Experiment: PR 236

Date: 20/03/2015

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PR236

Fine structure of the Isoscalar Giant Monopole Resonance in ^{208}Pb, ^{90}Zr, ^{58}Ni and ^{40}Ca, using alpha scattering at zero degrees

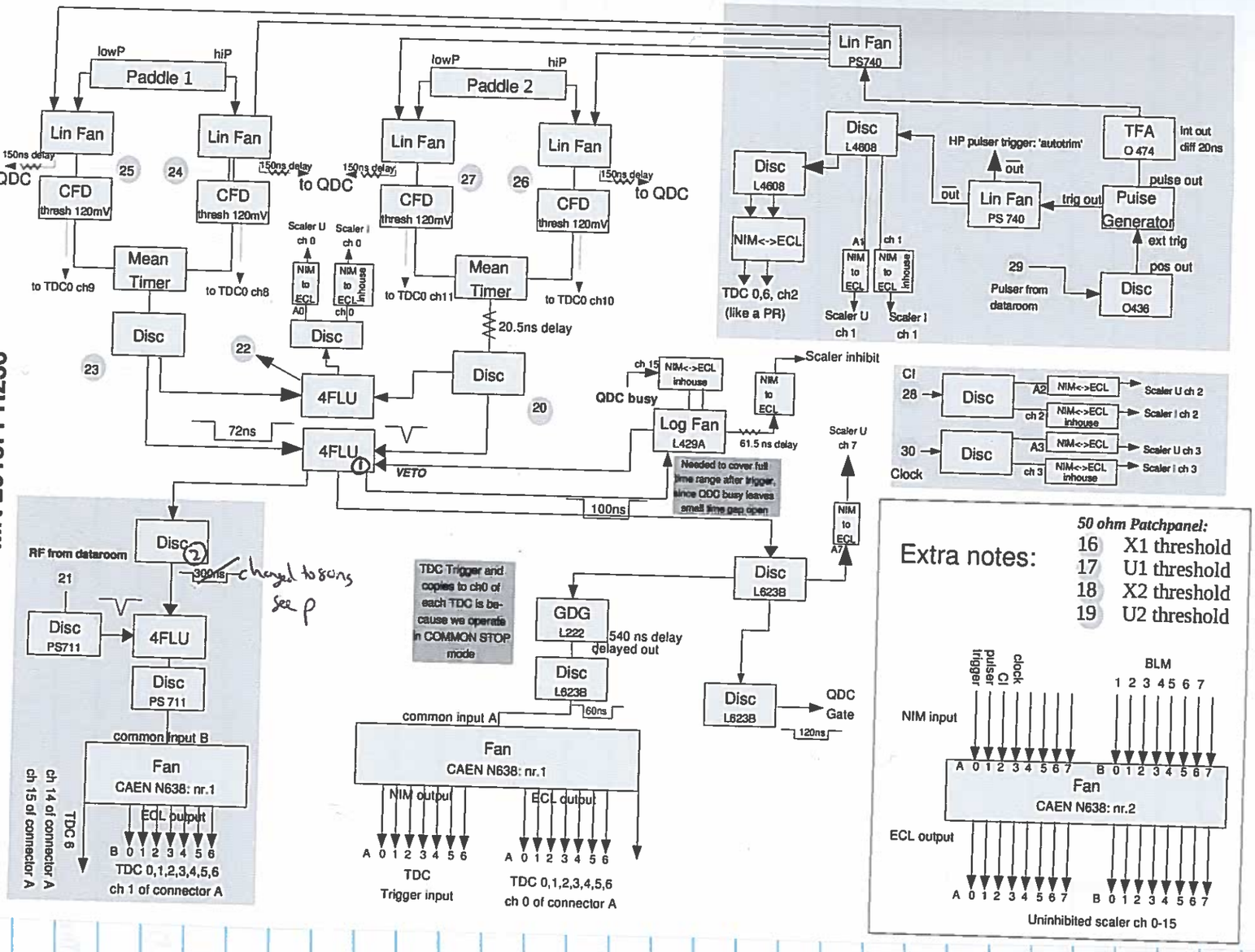
VDC_pulser test:

X1 - preamp 2 was not working.

Took it out and replaced.

Bad preamp: P-Tm 057 - 0608 - 0354

Mrt 2015: PR236



target ladder

Distance between VDC and Spectrometer exit window,
= 86,7 mm
↳ this is upon figure;

Distance upon pipe : 43,2 mm (See p2:A)
↳ between VDC1 and VDC2;

PCB board to superstructure : 80mm (p2:B)

Superstructure to VDC1 (aluminium frame) : 50 mm.
(p2:C)

20/03/2015

- First Week end (20th - 23rd March)

TARGETS LADDER

#1	Empty
2	Viewer
3	^{26}Mg
4	^{90}Zr
5	^{58}Ni
6	Mylar

→ ask Rudy (same as PR317?) ↗ 1.33 mg/cm² see email 13/03/2015

- TARGET THICKNESS → ^{58}Ni 0.7 mg/cm² confirmed with XRF

^{90}Zr 0.9 mg/cm² average

Mylar 200 µg/cm²

- Due to a problem with the HD Focal Plane we put the KAPTON WINDOW of Medium Dispersion Focal Plane

Note : Camera looking at VDC HV is on patchpanel #24

Date	20/03/2015
Week end #	1

Targets	#	Material	Thickness	Thickness measurement method
	1	EMPTY		
	2	VIEWER		
	3	^{26}Mg	1.33 mg/cm^2	See RN email 13 Feb 15 from Yuma.
	4	^{90}Zr	0.9 mg/cm^2	
	5	^{58}Ni	0.7 mg/cm^2	confirmed with XRF
	6	MYLAR	200 µm/cm^2	
	Target perpendicular to beam at [°]		-118°	
	Target to camera		-138°	

Additional Notes:

Beam			
	Energy [MeV]	200	
	Pulse selection (yes/no)	no	
	Injectot (SPC1 or SPC2)	SPC 2	
	SSC Transmission	FC 19J	
		FC 1X	
		FC 11X	
		FC 4P	
		FC 4S	
		FC Target	

Additional Notes:

Scattering chamber		
beamstop	In beam position	2051
	Out of beam position	~~2501~~ 2500

Additional Notes:

Detector Setup	Order of detectors	Detectors	Sketch
↓	VDC 1	X	Not from PR226 p 33 logbook 2
		Y	
	VDC 2	X	VDC1 HV = -2.99 in vault
		U	2 HV = -2.96 in vault
	Paddle 1	¼" new	
	Paddle 2	½" new	
Focal Plane (HD or MD)			HD
Kapton window (HD or MD)			HD without angle (see p9)

Additional Notes: trigger level: 2 (changed to 1 on p 16)

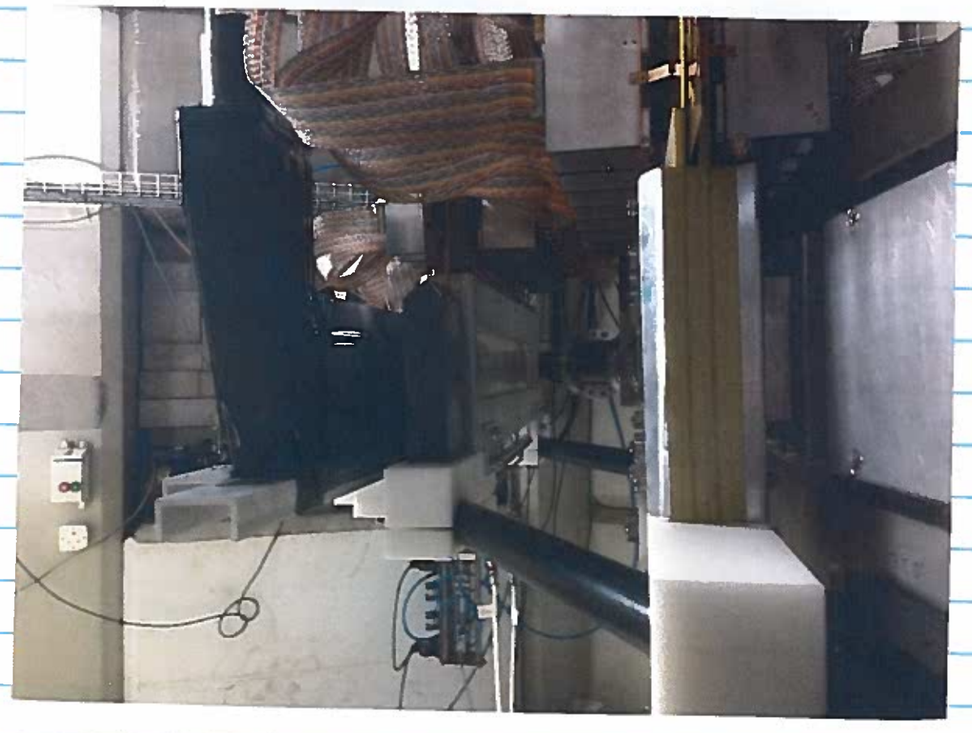
Collimator Carousel	#	In perspex	In beam
	1	49 Φ 11mm	NOTHING
	2	63 Φ	PEPPERPOT
	3	SOLID	49 Φ 11 mm
	4	42 Φ 8mm Td	63 Φ
	5	NOTHING	SOLID
	6	PEPPERPOT	42 Φ 8mm Td
		Configuration (not 0 deg/ =0 deg)	= 0 deg

Additional Notes:

Spectometer Parameters			
	Angle	± 0.05° (double check!)	
	Magnets settings	Q	-454.415
		D1	413.2
		H	-2.836
		D2	271.271
		K	2.836
	Superknob settings	Dipole 1	413.2
		D1/D2	1.5232
		D1/Q	-0.9089
		D1/K	165.6912
		D1/H	-165.6912
	SP Interlock control (Enable/ Disable)		Enabled

Additional Notes:

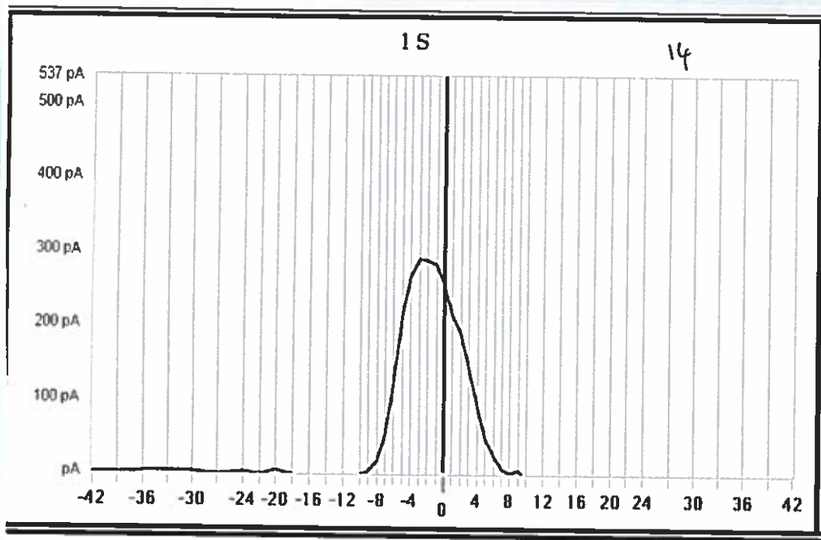
Focal plane setup.

