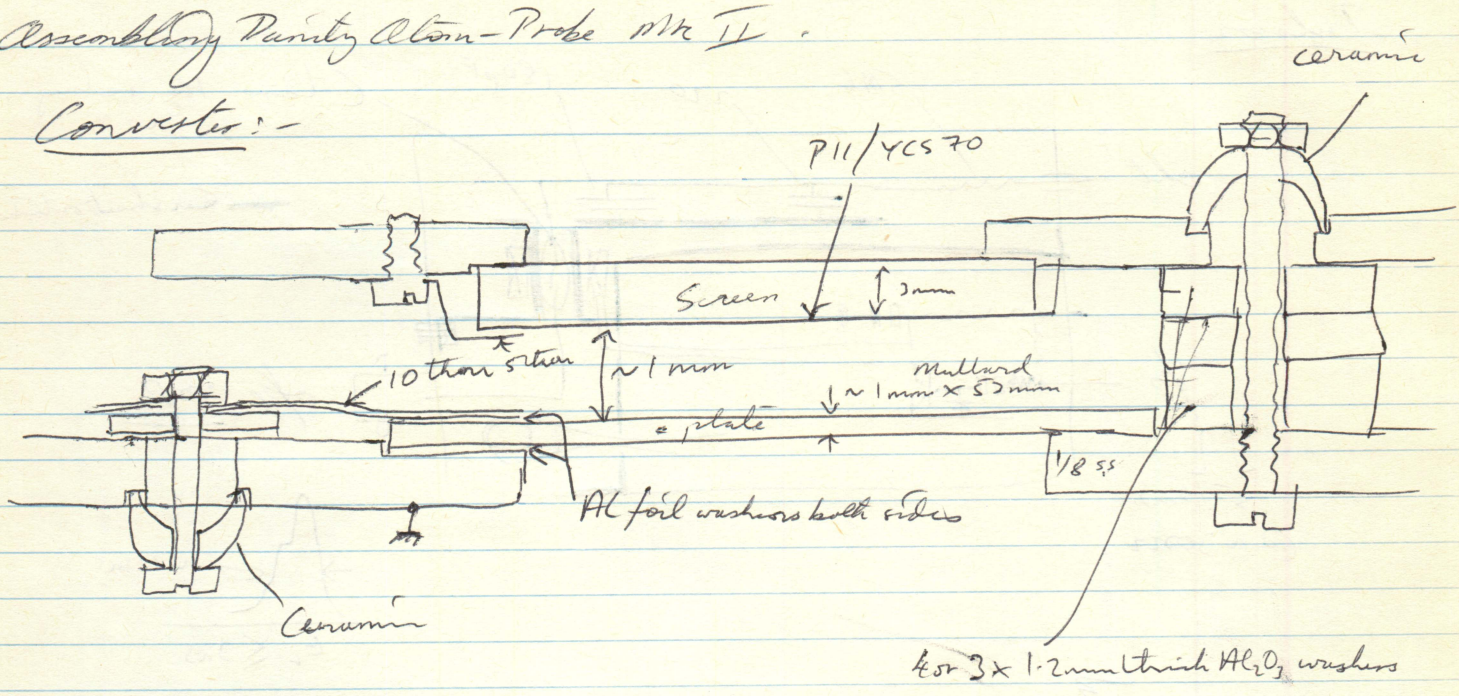
May '75.

Assembling Purity Atom-Probe MK II.

Converter:-

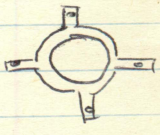


c-plate gold-plated.

