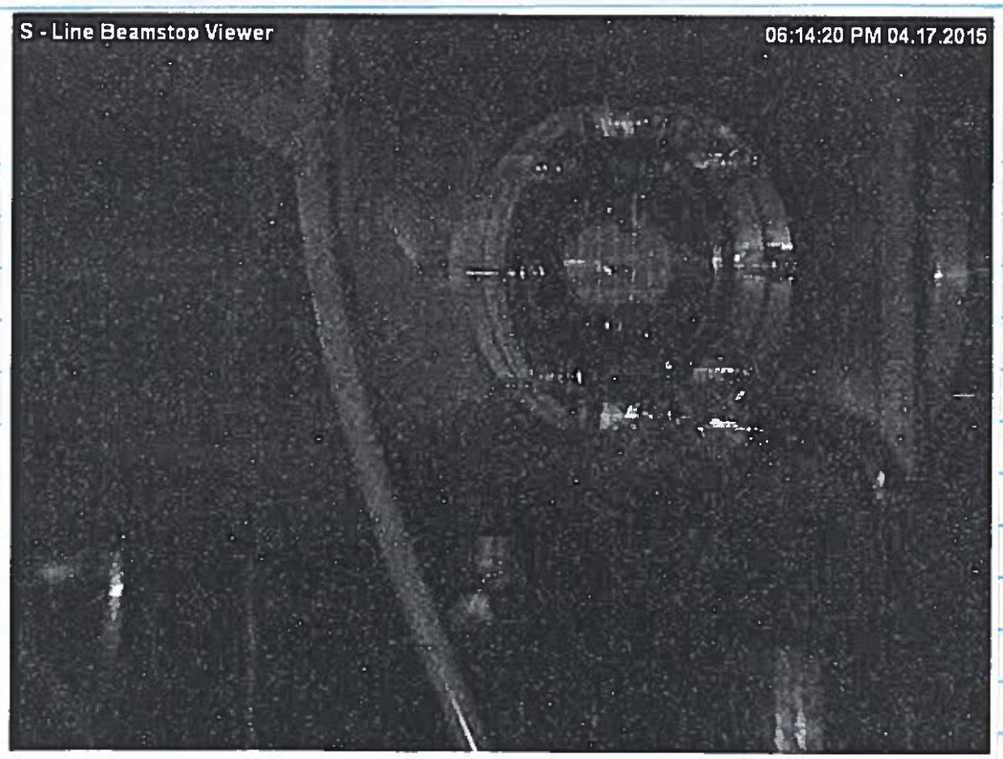
~~Scattering chamber beamstop~~	~~In beam position~~	
	~~Out of beam position~~	

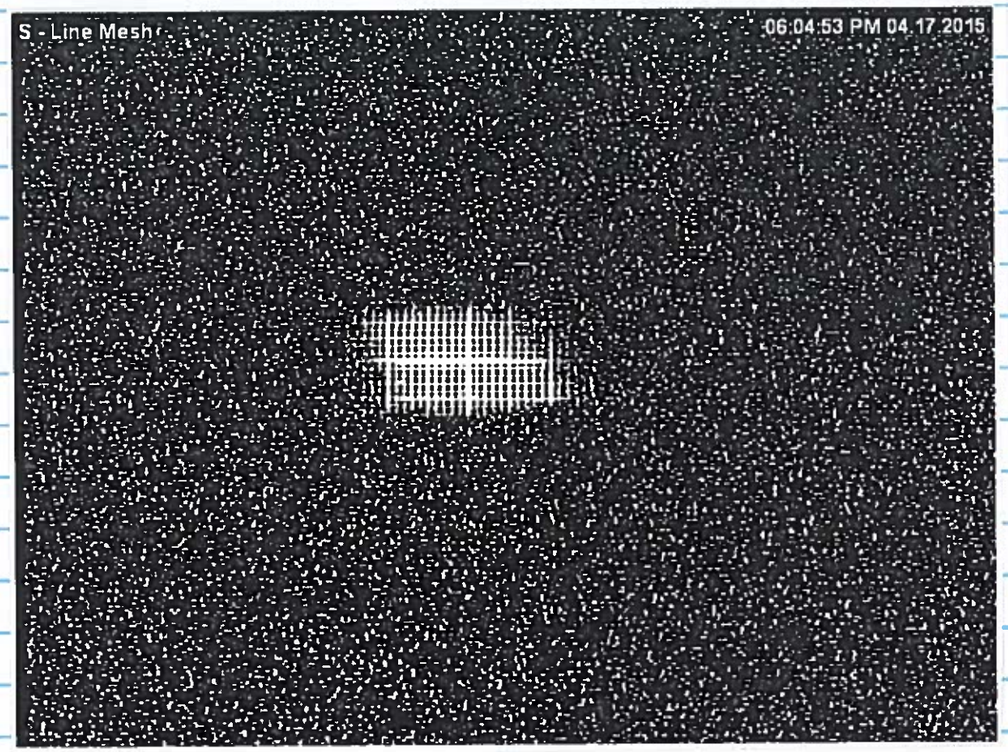
Additional Notes:

Same detector setup as during wEL-3

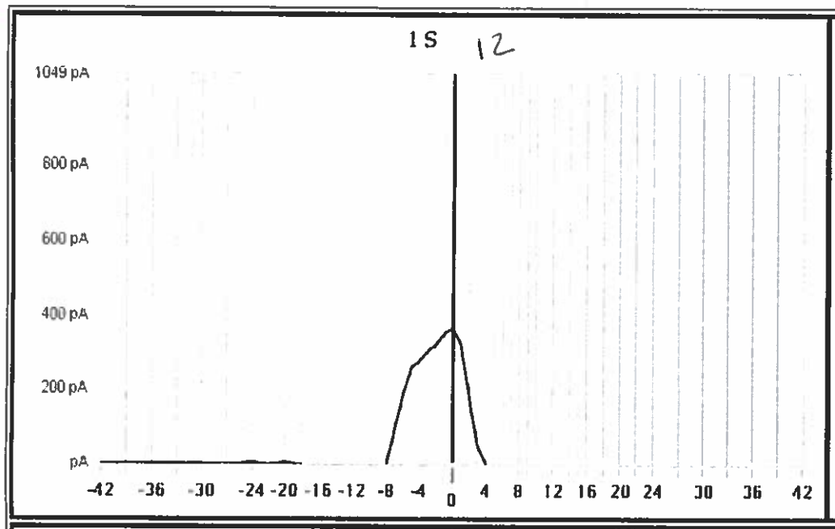
Energie_NMR.txt

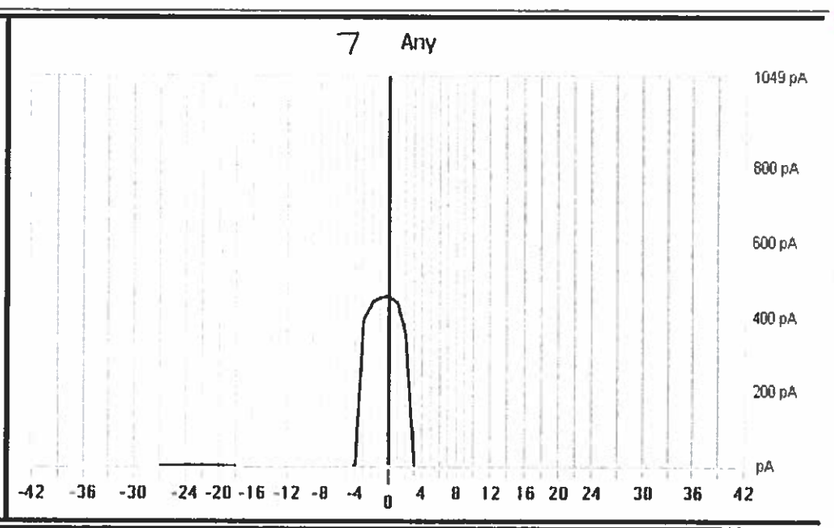
```
    ** EnMet Ver5.7 Oct 2013 **

    ** BEREKENDE ENERGIE **** CALCULATED ENERGY **        2015/04/17

Versnelde deeltjie        Accelerated particle :
  Element                                    = He
  Atoomgetal            = Atomic Number      = 2
  Massagetal            = Mass Number        = 4
  Rel. Atoommassa       = Rel. Atomic Mass   = 4.0026
  Natuurlike voorkoms   = Natural Abundance  = 100 %
  Ladingsgetal Q        = Charge State Q     = 2

              1 Tesla = 42.5759 MHz    [Linear Relation]

-------------------------------------------------------------

BEAM ENERGY FROM NMR-READING/S (frequency) :


-------------------------------------------------------------


BEAM ENERGY FROM NMR-READING/S (field):

  B3P Beam Energy = 196.03 MeV from NMR = 1.02128 Tesla

-------------------------------------------------------------
```