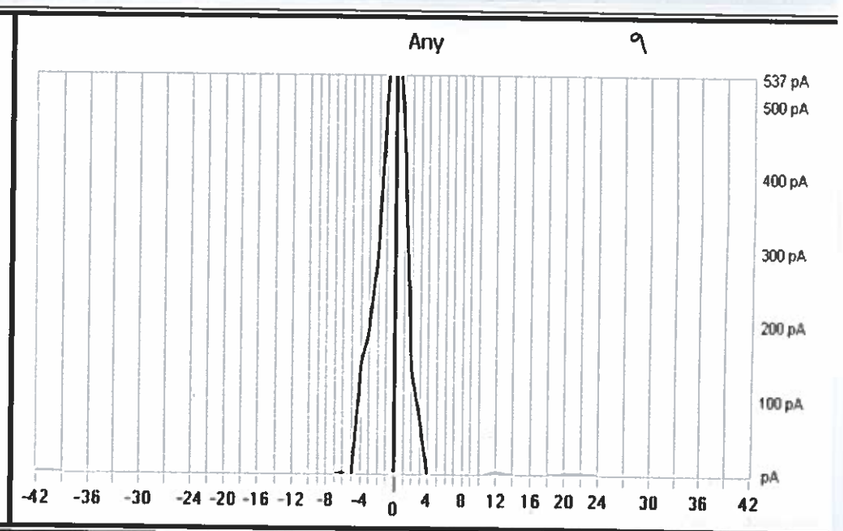


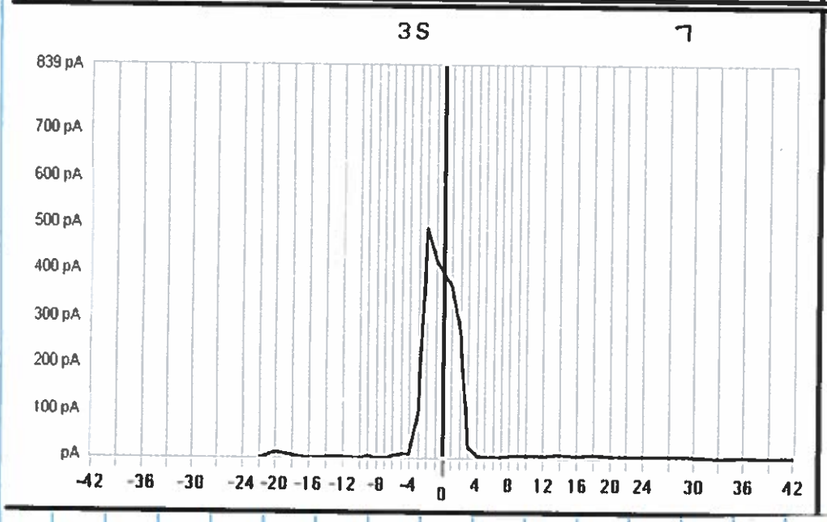
High dispersion focal plane Kapton window

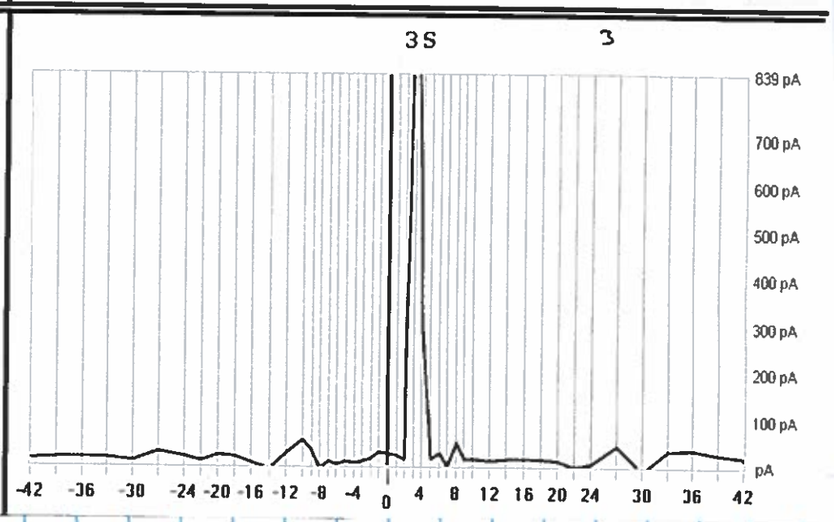
Note that the one that allows access to the lamp region was leaking. That is why we replaced it with the old Kapton window.

Profile Print : 20 March 2015 : 12:26:47

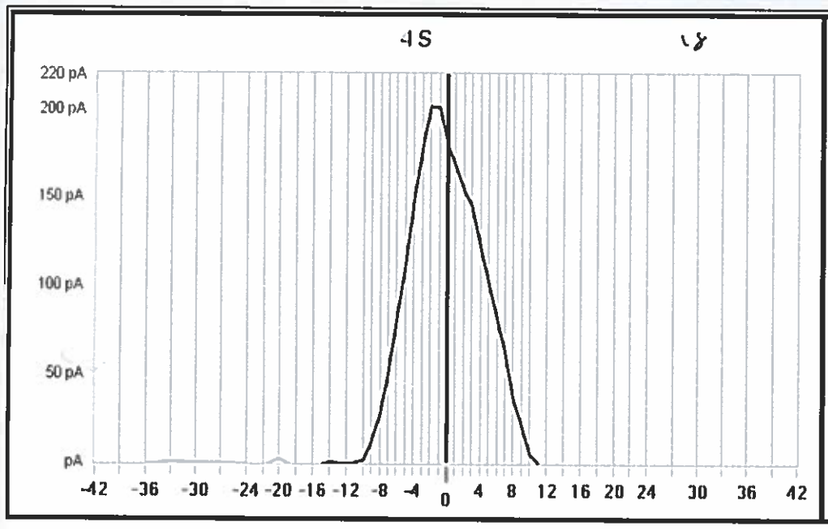


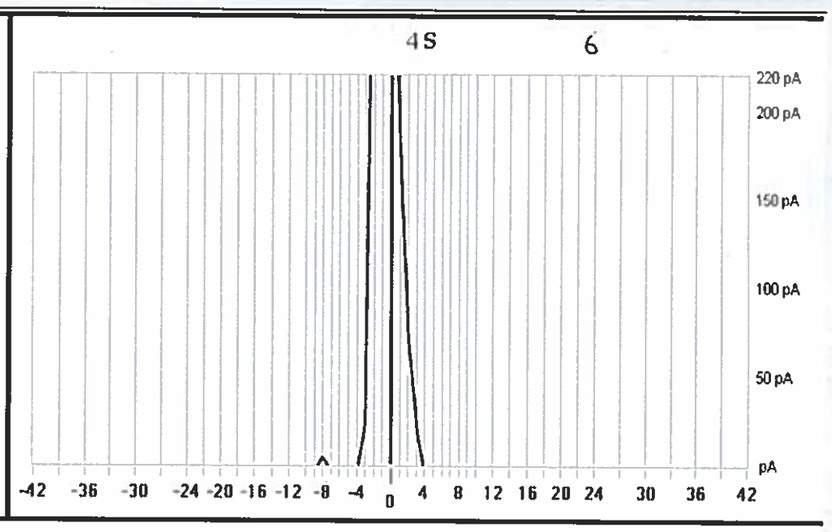






Profile Print : 20 March 2015 : 12:28:24



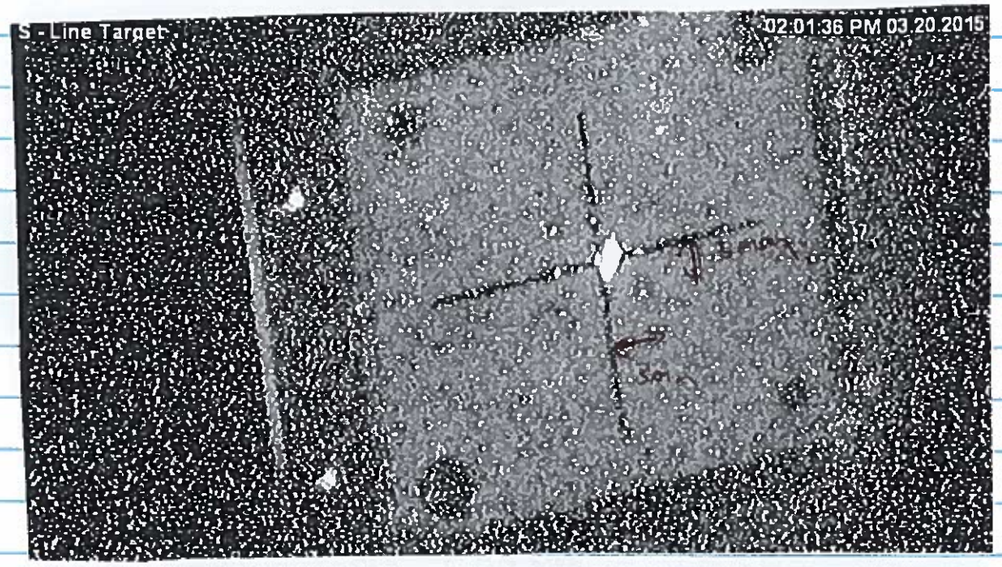


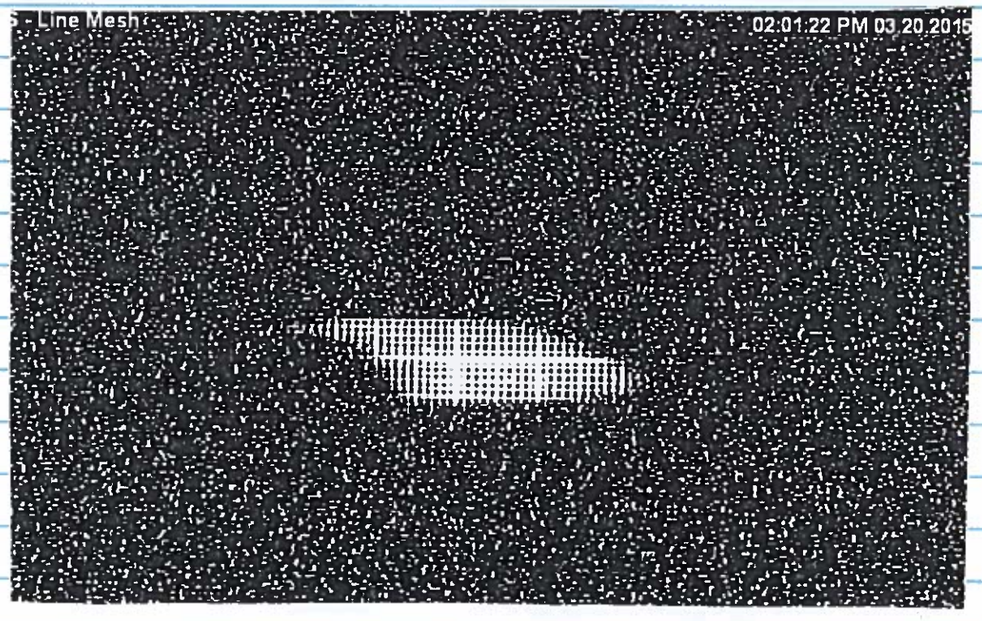
X: 6.68 π mm mrad

Y: 1.46 π mm mrad.