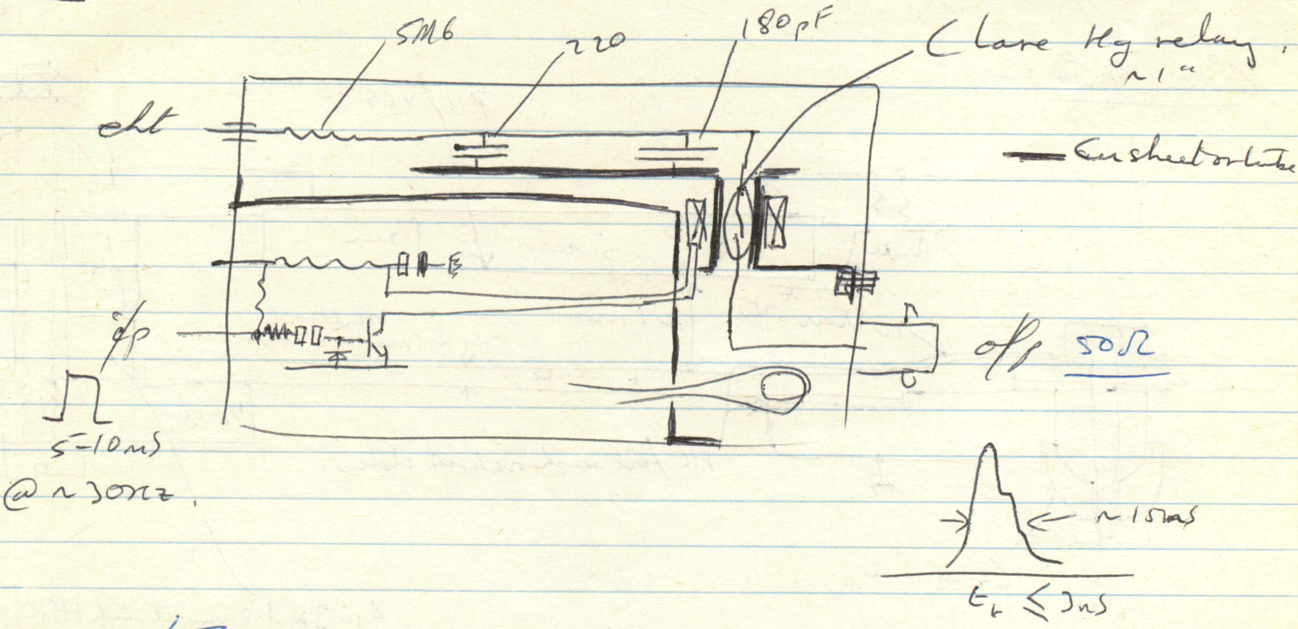
Screen 8K ups to 7KV,
c-plate ~ ~ to 1500 dc
~ 2·3KV nS pulsed

c-plate resistance ≃ 17 MΩ.

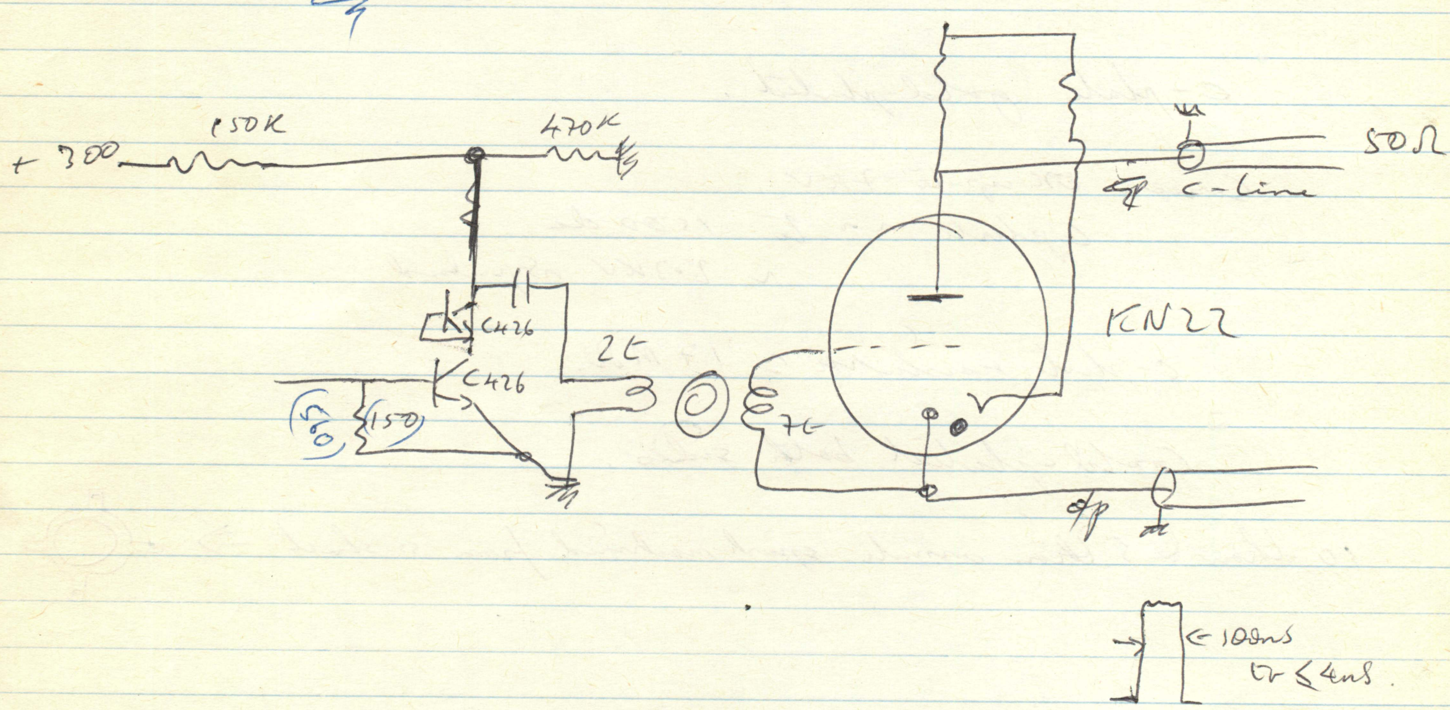
Gold-plated both sides.