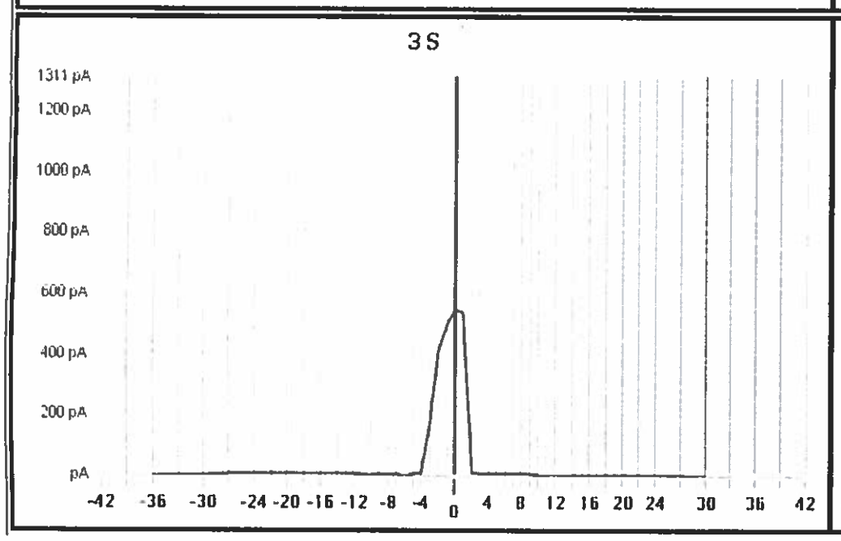


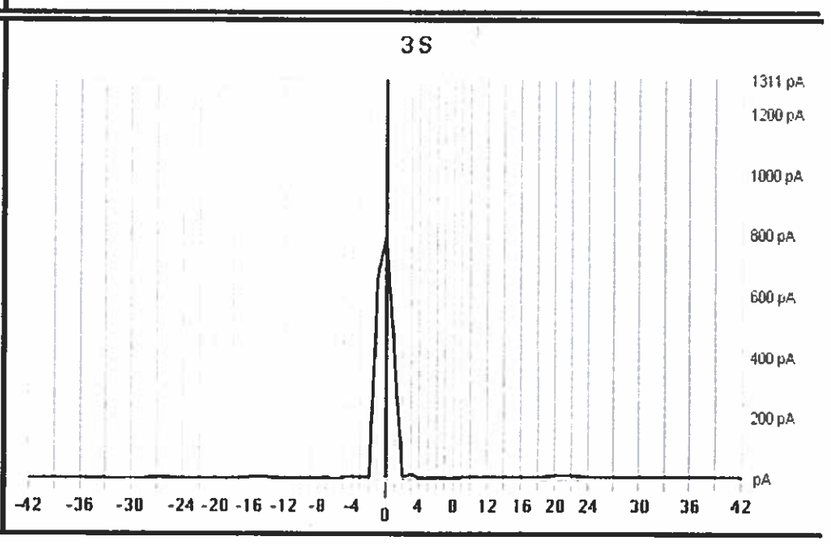


Profile Print : 17 April 2015 : 17:14:58



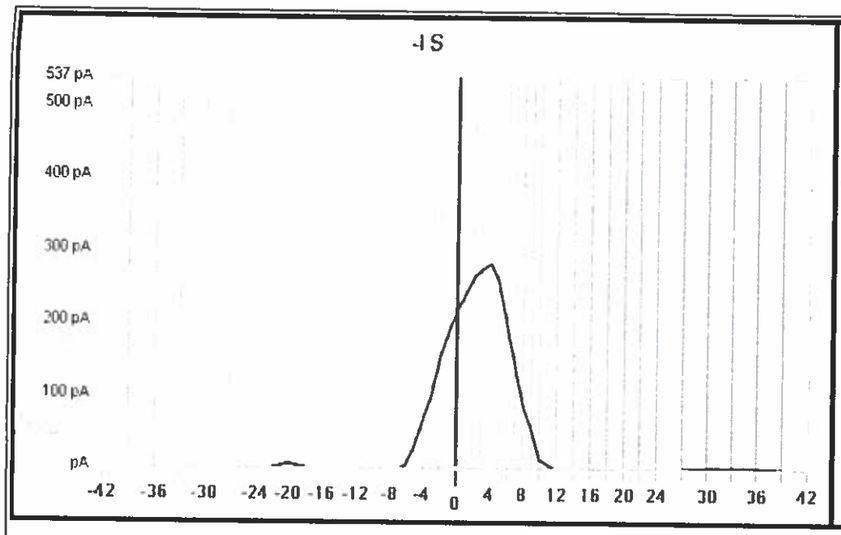


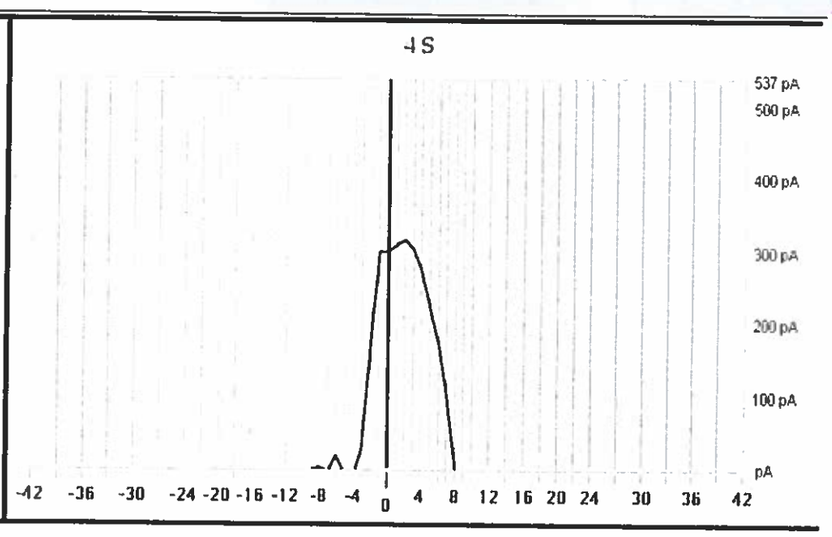




6 4

Profile Print : 17 April 2015 : 17:16:15





16 11

x 4,87 mm rad

y 1,79 mm rad

Kbou fields (set field mode)

Q	-454.175
P1	412.8
H	-2.833
D2	271.008
K	2.833

Run 4000 Only paddles are on
See a thing note @ 1nA.
Go in to see why...
↳ discovered 1 ADC veto still in the general veto.

Run 4001 Halo check (switch on VDC during run)
24Hz @ 1nA.
Mmm too good to be true?

Run 4002 ^{24}Mg
Rates still very low
Pad thiP 1300
change to 1600
change to 1500.
QDC Raw_000 still looks inconsistent
QDC Raw_001 looks good.

Went in again. Small improvements on Linear for offsets.
Replaced lemo connector/board of PadThiP signal cable.

Run 4003 ^{24}Mg. stopped. FE crash.