E_{beam} = 196.5 MeV

Beam on tgt: Friday 14:15





Energie_NMR.txt

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

** BEREKENDE ENERGIE **** CALCULATED ENERGY **        2015/03/20

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 = 196.45 MeV from NMR = 1.0224 Tesla

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

Fri 14:40 Cycle K600 fields to PR226 values

Q = 455.716
D1 = 414.2
H = -2.843
D2 = 271.928
K = 2.843

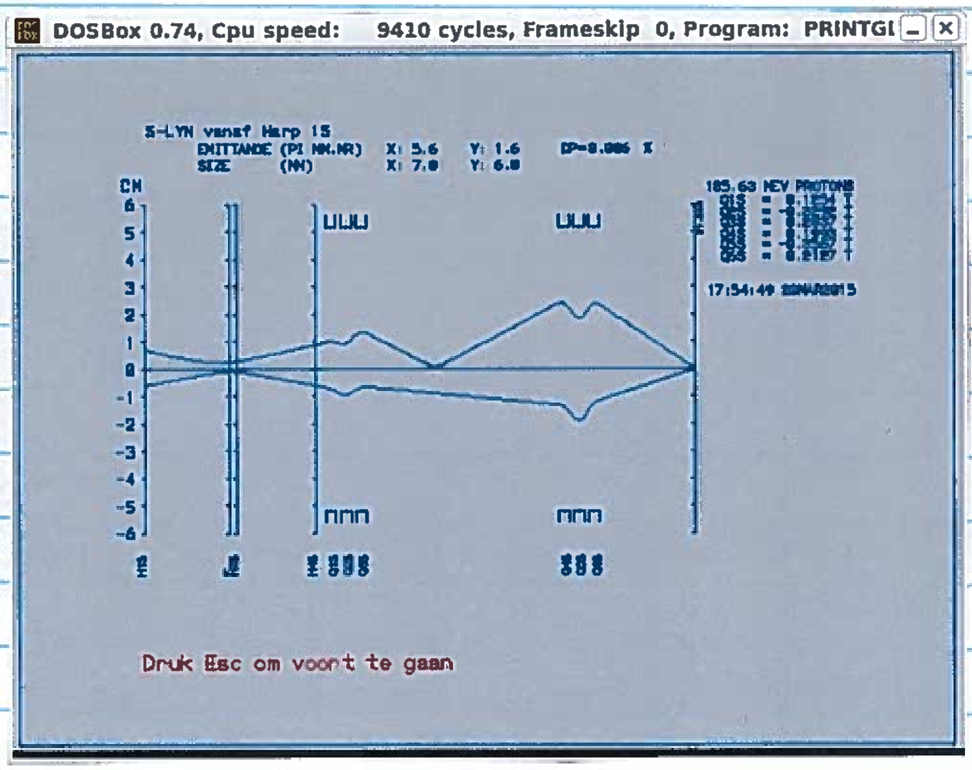
Friday 16:00 Long looking at beam again.

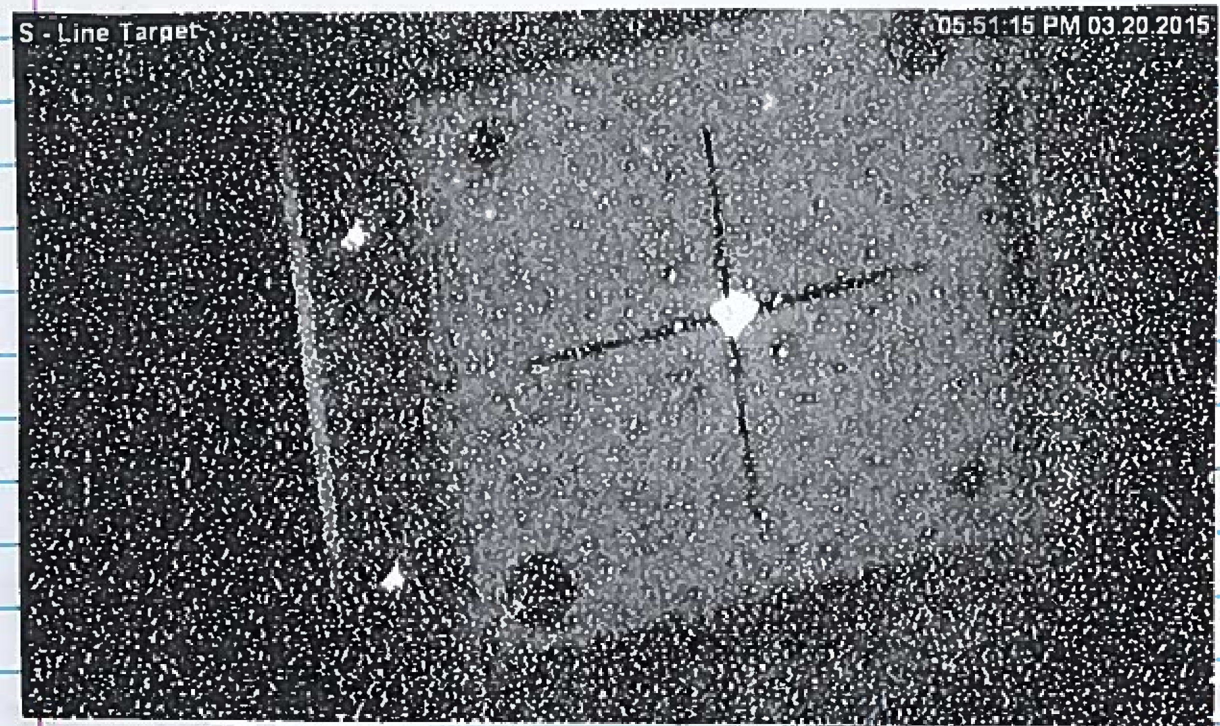
~ 17:50 After some beam tuning.

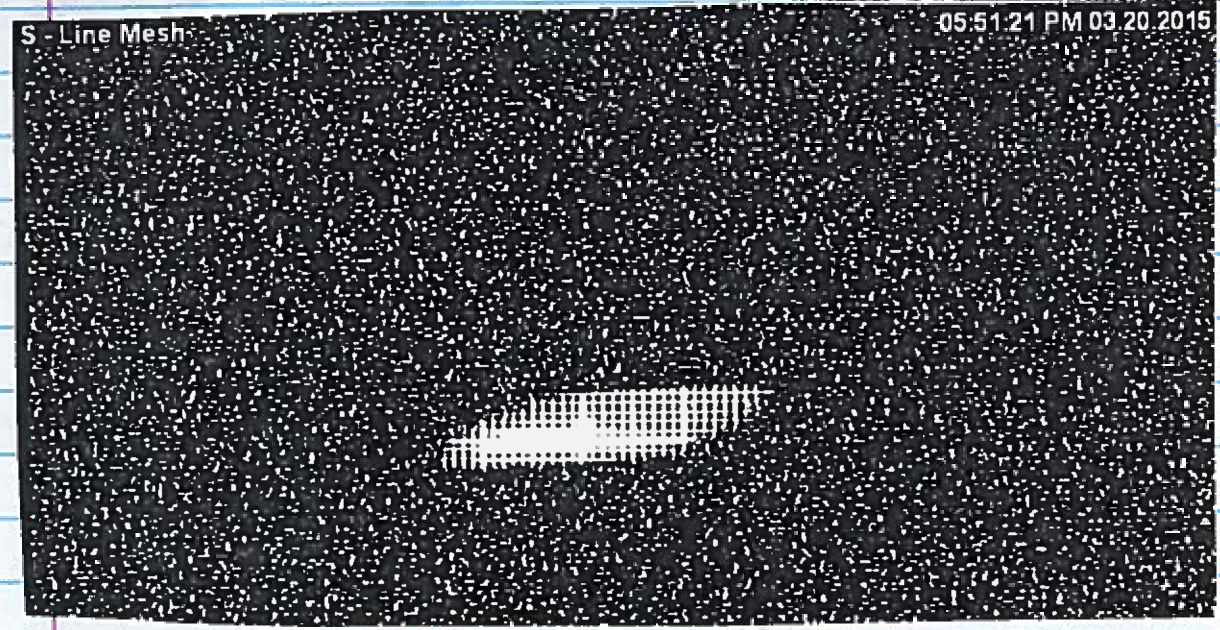
		x	y
Harp	15	14	1.2
	35	6	2
	45	18	12

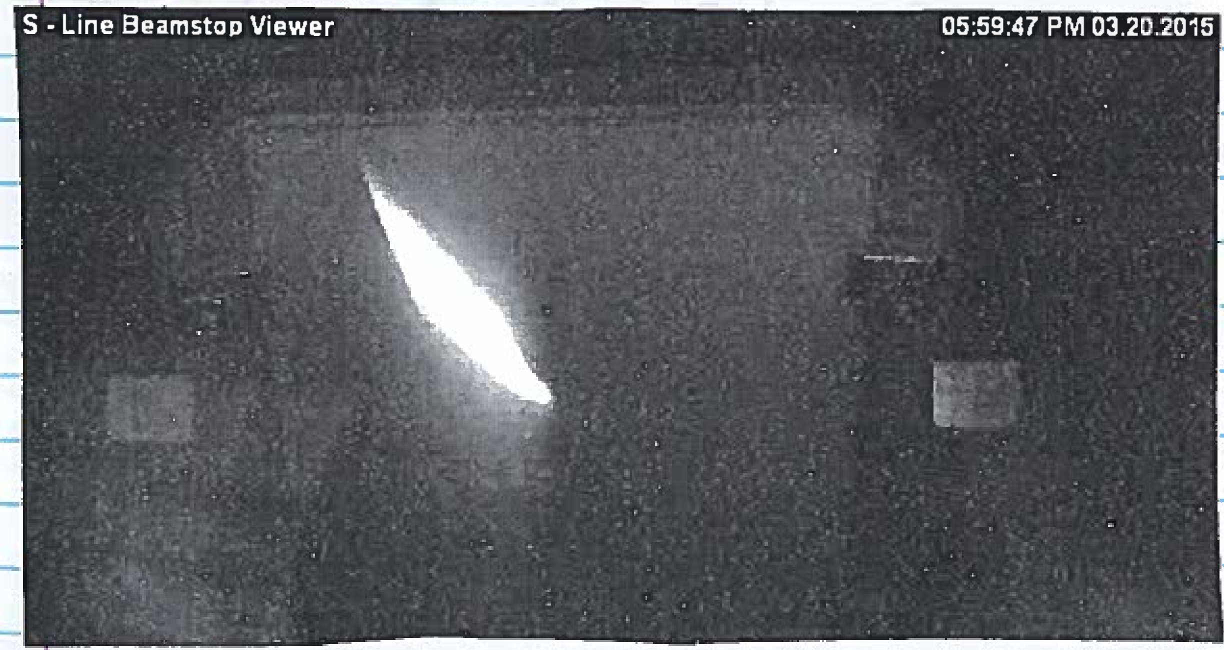
Emittance x = 5.6 π mm mrad

y = 1.5 π mm mrad.