10-thou & 5 thou annuli spark-machined from SS sheet ⇒ 

Pulsers

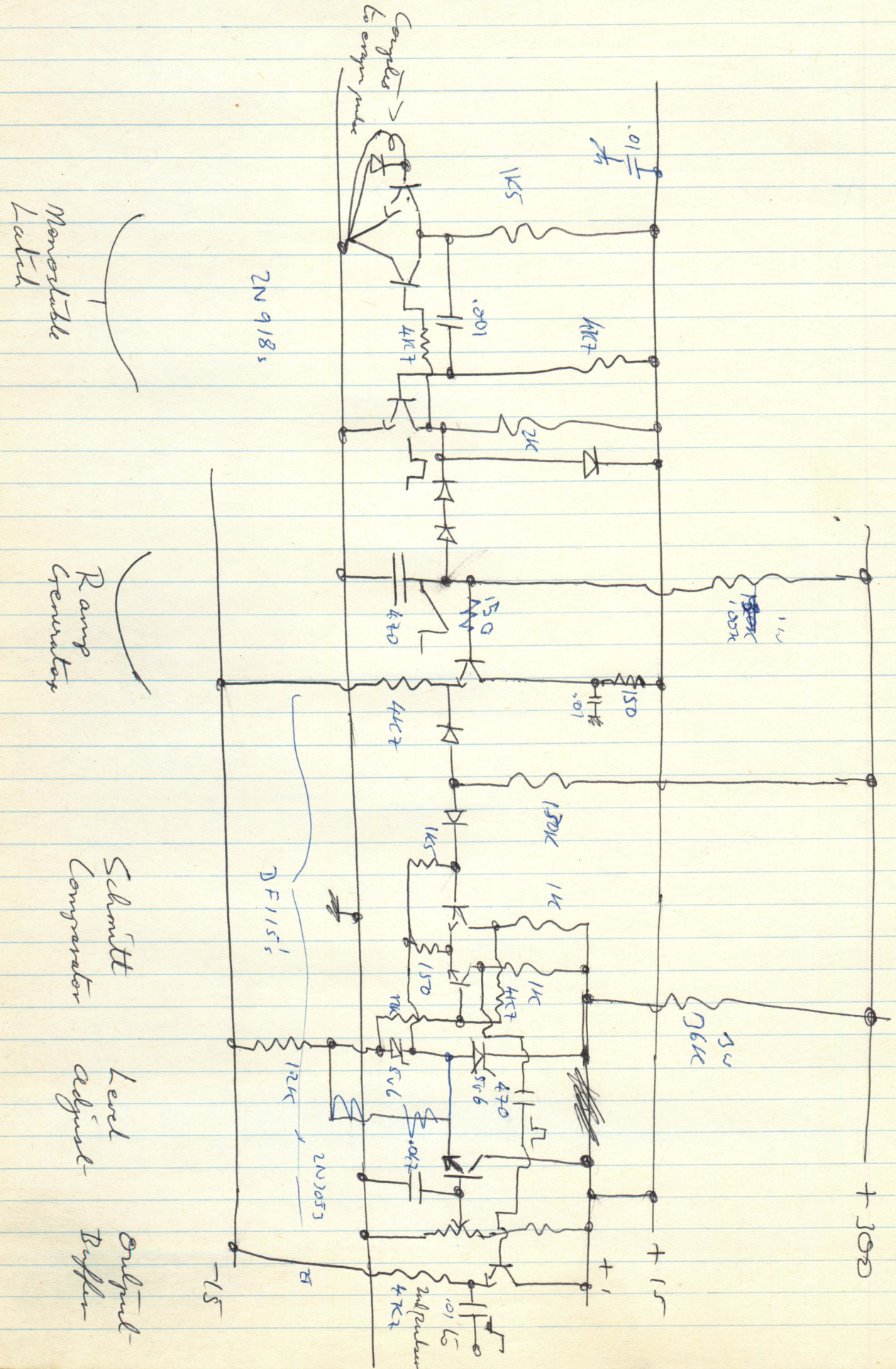


5M6
220
180pF
Clare Hg relay, ~1"
eht
Cu sheet or tube
i/p
5-10ns
@ ~30Hz.
o/p
50Ω
~15ns
$t_r \leq 3$ns



+300
150K
470K
C426
C426
560
150
2t
7t
KN22
50Ω
c-line
o/p
≤100ns
$t_r \leq 4$ns

Afterwards (c 2000000) intermediate circuits, final (2) delay & circuit is :- (lifted partially from Marconi Scope)



$150 \times 12 = 1800 \times 2 = 3600$
vp = 3900.

Mon May 20 '75

Pamity II ~1.0⁻⁷ W_{car} 78°K He

3 or 4 pins off previous specimen (sat., flashed)

1 Blank.

(110) 1, 5 He. ? g-b. cp ~2KV (impul-to vess) ser ~5KV

Tip Pulser ~2KV, less ~30% cos of delay cable.

1 sec.
5 planes (110) fast-ish pulsed. W^{3+}.
1 sec. He.
W^{4+} 3 pins quite a few planes | in presence of He
W^{3+} 1 pin
He ½ 1, ½
He^+ (or ? He^+)
W^{3+} short exp. | "
change pos He - - - ½, 1, ½ - - -
W^{3+} (W^{3+}) | "
2 He^+ - camera missed.
He 1 sec.
He^+ lots mainly from (111) environs.
lower gas press W^4 | "
W^4 | "
W^3 Tip ~9KV.
W^3 ½ sec. "
He 5

New film (II) He 1 BIV
He 8 secs
Ne 1 BIV He out.
Ne ½
W^{3+} | in presence of Ne.
W^{4+}
Loops goes the specimen.