Look. System check. No beam.

The problem is, for reference, that the QDC channel 0 is putting most events in the '0' bin. The signals look fine. Unsure if it's the QDC readout or something else.

↳ The crate was power-cycled and now we can see pulser signals in the QDC channels.

When our beam was put back (4005), got nothing in the QDCs.

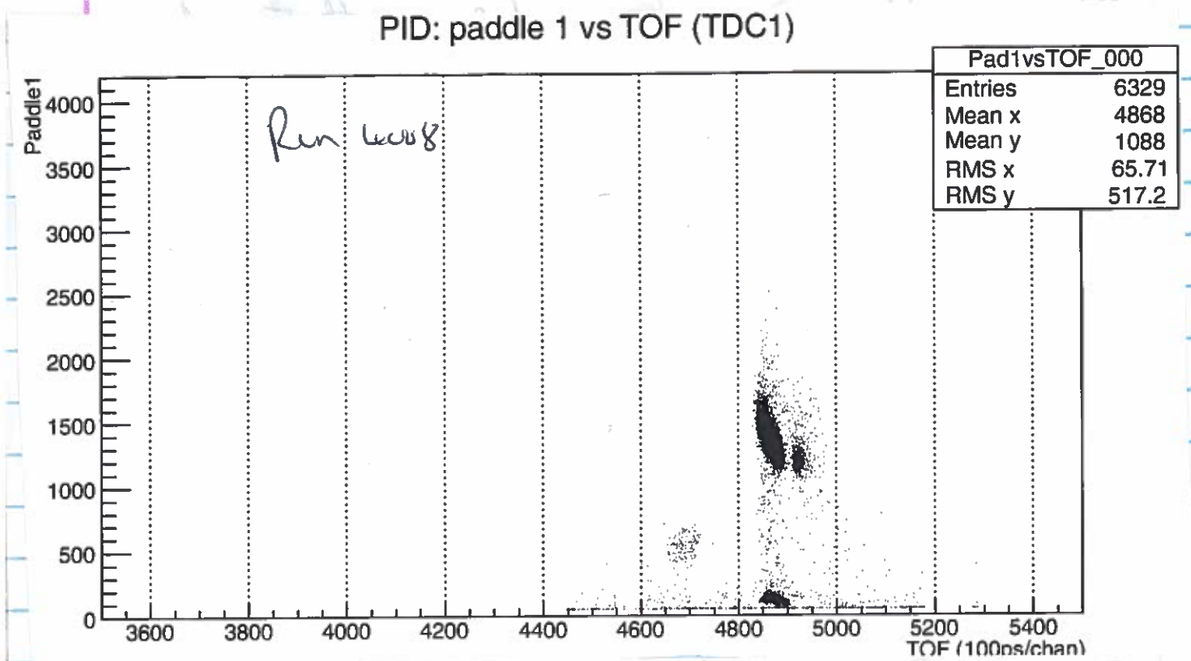
Run 4006 → Elastics mode. Nothing. Rate ~3-5Hz @ 1nA
Going to have another look.

Valve SV10 was not opened.
This was our problem.

Kbou field back to D1 = 412.8 A
Empty target.

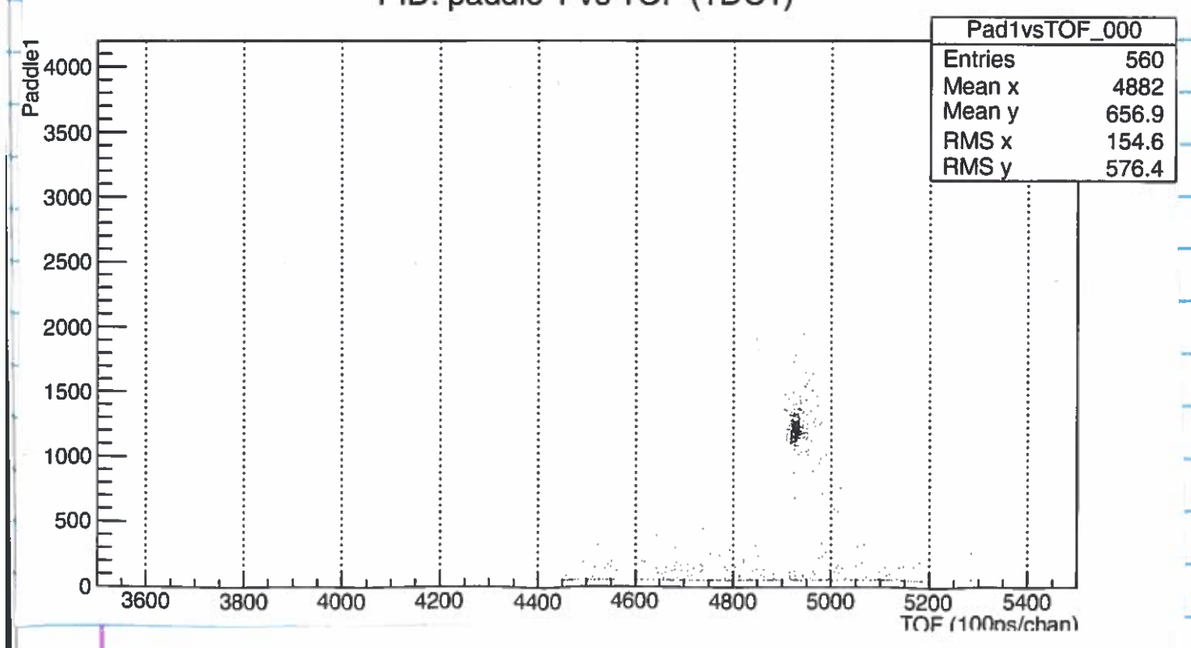
Run 4007 Empty target
1.4nA 8 Hz

Run 4008 ^{24}Mg 4 Hz @ 1.2 nA



Run 4009 Empty

9 Hz @ 1.2 nA



Go to D1 = 437.28

Run 4010 12 Hz Empty tgt.
Run 4011 ^{24}Mg 2900 Hz @ 1.2 nA
Run 4012 ^{24}Mg 1000 Hz @ 0.35 nA

'Faint' beam tune: 0.68 mm
52.5 ~~mm~~ keV
(Not faint beam, of course).
$\theta_{fp} \in [42, 43]$.

Q6S: 36.1 A
↓
36.2 A

Run 4013 σ: 0.68 mm About the same

Q6S → 36.0 A.

Run 4014. σ: 0.77 mm Much worse.

Q6S → 36.3 A
Run 4015. σ: 0.59 mm. Much better...
Q6S → 36.5 A
Run 4016. σ: 0.53 mm
Q6S → 36.7 A
Run 4017. σ: 0.50 mm
Q6S → 36.9 A
Run 4018 σ: 0.56 mm
Q6S → 36.8 A.

Run 4019. σ: 0.51 mm
Q6S → 36.6 A
Run 4020. σ: 0.51 mm
Q6S → 36.7 A

Q6S = 36.7 A seems to have been our best so far.

σ: 0.51mm

Q5S now −55.4 A
Q5S → −55.5 A.

Run 40 22 σ: 0.53mm.

Q5S → −55.3 A.
Run 4033. σ: 0.52mm

Q5S → −55.4 A.
Changing 21P: ~~22.2~~ 29.25 A
4024 29.35 A → σ = 0,48

4025 29.45 A → σ = 0.47

4026 29.55 A → σ = 0.46 → 36 keV FWHM

Moving D1 back to 412.8

Run comment: Halo
Run #: 4027
Start: 22:11
Stop: 22:17
Target: MT #1
Target angle: −118°
Current: 1 nA
CI Range: 6n
Collimator: 40 mode
Trigger rate: 8 Hz
Data rate: 3 kB/s
Trigger evts: —
Scaler evts: —
K600 angle: 4 deg
K600 field:
Q: −454.175 A
D1: 412.800 A
H: −2.833 A
D2: 271.008 A
K: 412.833 A
VDC efficiency
X1 —
U1 —
X2 —
U2 —

Run comment: 24Mg
Run #: 4028
Start: 22:17
Stop: 23:06
Target: 24Mg #3
Target angle: −118°
Current: 1 nA
CI Range: 6n
Collimator: 40
Trigger rate: 40 Hz
Data rate: 15 kB/s
Trigger evts: —
Scaler evts: —
K600 angle: 4 deg
K600 field:
Q: S A
D1: 4 A
H: M A
D2: E A
K: A
VDC efficiency
X1 93
U1 94
X2 87
U2 93

Current increased to ~2.2 nA.
CI alarm now activated.