D1 = 412.8 using superknob

Halo @ start of tuning ~200 Hz @ 0.5 nA

Run 1002 ; tuning

Run 1003 : ^{26}Mg

Do not understand spectrum.
→ Changed to coinc level 1
→ switched on preamp power of VDC's

Best halo tune thus far → 30 Hz @ .8 nA.

ODB gates:
ToF → [3660, 3800]
Pad 1 → [1300, 2000]

Put ^{26}Mg in for resolution check. ~150 Hz

ToF → [3600, 3660]

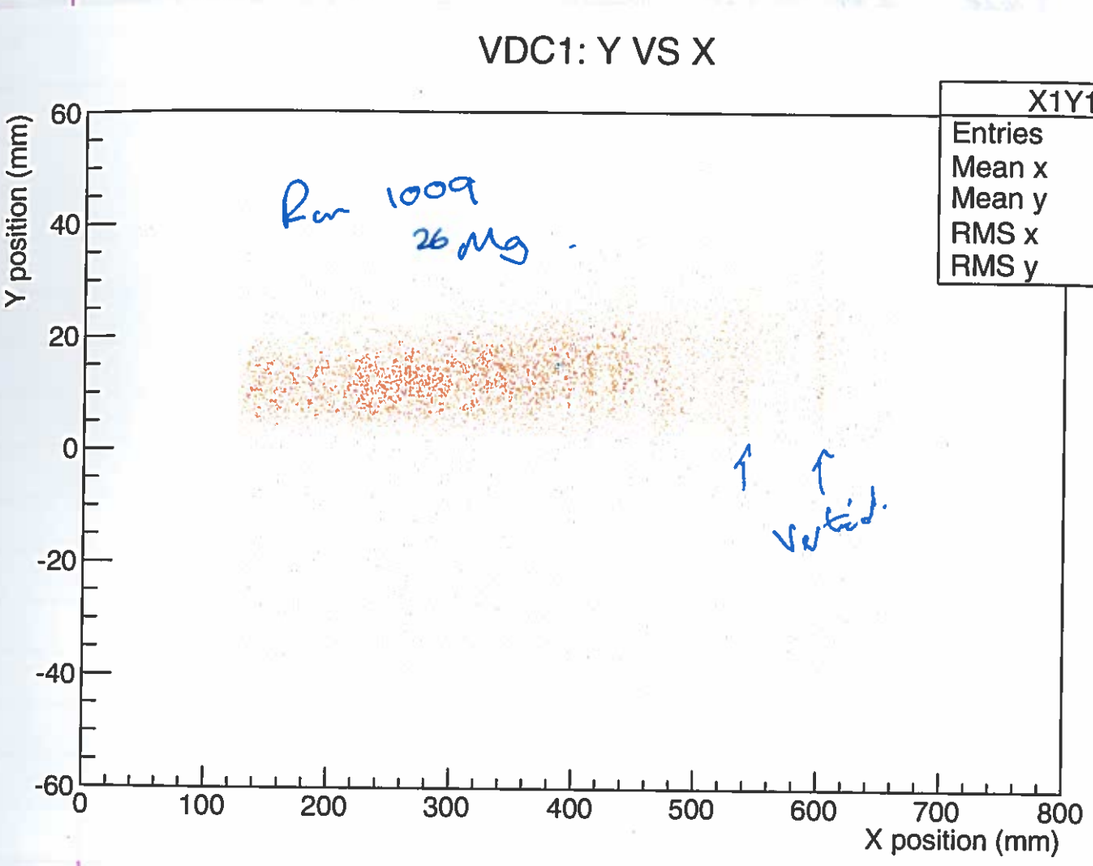
Had set on Coinc.
Doh.

Slow count rate → Switch to mylar.

Rate ~70 Hz

Even worse.

Run 1009 → I = .8 nA
240 Hz.



Resolution of the peak ~600 ns
σ: 3.33 mm.
Using 2mm binning.

Run comment: 26Mg rate testing started
Run #: 1009
Start: 19.46
Stop: 20.07
Target: #3 26Mg
Target angle:
Current: .8 nA
CI Range:
Collimator: #3
K600 angle: 4 deg
Trigger rate: 100 Hz
Data rate: 40 kB/s
Trigger evts: 203843
Scaler evts: 1234
K600 field:
Q: -454.175 A
D1: 412.800 A
H: -2.833 A
D2: 271.008 A
K: 2.833 A
VDC efficiency
X1 94
U1 94
X2 87
U2 95

2.833 A.

Going to faint beam.

Field set for energy of 223 MeV.
Maybe.

^{26}Mg faint beam test. (Run 1010)
~~Run 100~~
ToF: [3560, 3620]
Pad 1: [1200, 1500]

Run 1011 → Faint beam w/ MT.

σ: 0.636 mm

Q6S → 33.69 A

Change to 33.90 A
σ: 0.448 mm

Change to 34.10 A.
σ: 0.425 mm

Q6S → 34.30 A
σ: 0.46 mm

If 34-keV per mm → 35 keV FWHM
which I don't believe.

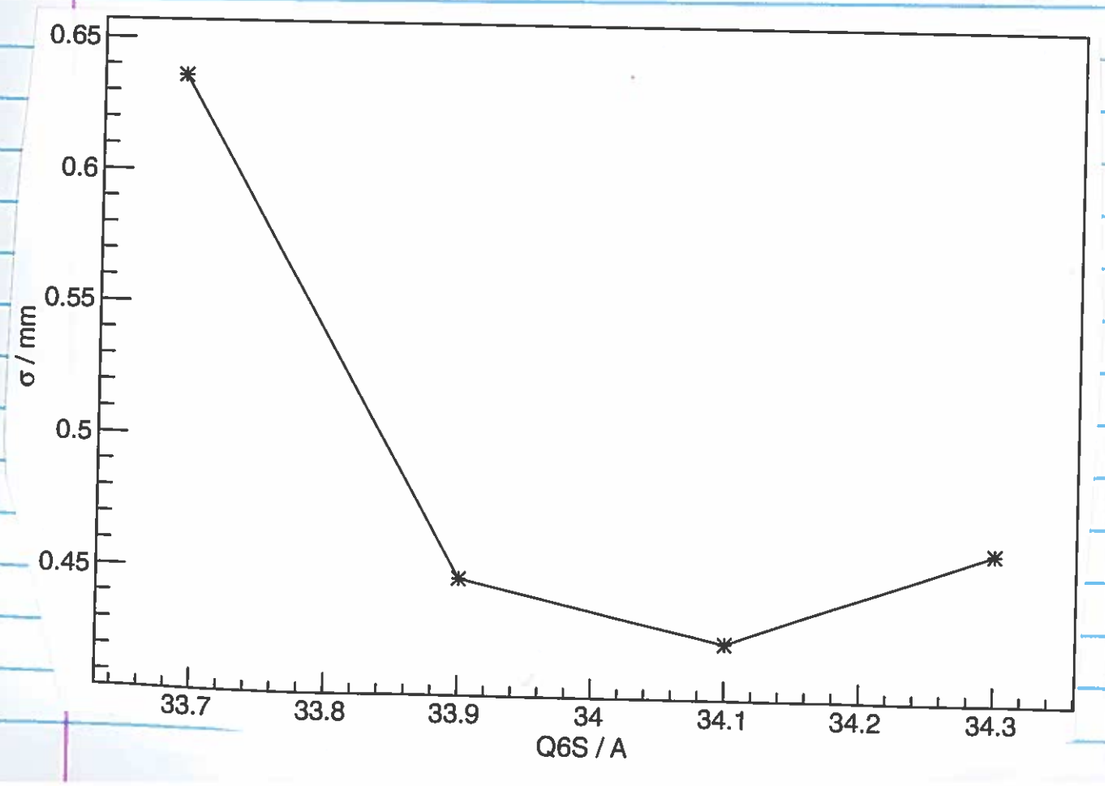
Run comment: Long faint beam run.
Run #: 1012
Start: 20.41
Stop:
Target: MT
Target angle:
Current: Faint nA
CI Range: 6A
Collimator: #3
Trigger rate: 500 Hz
Data rate: 200 kB/s
Trigger evts:
Scaler evts:
K600 angle: 4 deg
K600 field:
Q: -481.065 A
D1: 437.24 A
H: -3.001 A
D2: 287.054 A
K: +3.001 A
VDC efficiency
X1
U1
X2
U2

Q6S → 34.00 A
σ: 0.38 mm.

Plot: ^{26}Mg to see the res^n w/ target. (1.33 mg/cm^2)

Run 1013 σ: 0.51 mm.

Run 1014
Q6S: -55.00 A.
↳ -54.80 A. σ: 0.52 mm
↳ -55.20 A σ: 0.49
↳ ~~-54.80 A~~ -55.00 A



Q21P : 28.3 ⇒ σ = 0.43

Q21P : 28.3 → 28.5 σ = 0.35

28.7 σ = 0.41

28.6 σ = 0.44

→ 21:17

We changed back from faint beam back to normal beam.

Field settings were changed back using the super-knob :