Rate dropped to 0. Frontend probably crashed. Maybe.

Restarted frontend.

Can't load the history in the drawer window.

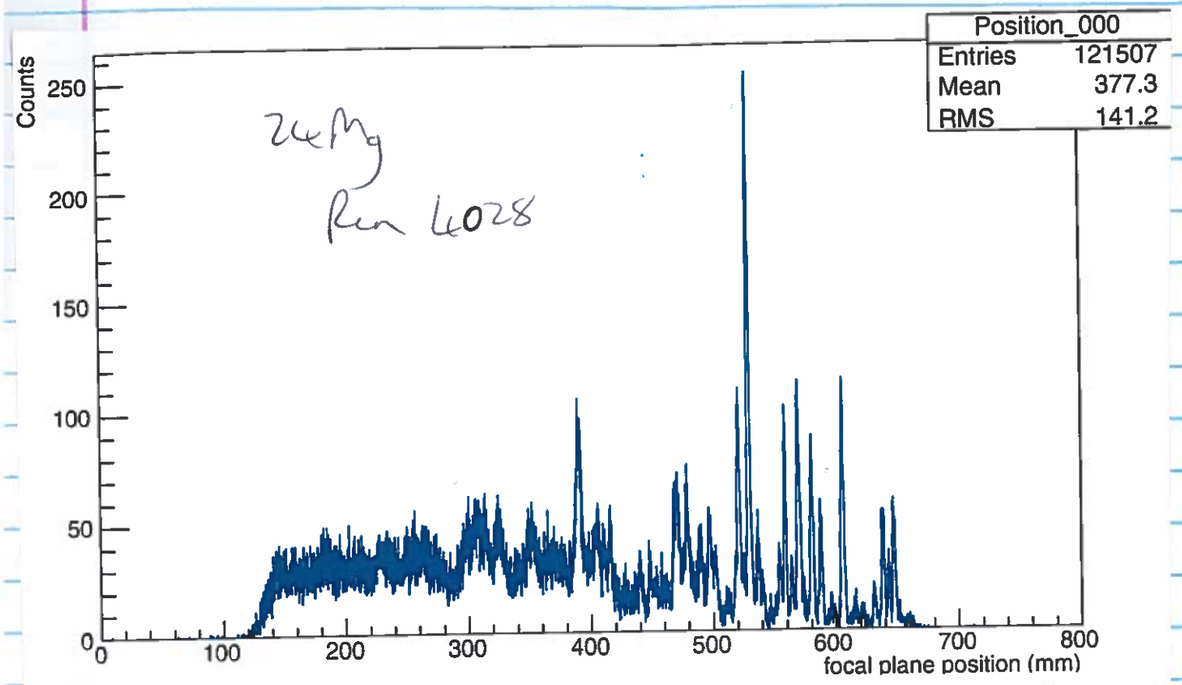
Run comment: 58Ni: data
Run #: 4029
Start:
Stop:
Target: 58Ni #4
Target angle: −1180
Current: nA
CI Range: 6n
Collimator: 40
Trigger rate: JUNK Hz
Data rate: kB/s
Trigger evts:
Scaler evts:
K600 angle: 4 deg
K600 field:
Q: S A
D1: A M A
H: E A
D2: A
K: A
VDC efficiency
X1
U1
X2
U2

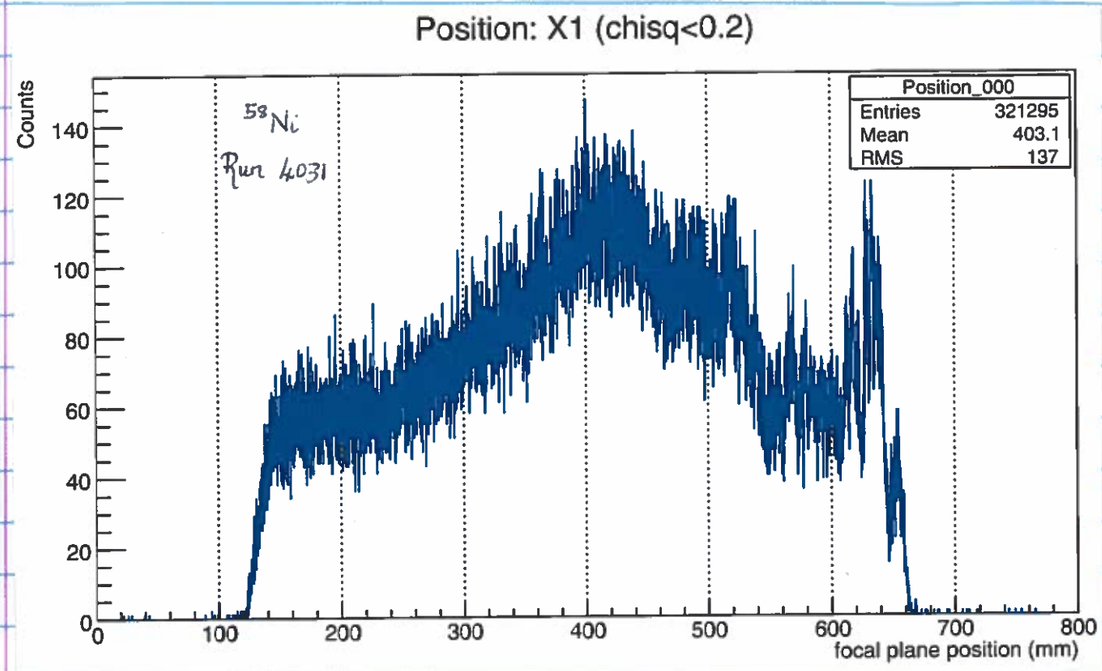
!Frontend error messages!

Rebooted vme1. + Restarted the frontend.

Run 4030: 58Ni for system check.

Run comment: ^{58}Ni:
Run #: 4031
Start: 23:28 Current: 2.9 nA Trigger rate: 160 Hz
Stop: 00:28 CI Range: 6n Data rate: 60 kB/s
Target: ^{58}Ni, #4 Collimator: 4mm Trigger evts: 504723
Target angle: −118° Scaler evts: 3542
K600 angle: 4 deg
K600 field:
Q: S A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 92.98
U1 94.39
X2 86.57
U2 91.88





Run comment: ^{58}Ni
Run #: 4035
Start: 02:24 Current: 1.8 nA Trigger rate: 116 Hz
Stop: 03:24 CI Range: 6 Data rate: 1 kB/s
Target: ^{58}Ni Collimator: Trigger evts: 466427
Target angle: −118° Scaler evts: 3488
K600 angle: 4 deg
K600 field:
Q: S A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 93.54
U1 94.39
X2 88.16
U2 92.74

Run comment: ^{90}Zr
Run #: 4032
Start: 00:30 Current: 2.9 nA Trigger rate: 112 Hz
Stop: 01:31 CI Range: 6 Data rate: 1 kB/s
Target: ^{90}Zr Collimator: Trigger evts: 428979
Target angle: −118° Scaler evts: 3524
K600 angle: 4 deg
K600 field:
Q: S A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 93.1
U1 94.29
X2 86.8
U2 92.2

Run comment: ^{90}Zr
Run #: 4036
Start: 03:26 Current: 2.1 nA Trigger rate: 93 Hz
Stop: 04:28 CI Range: 6nA Data rate: 38 kB/s
Target: ^{90}Zr Collimator: Trigger evts: 431584
Target angle: −118° Scaler evts: 3585
K600 angle: 4 deg
K600 field:
Q: S A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 92.94
U1 94.22
X2 87.71
U2 91.67

Run comment: ^{24}Mg
Run #: 4033
Start: 01:33 Current: 2.7 nA Trigger rate: 93 Hz
Stop: 02:59 CI Range: 6 Data rate: 1 kB/s
Target: ^{24}Mg Collimator: Trigger evts: 156202
Target angle: −118° Scaler evts: 1745
K600 angle: 4 deg
K600 field:
Q: S A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 93
U1 94
X2 88
U2 93

Run comment: ^{24}Mg
Run #: 4037
Start: 04:32 Current: 1.7 nA Trigger rate: 56 Hz
Stop: 05:02 CI Range: 6 Data rate: 1 kB/s
Target: ^{24}Mg Collimator: Trigger evts: 113991
Target angle: −118° Scaler evts: 1721
K600 angle: 4 deg
K600 field:
Q: S A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 93.51
U1 94.19
X2 88.4
U2 93.32

What's up with this?