Q : -454,175

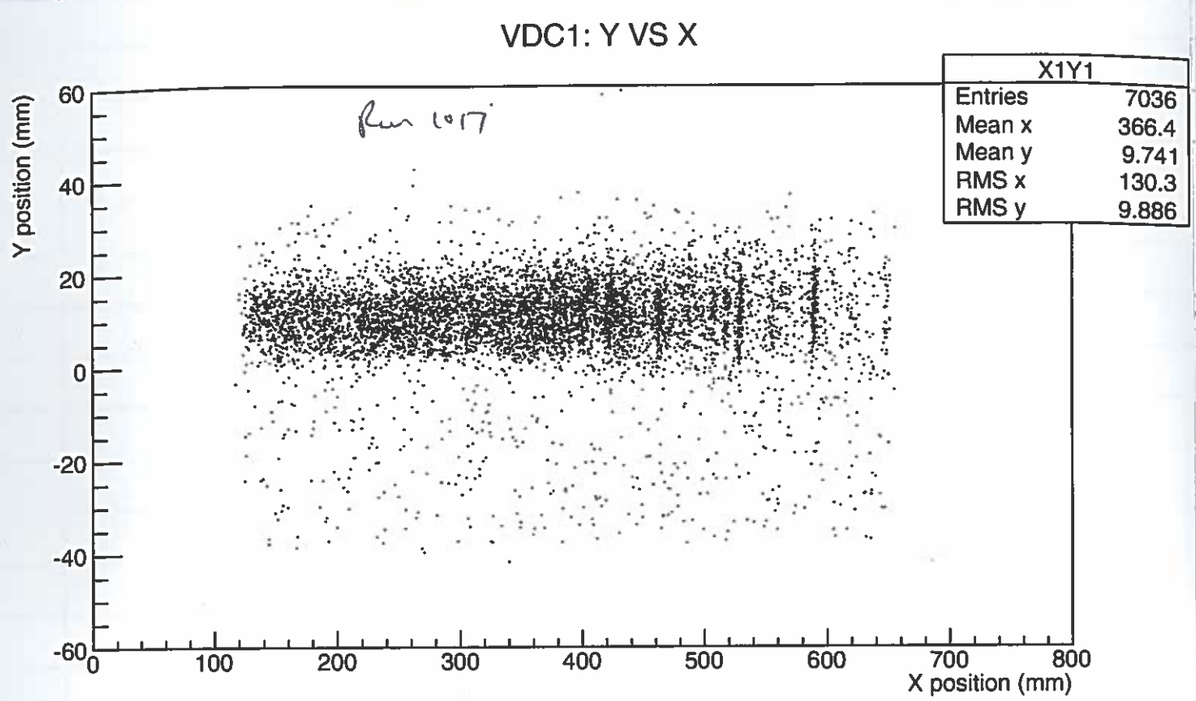
P1 : 412,800

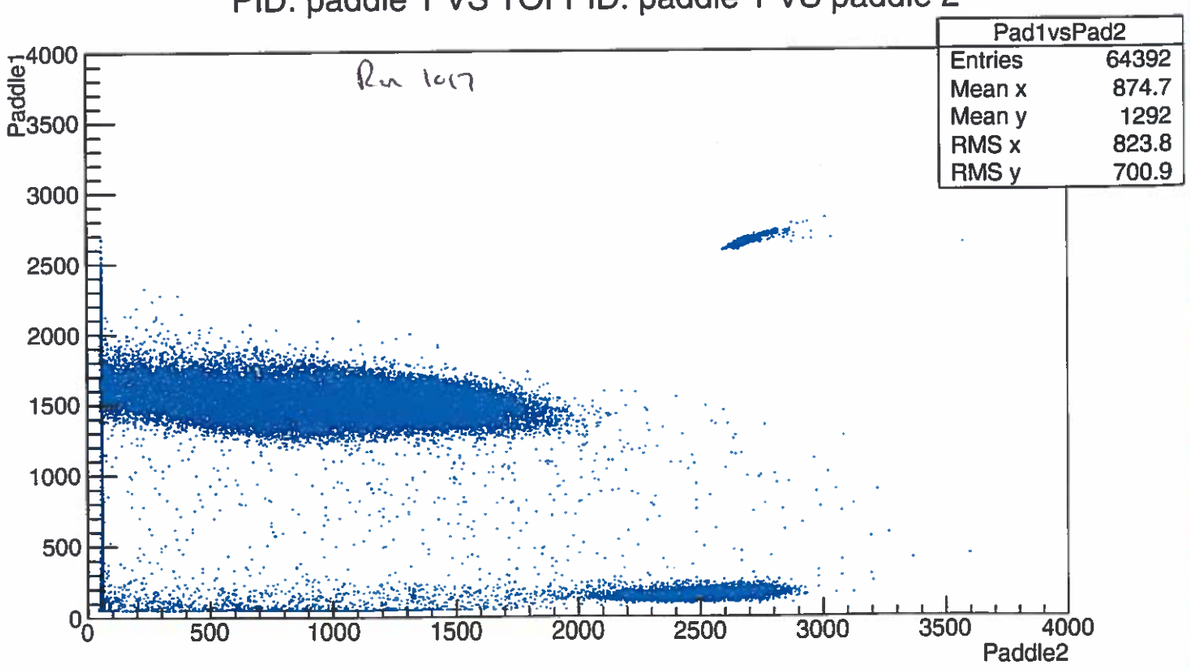
H : -2,833

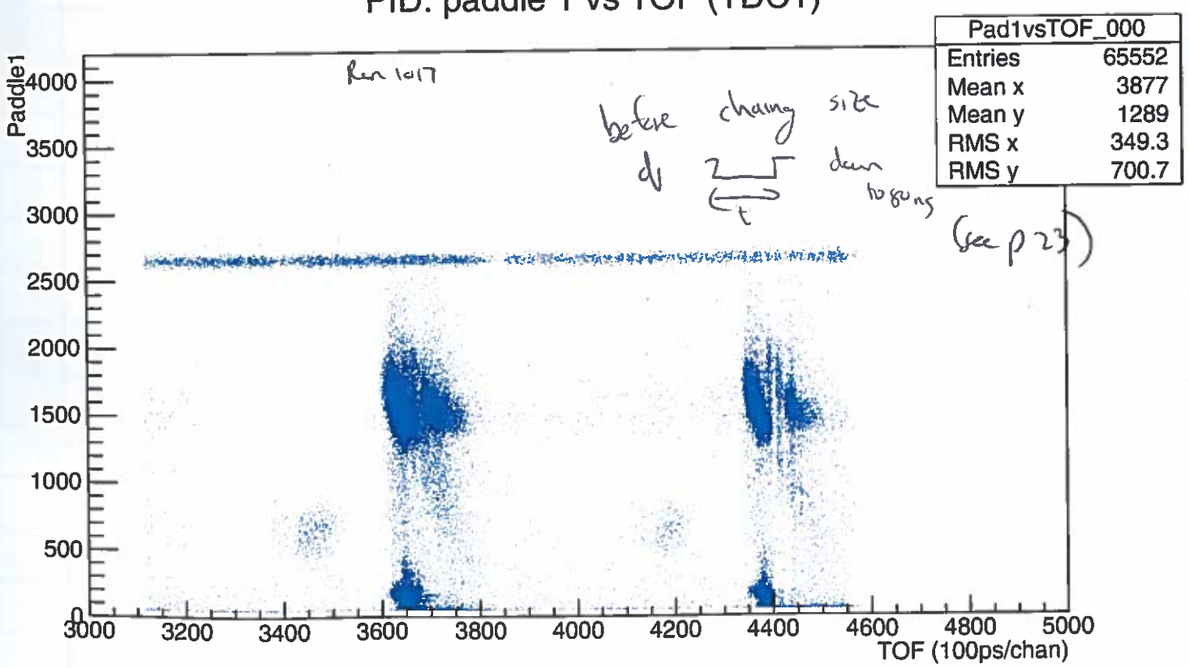
P2 : 271,008

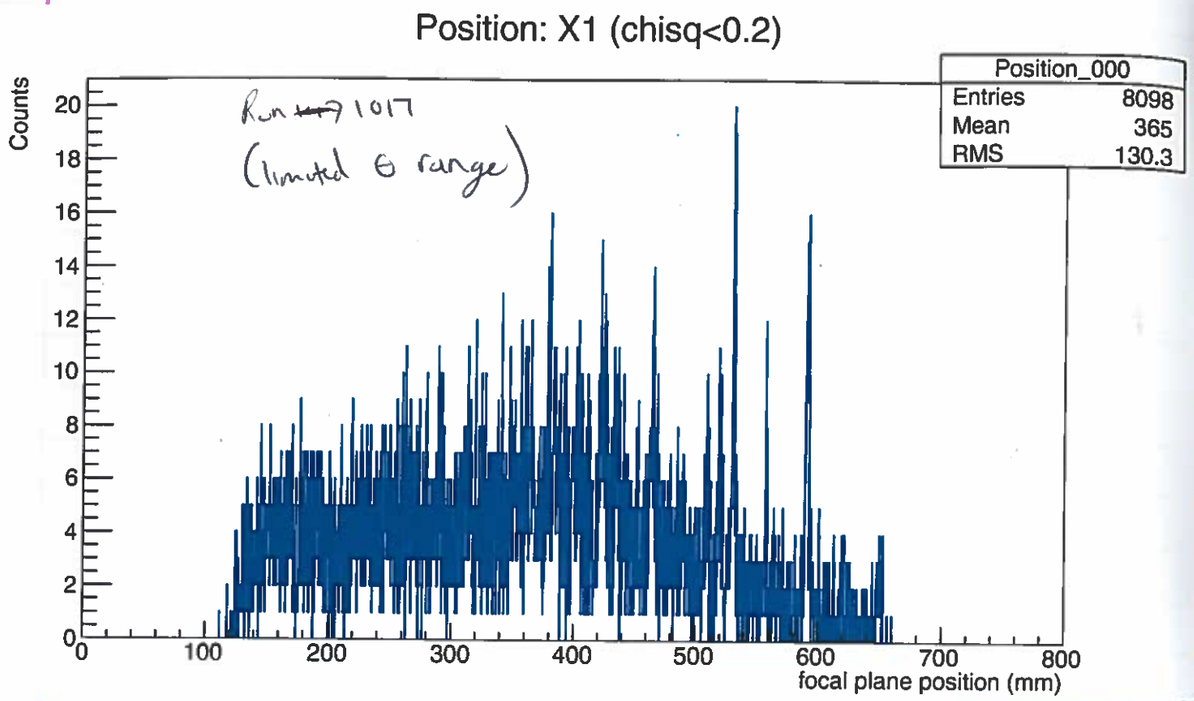
K : 2,833

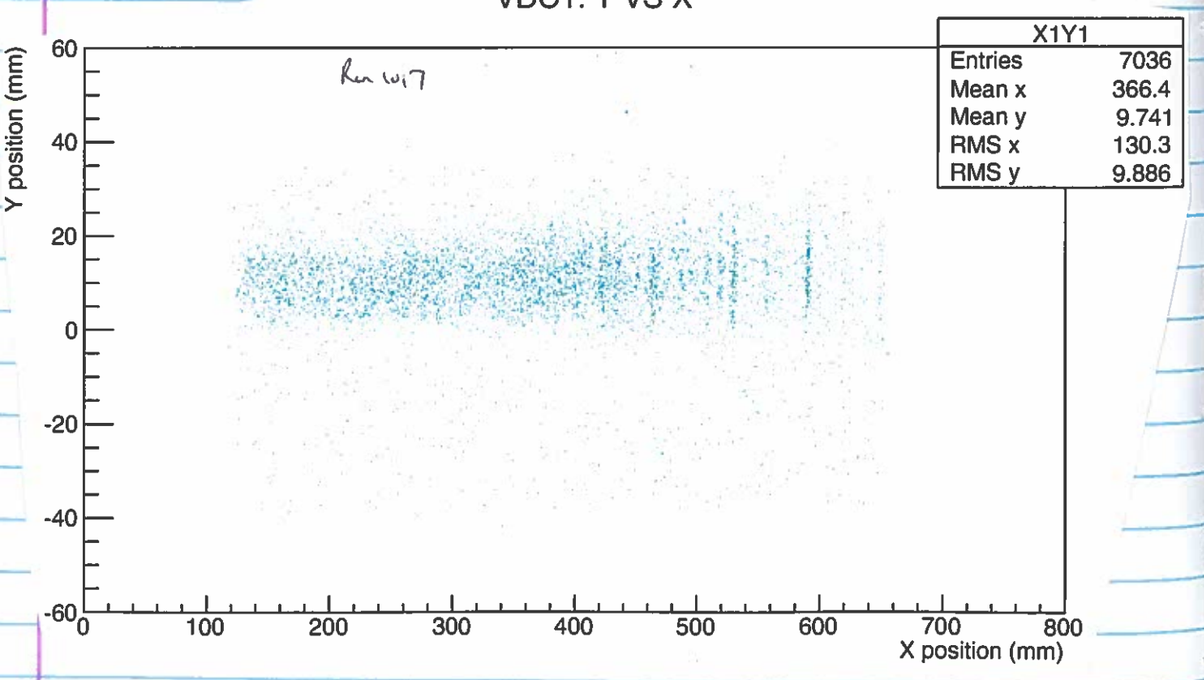
* Run 1017 ^{26}Mg Start 21:27 : Stop 21:37











Friday : 22:02

Change gas bottle

Made modifications to electronics.

1. Made output of 4FLU ① 80 ns (see p 3)
2. made DISC ② output 80 ns wide

Run 1018 Start : 22:07 Stop: 22:14

^{26}Mg ④ 0.7 nA 250 Hz

Have to change gate

Have to change TOF delay

Run comment: ^{26}Mg : calibration for experiment

Run #: 1019

Start: 22:15

Stop: 22:48

Target: ^{26}Mg #3

Target angle: -11°

Current: 0.7 nA

CI Range: 6nA

Collimator: #49 11mm

Trigger rate: 300 Hz

Data rate: 70 kB/s

Trigger evts: 569529

Scaler evts: 1882

K600 angle: 4 deg

K600 field:

Q: -4.417 A

D1: 412.800 A

H: -2.833 A

D2: 271.48 A

K: 2.833 A

VDC efficiency

X1 93.5

U1 94.6

X2 84.7

U2 94.9

VDC1 HV : -2.95 kV (in vault)

VDC2 HV : -2.94 kV (in vault)

Pad 1 hi -1300

1 lo -1350

2 hi -1200

2 lo -1400

Grid wires : -500 V

on X1, U1

X2, U2

Thresholds: X1 9.6V

U1 9V

X2 10V

U2 10V

Run comment: MT — K600 angle: 4 deg

Run #: 1020
Start: 22:49 — Current: .6 nA
Stop: 22:59 — CI Range: 6n
Target: MT — Collimator: #3
Target angle: -118

Trigger rate: 170 Hz
Data rate: 55 kB/s
Trigger evts: 114501
Scaler evts: 585

K600 field:
Q: 5 A
D1: 4 A
H: M A
D2: E A
K: A

VDC efficiency
X1 96
U1 95
X2 85
U2 92

Run comment: MyCar #6 — K600 angle: 4 deg

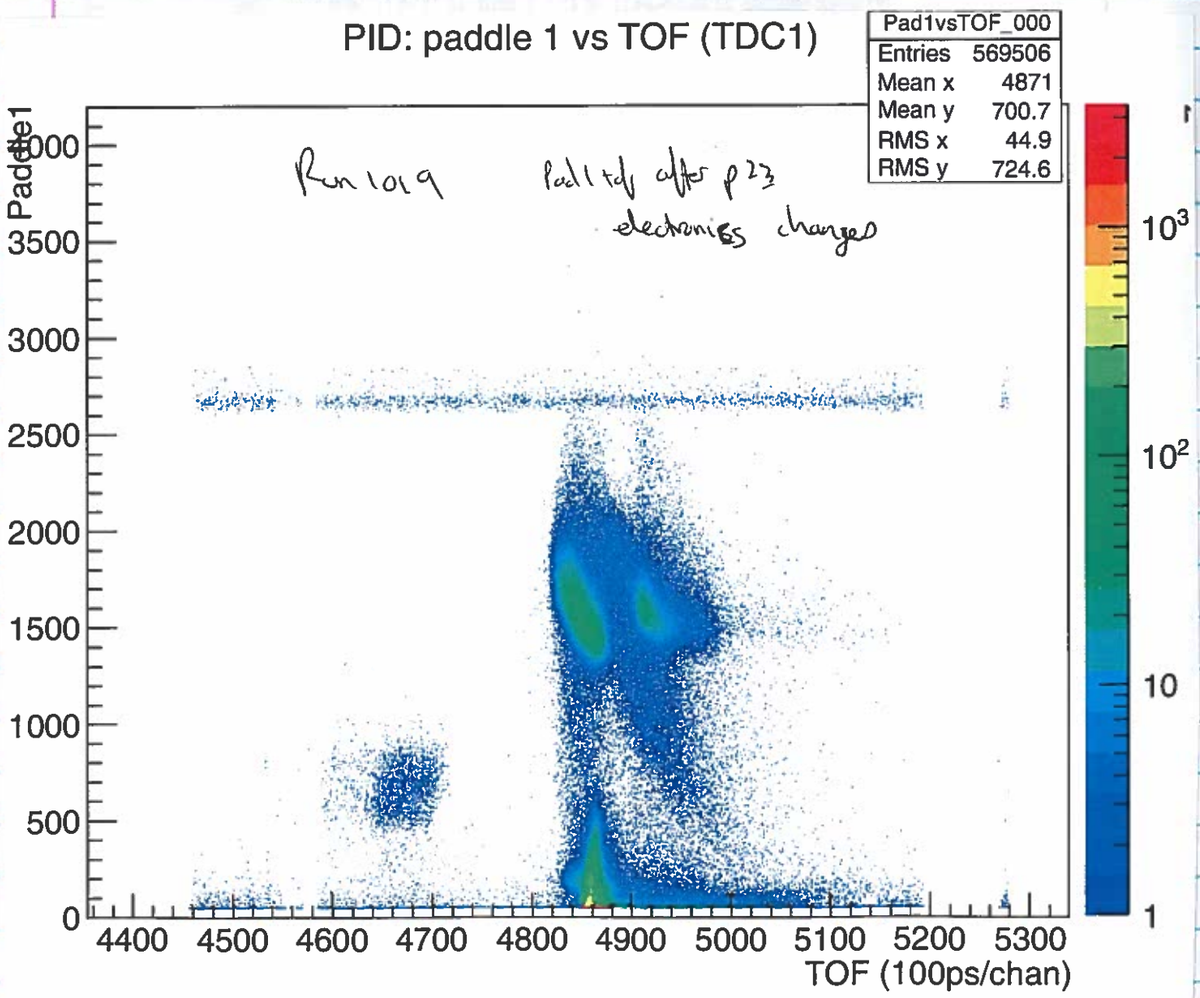
Run #: 1021
Start: 23:01 — Current: .7 nA
Stop: ~~23:00~~ 23:35 — CI Range: 6n
Target: #6 MyCr — Collimator: #3
Target angle: -118

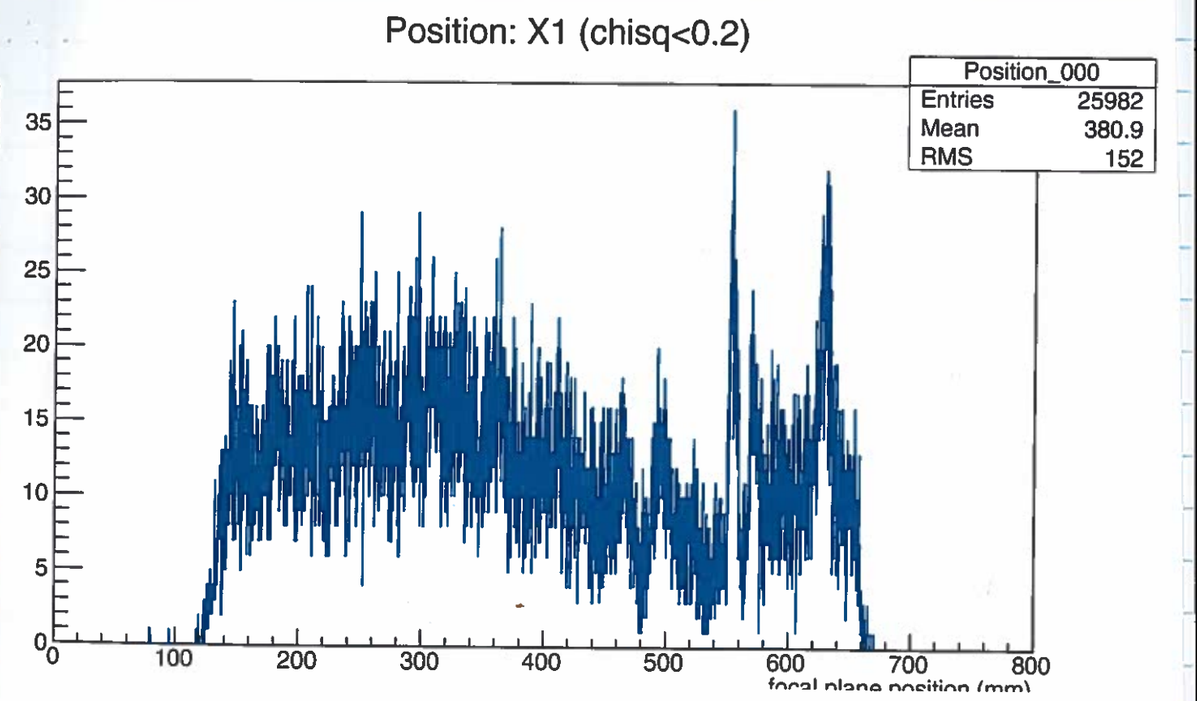
Trigger rate: 80 Hz
Data rate: 30 kB/s
Trigger evts: 178789
Scaler evts: 1441