Run comment: MT
Run #: 4034
Start: 00:00 Current: 2.2 nA Trigger rate: 10.6 Hz
Stop: 02:21 CI Range: 6nA Data rate: 4 kB/s
Target: MT Collimator: 4mm Trigger evts: 11670
Target angle: −118° Scaler evts: 834
K600 angle: 4 deg
K600 field:
Q: S A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 83.68
U1 83.44
X2 90.73
U2 0

VDC2 kept tripping – realised viewer was in instead of empty

Run comment: Empty
Run #: 4038
Start: 05:07 Current: 2.7 nA Trigger rate: 12 Hz
Stop: 05:22 CI Range: 6 Data rate: 1 kB/s
Target: Empty Collimator: Trigger evts:
Target angle: −118° Scaler evts:
K600 angle: 4 deg
K600 field:
Q: S A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 0
U1 0
X2 0
U2 0

next page

Notice that the analyzer hasn't really been taking data. There was an event rate as usual but when the spectrum was plotted, nothing was shown (Entries: 0). We noticed it when we looked at the efficiencies (all 0). Restart the analyser. Doesn't work :/ Decide to phone Phil - he explained that the reason we see nothing is because there is nothing (spectra are much cleaner at 4°) to see as a result of the gates. He asked to have ^{208}Pb put in as a quick check (run 4041) ... all is ok! :) Back to business as usual: You're welcome.

Run 4041: ^{208}Pb system check.

Run comment: ^{58}Ni | K600 angle: 4 deg | K600 field:

Run #: 4042
Start: 05:47 | Current: 2.5 nA | Trigger rate: 92 Hz | Q: 5 A | VDC efficiency
Stop: 06:47 | CI Range: 6 | Data rate: 1 kB/s | D1: A A | X1 93.02
Target: ^{58}Ni | Collimator: | Trigger evts: 466655 | H: M A | U1 94.22
Target angle: -118° | Scaler evts: 3495 | D2: E A | X2 88.16
K: A | U2 91.95

Run comment: ^{90}Zr | K600 angle: 4 deg | K600 field:

Run #: 4043
Start: 06:49 | Current: 3.2 nA | Trigger rate: 124 Hz | Q: 5 A | VDC efficiency
Stop: 07:54 | CI Range: 6 | Data rate: 1 kB/s | D1: A A | X1 93.62
Target: ^{90}Zr | Collimator: | Trigger evts: 416455 | H: M A | U1 94.28
Target angle: -118° | Scaler evts: 3796 | D2: E A | X2 87.17
K: A | U2 91.79

Run comment: ^{24}Mg | K600 angle: 4 deg | K600 field:

Run #: 4044
Start: 07:56 | Current: 2.2 nA | Trigger rate: 72 Hz | Q: 5 A | VDC efficiency
Stop: 08:26 | CI Range: 6 | Data rate: 1 kB/s | D1: A A | X1 93.59
Target: ^{24}Mg | Collimator: | Trigger evts: 126522 | H: M A | U1 94.11
Target angle: -118° | Scaler evts: 1730 | D2: E A | X2 88.31
K: A | U2 93.06

VDC2 tripped 6 mins into run 4044.

Run comment: EMPTY | K600 angle: 4 deg | K600 field:

Run #: 4045
Start: 08:29 | Current: 1.9 nA | Trigger rate: 9.2 Hz | Q: A | VDC efficiency
Stop: 08:44 | CI Range: 6 | Data rate: 3 kB/s | D1: 5A A | X1 0
Target: EMPTY | Collimator: | Trigger evts: 7495 | H: M A | U1 0
Target angle: -118° | Scaler evts: 850 | D2: E A | X2 0
K: A | U2 0

Run comment: ^{58}Ni | K600 angle: 4 deg | K600 field: Q: A, D1: 8 A, H: A A, D2: M A, K: E A

Run #: 4046
Start: 08:47 | Current: 2.9 nA | Trigger rate: 162 Hz | VDC efficiency
Stop: 09:29 | CI Range: 6 | Data rate: 75 kB/s | X1 92.92
Target: ^{58}Ni | Collimator: | Trigger evts: 34628 | U1 94.20
Target angle: -118° | Scaler evts: 2469 | X2 87.80
U2 90.62

VDC2 tripped (8:50)

SPC2 RF tripped => we stopped the run (9:29)

10:05 Beam in back (RF tripped due to insufficient cooling) 5 fixed yesterday + data taking

Run comment: ^{58}Ni | K600 angle: 4 deg | K600 field: Q: 5 A, D1: A A, H: M A, D2: E A, K: A

Run #: 4047
Start: 10:05 | Current: 2.5 nA | Trigger rate: 124 Hz | VDC efficiency
Stop: 10:28 | CI Range: 6 | Data rate: 51 kB/s | X1 92.8
Target: ^{58}Ni | Collimator: | Trigger evts: 242756 | U1 94.2
Target angle: -118° | Scaler evts: 1309 | X2 87.8
U2 90.6

Run comment: ^{90}Zr | K600 angle: 4 deg | K600 field: Q: 5 A, D1: A A, H: M A, D2: E A, K: A

Run #: 4048
Start: 10:30 | Current: 3.2 nA | Trigger rate: 122 Hz | VDC efficiency
Stop: 11:30 | CI Range: 6 | Data rate: 51 kB/s | X1 93.2
Target: ^{90}Zr | Collimator: | Trigger evts: 467328 | U1 93.9
Target angle: -118° | Scaler evts: 3493 | X2 88.1
U2 91.4

Run comment: ^{24}Mg Check | K600 angle: 4 deg | K600 field: Q: 5 A, D1: A A, H: M A, D2: E A, K: A

Run #: 4049
Start: 11:33 | Current: 2.2 nA | Trigger rate: 77.7 Hz | VDC efficiency
Stop: 12:07 | CI Range: 6 | Data rate: 30 kB/s | X1 93.6
Target: ^{24}Mg | Collimator: | Trigger evts: 191307 | U1 94.4
Target angle: -118° | Scaler evts: 1953 | X2 89.3
U2 92.4

Relative heights look very much the same so resolution may be slightly worse or the same

Run comment: ~~^{90}Zr~~ Empty target run | K600 angle: 4 deg | K600 field: Q: 5 A, D1: A A, H: A A, D2: M A, K: E A

Run #: 4050
Start: 12:10 | Current: 3.0 nA | Trigger rate: 19.4 Hz | VDC efficiency
Stop: 12:25 | CI Range: 6 | Data rate: 7 kB/s | X1
Target: MT Frame | Collimator: | Trigger evts: 16007 | U1
Target angle: -118.0 | Scaler evts: 834 | X2
U2