K600 field:
Q: 5 A
D1: 4 A
H: M A
D2: E A
K: A

VDC efficiency
X1
U1
X2
U2

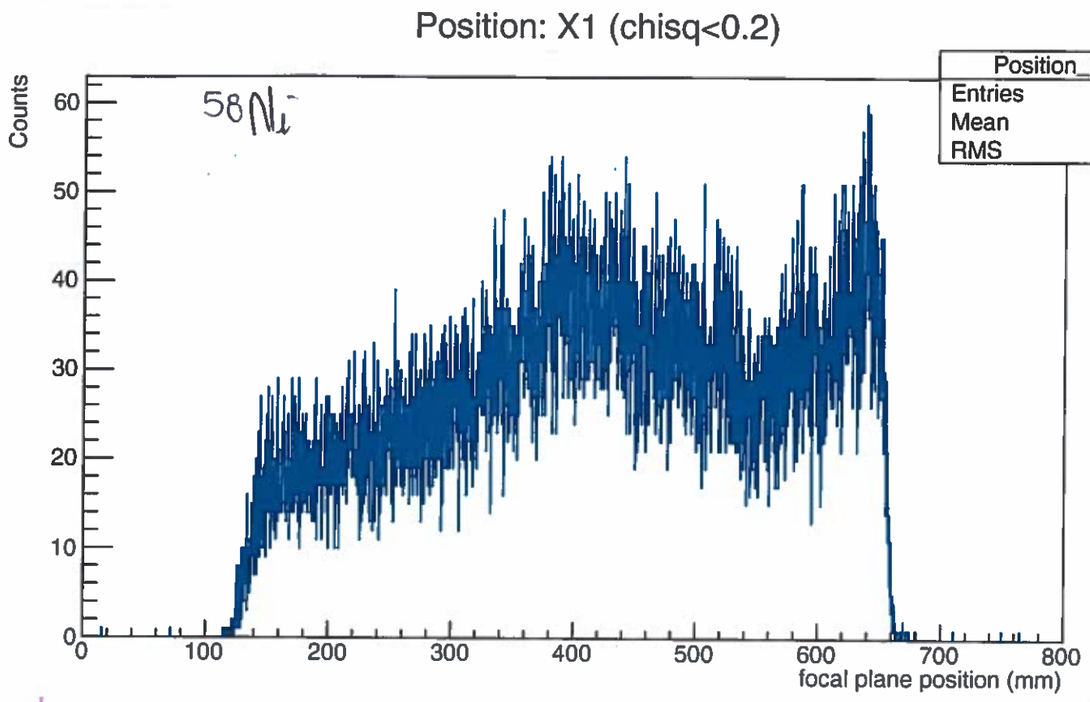
Run 1021



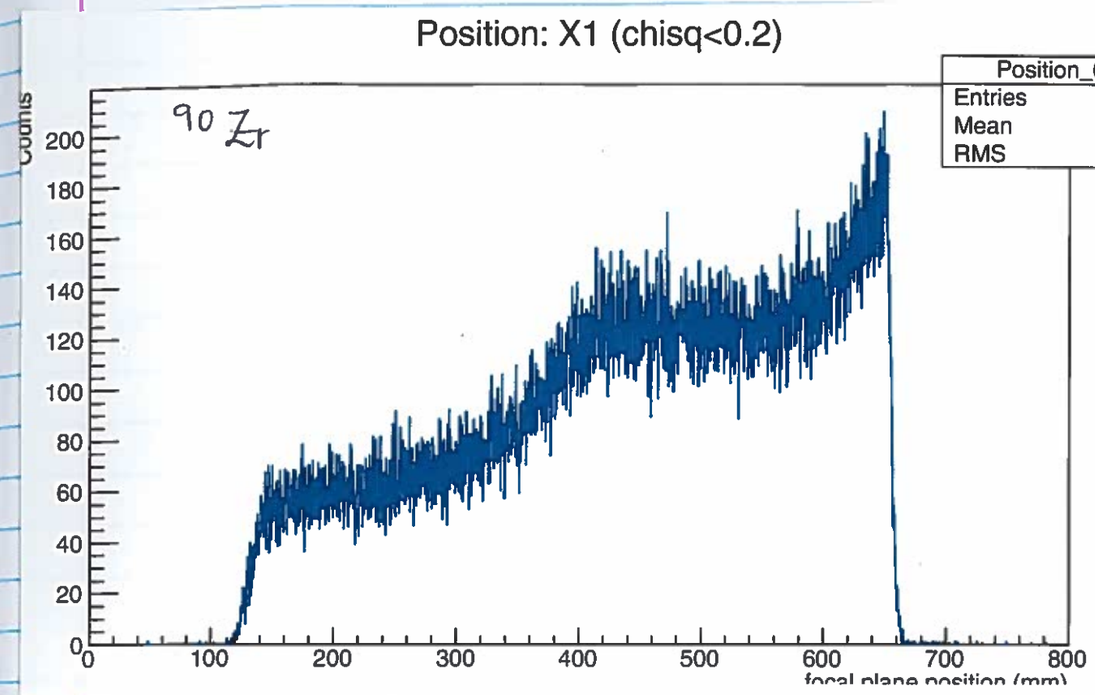


11:30 Beam lost
J-line buncher tripped!

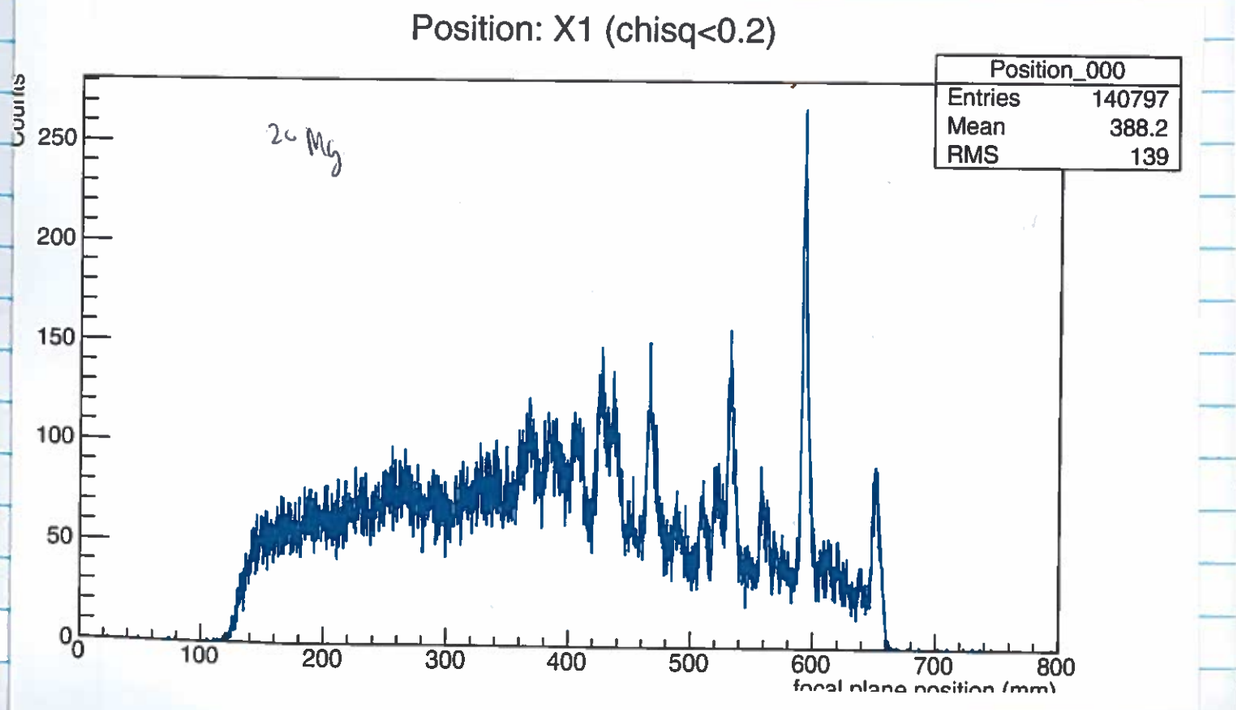
Run comment: 58 Ni Data
Run #: 1022
Start: 23:35
Stop: 00:36
Target: 58 Ni
Target angle: -118°
Current: 0,5 nA
CI Range: 6 nA
Collimator: #3
Trigger rate: 325 Hz
Data rate: 119 kB/s
Trigger evts: 813148
Scaler evts: 3517
K600 angle: ~~4 deg~~ 0°
K600 field:
Q: 5 A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 93.3
U1 94.6
X2 85.5
U2 94.7



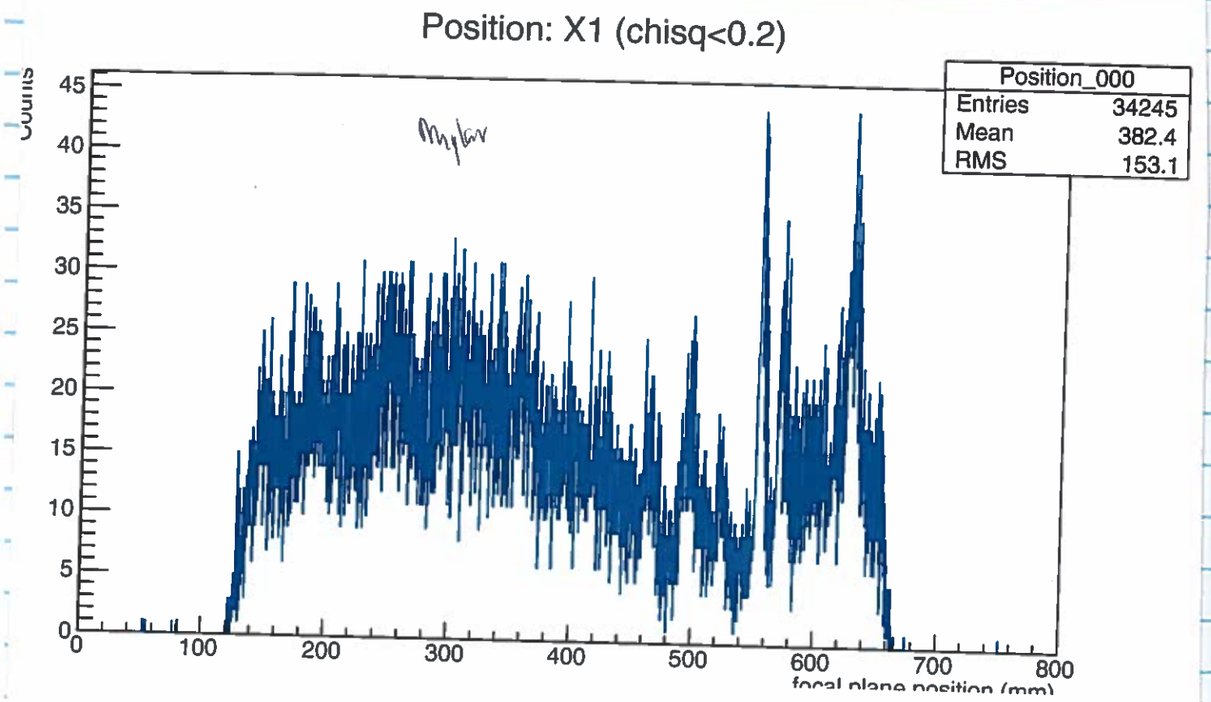
Run comment: DATA
Run #: 1023
Start: 00:39
Stop: 01:39
Target: 90 Zr
Target angle: -118°
Current: 0.7 nA
CI Range: 6nA
Collimator: #3
Trigger rate: 269 Hz
Data rate: 108 kB/s
Trigger evts: 983110
Scaler evts: 3507
K600 angle: 6 deg
K600 field:
Q: 5 A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 93,9
U1 94,6
X2 85,1
U2 94,8



Run comment: DATA (26 Mg)
Run #: 1024
Start: 01:45
Stop: 02:15
Target: 26 Mg
Target angle: -118°
Current: 0.7 nA
CI Range: 6nA
Collimator: #3
Trigger rate: 680 Hz
Data rate: 257 kB/s
Trigger evts: 826215
Scaler evts: 1761
K600 angle: 4 deg
K600 field:
Q: 5 A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 93,7
U1 94,3
X2 84,6
U2 94,8