Run comment: 58Ni data run — K600 angle: 4 deg — K600 field:
Run #: 4051
Start: 12h27 — Current: 2.4 nA — Trigger rate: 118.5 Hz
Stop: 13h33 — CI Range: 6 — Data rate: 44.5 kB/s
Target: 58Ni — Collimator: — Trigger evts: 592136
Target angle: −118.0 — Scaler evts: 3813
Q: 5 A — D1: A A — H: M A — D2: — A — K: E A
VDC efficiency: X1 93.6 — U1 94.2 — X2 89.0 — U2 91.8

Run comment: 90Zr data run — K600 angle: 4 deg — K600 field:
Run #: 4052
Start: 13h35 — Current: 3.4 nA — Trigger rate: 147 Hz
Stop: 14h36 — CI Range: 6 — Data rate: 58 kB/s
Target: 90Zr — Collimator: — Trigger evts: 449450
Target angle: −118.0 — Scaler evts: 3544
Q: 5 A — D1: A A — H: M A — D2: — A — K: E A
VDC efficiency: X1 92.8 — U1 94.3 — X2 88.3 — U2 91.26

Run comment: 24Mg Calib., Resol. — K600 angle: 4 deg — K600 field:
Run #: 4053
Start: 14h38 — Current: 3.2 nA — Trigger rate: 110 Hz
Stop: ? — CI Range: — Data rate: 45 kB/s
Target: 24Mg — Collimator: — Trigger evts: 182357
Target angle: −118.0 — Scaler evts: 1740
Q: 5 A — D1: A A — H: M A — D2: — A — K: E A
VDC efficiency: X1 93.4 — U1 94.3 — X2 89. — U2 92.2

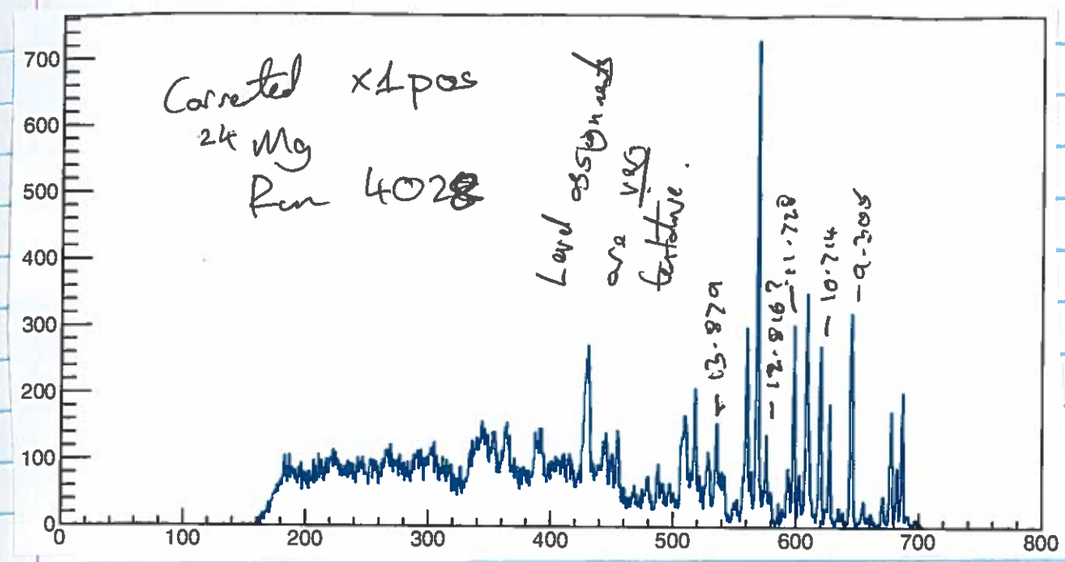
VDC2 trip in this run after 10 min

Run comment: Empty — K600 angle: 4 deg — K600 field:
Run #: 4054
Start: 15h10 — Current: 3.0 nA — Trigger rate: 20 Hz
Stop: 15h25 — CI Range: 6 — Data rate: 8 kB/s
Target: MT — Collimator: — Trigger evts: —
Target angle: −118.0 — Scaler evts: —
Q: 5 A — D1: A A — H: M A — D2: — A — K: E A
VDC efficiency: X1 — U1 — X2 — U2

Run comment: 58Ni — K600 angle: 4 deg — K600 field:
Run #: 4055
Start: 15h27 — Current: 2.9 nA — Trigger rate: 138 Hz
Stop: 16:32 — CI Range: 6 — Data rate: 58 kB/s
Target: 58Ni — Collimator: 40 mode — Trigger evts: 549589
Target angle: −118.0 — Scaler evts: 3764
Q: 5 A — D1: A A — H: M A — D2: E A — K: — A
VDC efficiency: X1 93 — U1 94 — X2 89 — U2 91

Run comment: 90Zr — K600 angle: 4 deg — K600 field:
Run #: 4056
Start: 16:36 — Current: 2.8 nA — Trigger rate: 120 Hz
Stop: 17:21 — CI Range: 6n — Data rate: 50 kB/s
Target: 90Zr, #6 — Collimator: 40 mode — Trigger evts: 296548
Target angle: −118° — Scaler evts: 2625
Q: 5 A — D1: A A — H: M A — D2: E A — K: — A
VDC efficiency: X1 93 — U1 94 — X2 89 — U2 92

Cup fell in.



Valve interlock caused JFC10 to fall in.

Closing to MT. Going to try boosting the beam current.

Going to ask for 6nA.

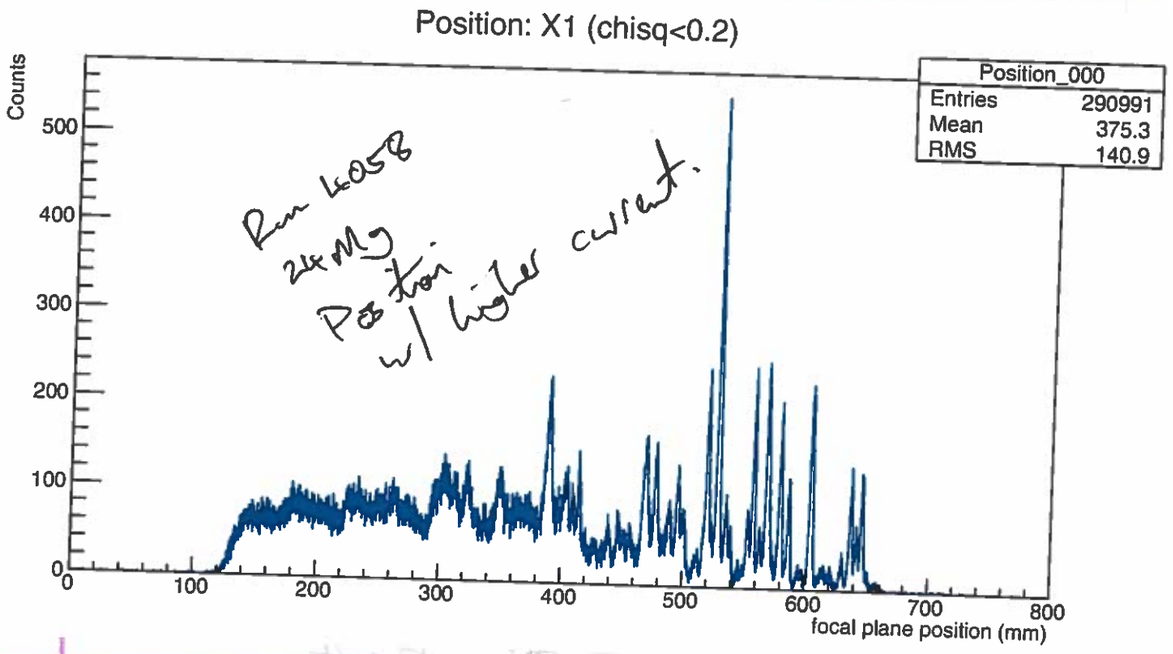
CI changed to 2×10^{-8} 20 nA

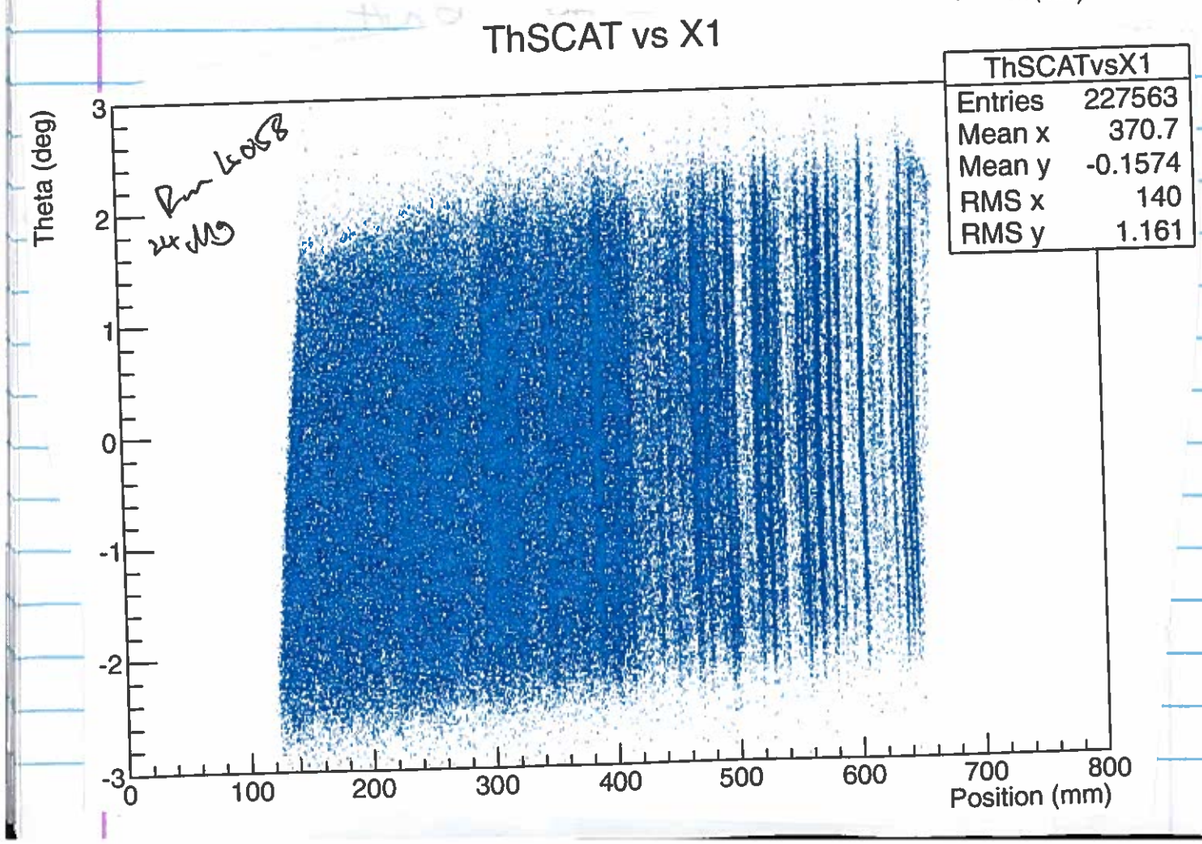
Charles had to adjust the SSC RF to get the current up to ~7 nA.

MT halo check first. CI Limits: 6nA 9nA

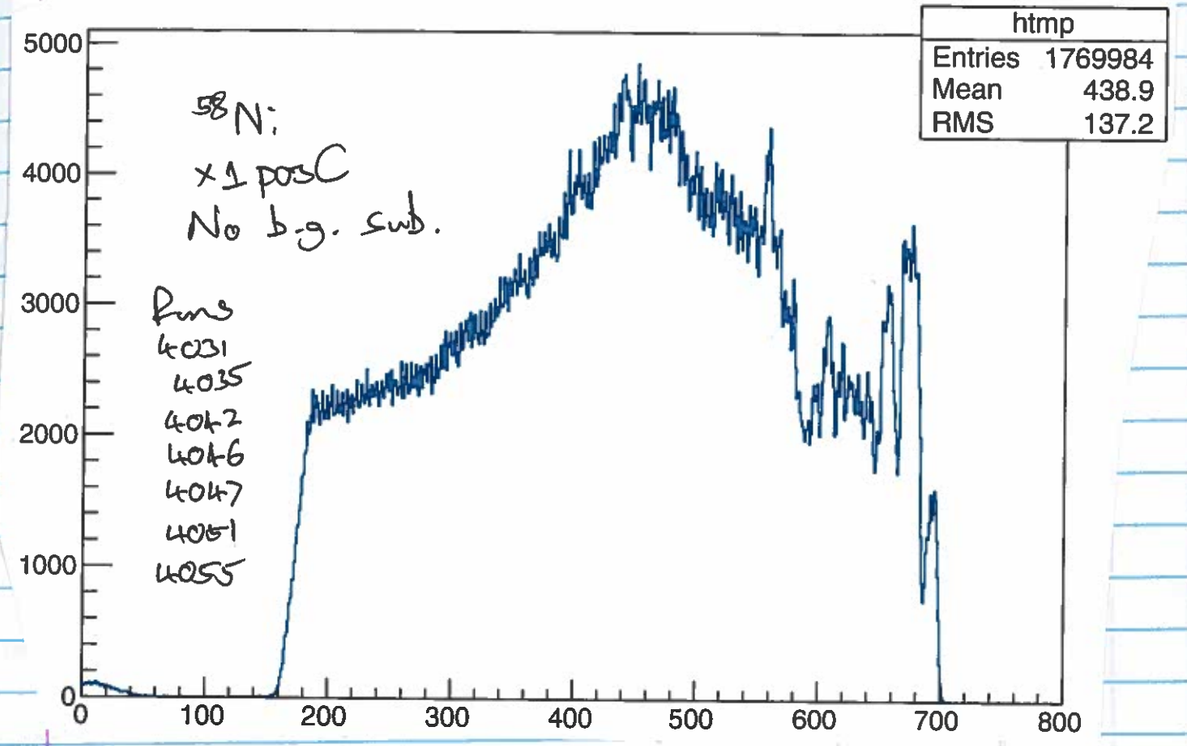
Run comment: MT halo check — K600 angle: 4 deg — K600 field:
Run #: 4057
Start: 17:33 — Current: 7 nA — Trigger rate: 50 Hz
Stop: 17:40 — CI Range: 20n — Data rate: — kB/s
Target: MT, #1 — Collimator: 40 mode — Trigger evts: —
Target angle: −118° — Scaler evts: —
Q: 5 A — D1: A A — H: M A — D2: E A — K: — A
VDC efficiency: X1 — U1 — X2 — U2