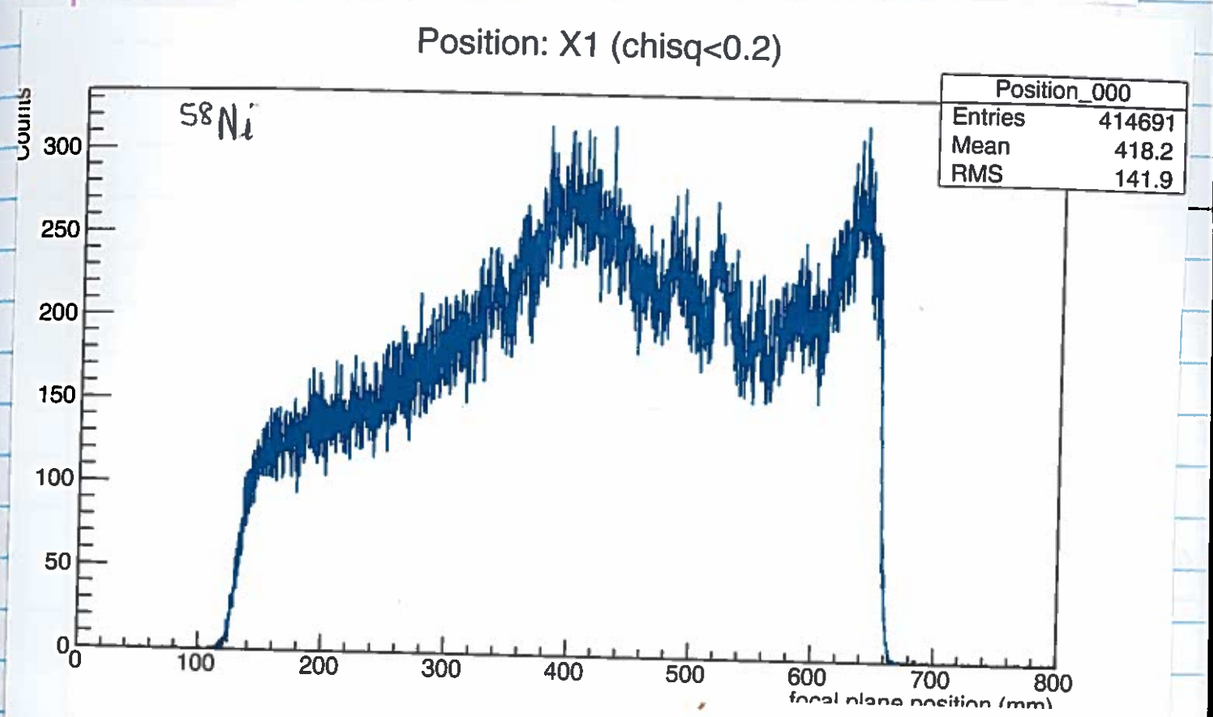


Run comment: Mylar
Run #: 1025
Start: 02:21
Stop: 02:51
Target: Mylar #6
Target angle: -118
Current: 0.6 nA
CI Range: 6nA
Collimator: #3
Trigger rate: 420 Hz
Data rate: 150 kB/s
Trigger evts: 500651
Scaler evts: 1755
K600 angle: 0 deg
K600 field:
Q: C A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 93,9
U1 94,4
X2 85,7
U2 94,7



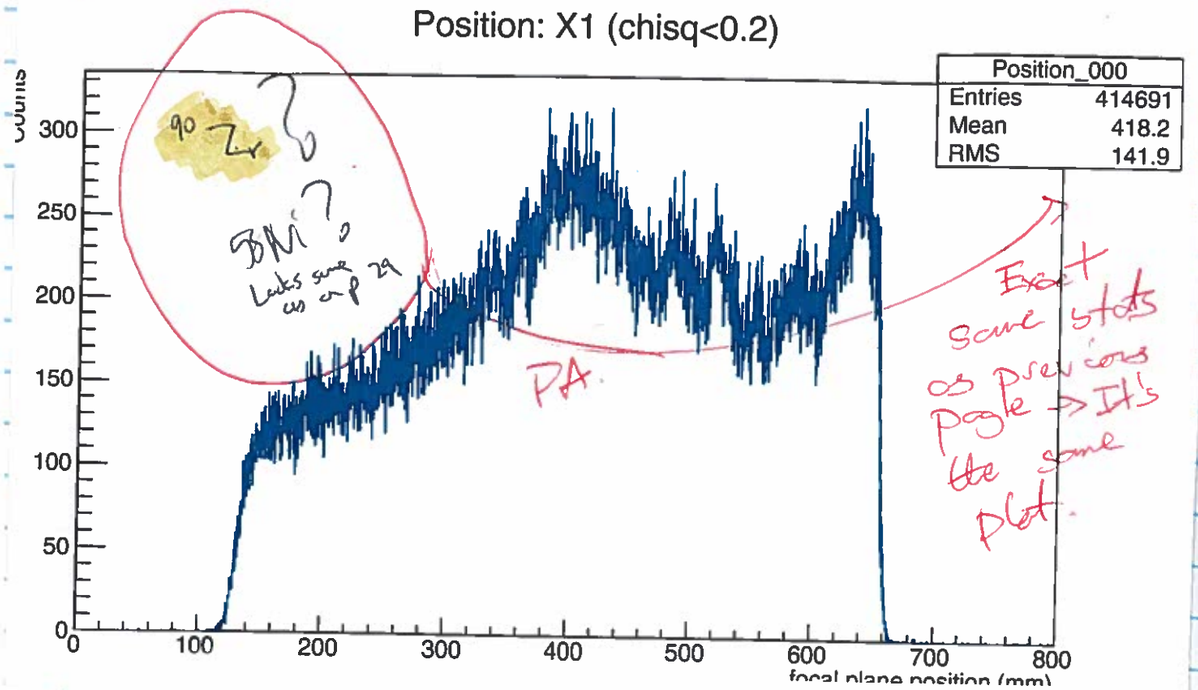
Run comment: MT
Run #: 1026
Start: 02:56
Stop: 03:41
Target: MT #1
Target angle: -118
Current: 0.6 nA
CI Range: 6nA
Collimator: #3
Trigger rate: 161 Hz
Data rate: 56 kB/s
Trigger evts: 334379
Scaler evts: 882
K600 angle: 0 deg
K600 field:
Q: C A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 95,2
U1 93,2
X2 80,4
U2 91,4

Run comment:
Run #: 1027
Start: 03:15
Stop: 04:15
Target: 58Ni
Target angle: -118°
Current: 0.9 nA
CI Range: 6nA
Collimator: #3
Trigger rate: 1500 Hz
Data rate: 478 kB/s
Trigger evts: 3.763M
Scaler evts: 3519
K600 angle: 0° deg
K600 field:
Q: C A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 93,7
U1 94,5
X2 83,9
U2 94,7



Run comment: 90Zr
Run #: 1028
Start: 04:21
Stop: 05:09
Target: 90Zr
Target angle: -118°
Current: 3.5 nA
CI Range: 6nA
Collimator: #3
Trigger rate: Hz
Data rate: kB/s
Trigger evts: 4.05M
Scaler evts: 2851
K600 angle: 0 deg
K600 field:
Q: C A
D1: A A
H: M A
D2: E A
K: A
VDC efficiency
X1 93.6
U1 94.5
X2 93.5
U2 94.6

Beam lost for ~ 1 min @ 12 min into the run. 1028
Run continued. Beam current came down to ~ 1.7 nA



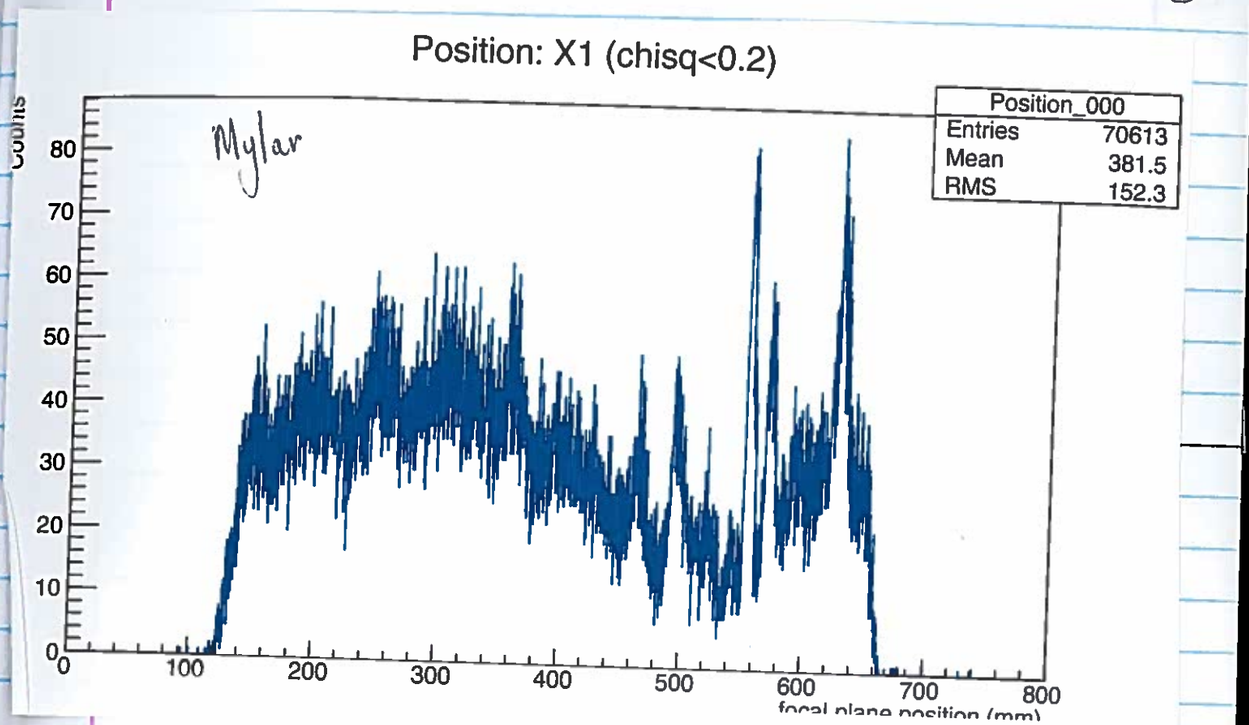
1-09-15 Beam Gone @ 5:15 AM, because of a buncher-trip!
J_Line buncher tripped.
Operators trying to fix it. (5:20 AM)
Beam back @ 05:27 AM.

Run comment: _____
Run #: 1030
Start: 05:28 Current: 1.0 nA
Stop: 05:42 CI Range: 6
Target: Mylar Collimator: #3
Target angle: -11.8
K600 angle: 0 deg
Trigger rate: 450 Hz
Data rate: 157 kB/s
Trigger evts: 27160
Scaler evts: 795
K600 field:
Q: 5 A
D1: 4 A
H: M A
D2: E A
K: ____ A
VDC efficiency
X1 93.5
U1 94.2
X2 84.1
U2 95.2

Beam lost again @ 9 min into run.
Again J_line buncher tripped.
Beam back

Run comment: _____
Run #: 1031
Start: 05:48 Current: 1.8 nA
Stop: ____ CI Range: 6nA
Target: Mylar Collimator: #3
Target angle: -11.8
Trigger rate: 673 Hz
Data rate: 239 kB/s
Trigger evts: ____
Scaler evts: ____
K600 field:
Q: 5 A
D1: 4 A
H: M A
D2: E A
K: ____ A
VDC efficiency
X1 ____
U1 ____
X2 ____
U2 ____

DAQ trouble. Trying to restart the run control browser.
Done!



Power failure @ 6:57 AM for a few seconds
Everything went off!!

Sat 21 March 9 am
- Restarted K600 vacuum pumps
- Reboot VME crate
- Recycle K600 fields to values on p 23
- Some k600vme1 problems. Contacted Lee fixed (See p 32)

NOTE: to reboot k600vme1 the new command is simply: reboot.