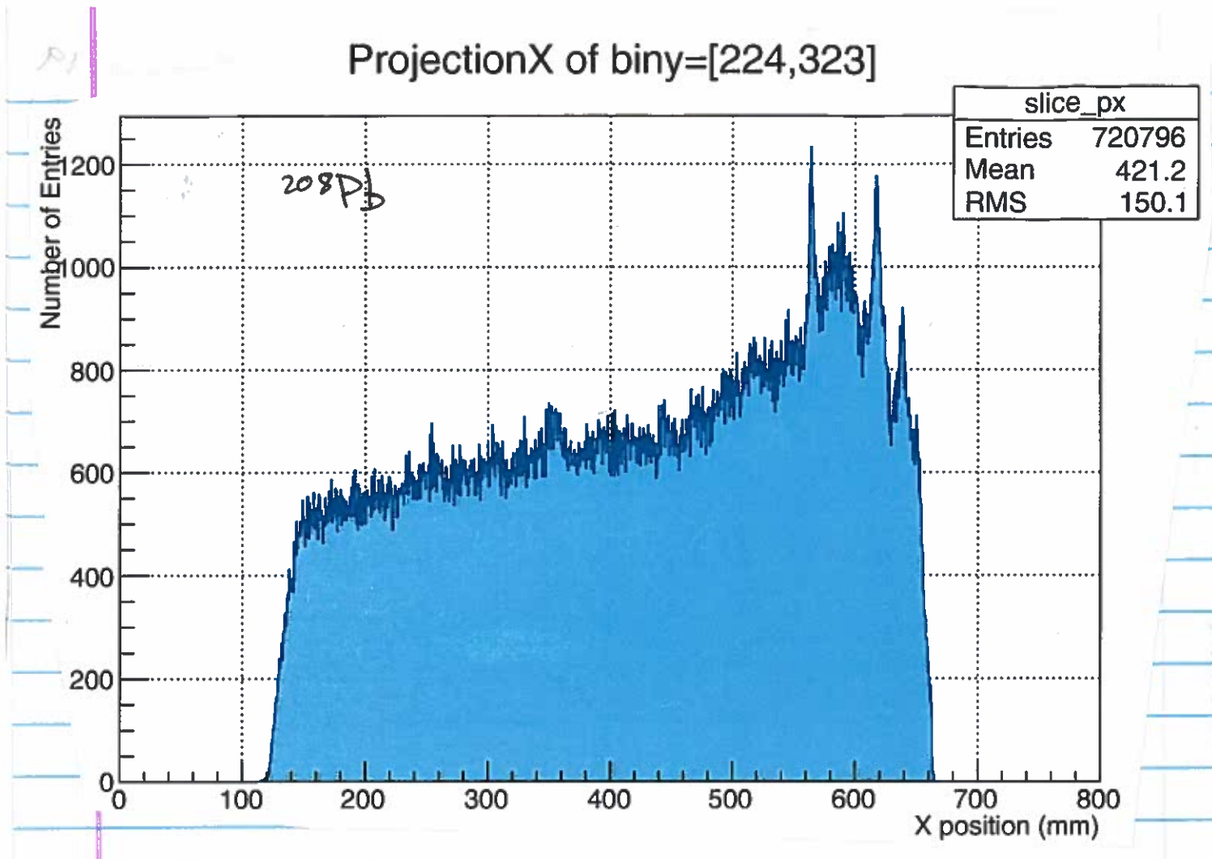
Run comment: ^{24}Mg, resolution check
Run #: 4058
Start: 17:42
Stop: 18:12
Target: ^{24}Mg
Target angle: -11.8°
Current: 7.2 nA
CI Range: 20nA
Collimator: 40 mole
Trigger rate: 250 Hz
Data rate: 110 kB/s
Trigger evts: 479472
Scaler evts: 1770
K600 angle: 4 deg
K600 field:
Q: 5 A
D1: 4 A
H: M A
D2: E A
K: A
VDC efficiency
X1 93
U1 94
X2 88
U2 90





Run comment: ^{208}Pb data run
Run #: 4059
Start: 19:16
Stop: 19:15
Target: ^{208}Pb
Target angle: -11.8°
Current: 7 nA
CI Range: 20n
Collimator: 40 mole
Trigger rate: 505 Hz
Data rate: 209 kB/s
Trigger evts: 1.871M
Scaler evts: 3419
K600 angle: 4 deg
K600 field:
Q: 5 A
D1: A A
H: M E A
D2: A
K: A
VDC efficiency
X1 91.5
U1 94.2
X2 86.1
U2 87.1



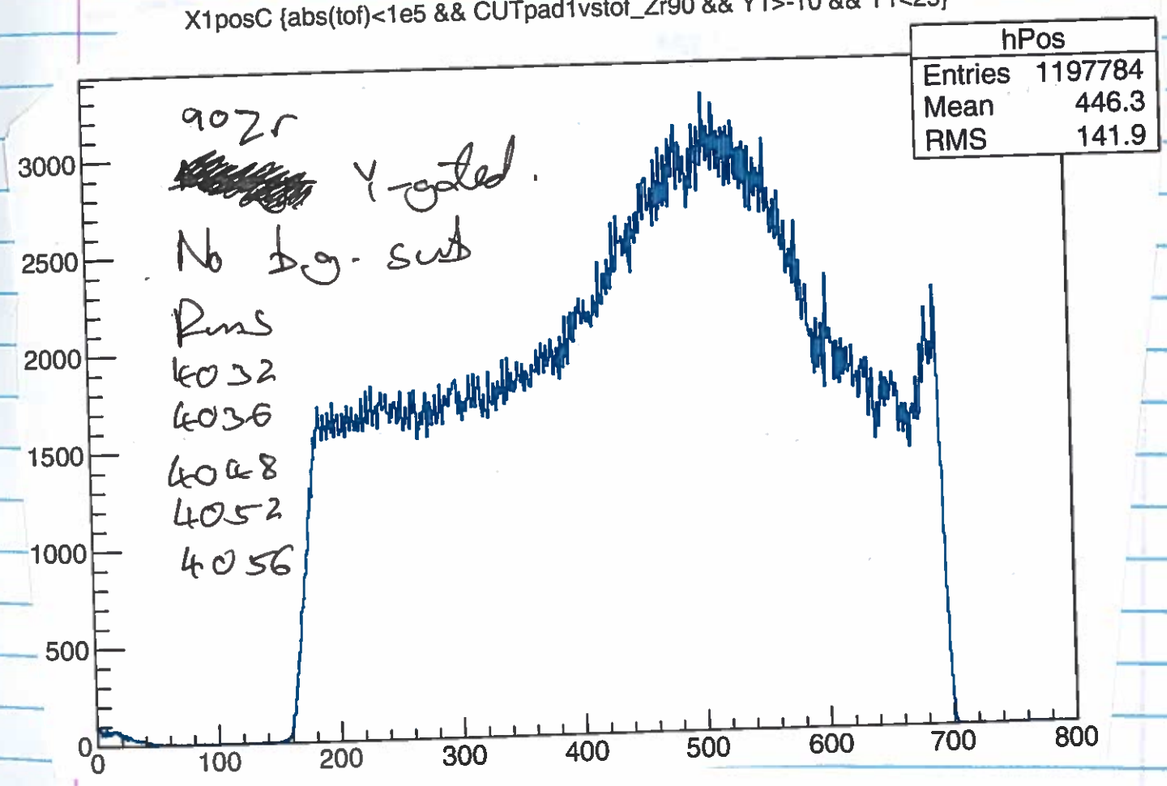


So, at the moment for ^{208}Pb, I think that the FP is missing most of the strength in ^{208}Pb. Going to try increasing the field after another couple of ^{58}Ni; ^{90}Zr runs.

Run comment: 58Ni: Data
Run #: 4059
Start: 19:19
Stop: 20:21
Target: 58Ni; #4
Target angle: −118°
Current: .8 nA
CI Range: 20n
Collimator: 4° mode
Trigger rate: 360 Hz
Data rate: 160 kB/s
Trigger evts: 1·233M
Scaler evts: 3662
K600 angle: 4 deg
K600 field:
Q: S A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 92
U1 94
X2 87
U2 89

Run comment: 90Zr Data
Run #: 4060
Start: 20:23
Stop: 21:12
Target: 90Zr, #6
Target angle: −118°
Current: .7 nA
CI Range: 20n
Collimator: 4° mode
Trigger rate: 300 Hz
Data rate: 120 kB/s
Trigger evts: 934203
Scaler evts: 2632
K600 angle: 4 deg
K600 field:
Q: S A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 92
U1 94
X2 87
U2 89

Cup fell in



Run comment: 24Mg Coin
Run #: 4061
Start: 21:22
Stop: 21:45
Target: 24Mg
Target angle: −18°
Current: 7.8 nA
CI Range: 20n
Collimator: 4° mode
Trigger rate: 290 Hz
Data rate: 120 kB/s
Trigger evts: 358911
Scaler evts: 1332
K600 angle: 4 deg
K600 field:
Q: S A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 92
U1 94
X2 88
U2 89