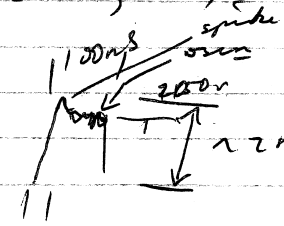
The W^{4+} (+Helide?) is seen to be concentrated along 4 bright rays from 110 in main: some from 111's & from zone decs. Not random!

The He^+ is also from bright rays & also lots from 111 region.
The WHe^{3+} still shows some traces of the bright rays.

Flight times 400 – 500 nS (O^{*+}, $3+$)

$\sim$ 100 He^+

Channel-plate pulse $\simeq$



$t_r \simeq 10$ nS. don't know why – ? should've had adjusted bias current.

Tues 20th Same film. 2×10^{-9} W 78°K.

1 Blank,

He 1 sec.
½ sec.

Tip 6KV pulser 1500
→ erupts @ DIV + pulse.

(He) W^{3+} 10 planes
" mixture
" W^{4+}

reduce gas pressure
W^{4+} ? some $3+$
W^{4+} readily visible
W^{3+}
He^+
He ~15 secs > BIV pulse reduced to 1KV.
W^{3+} ~ 10 planes
He^+
W^{4+}
He 15 >IV
~blank
15 BIV
He W^{3+}
W^{4+}
He^+
He 10-15 sec. some voids

Tip 7KV.
Pulse increased to 2.8KV.
Tip 7KV.

Gas pressure measured as 1.5×10^{-6} torr ↑.
Replace He with 1.5×10^{-6} Neon.

Ne W^{3+} some 2.8KV pulse.
Ne^+
W^{4+}
Ne. 10 sec at some volts >>BIV 24 7KV.
Ne BIV ~ 204 10 sec.
remove Ne whilst 10 secs → Running in He. (set up $W^{3+,4+}$ channels) →
Pump out He.
W^{3+} var
W^{4+}
W^{4+}
W^{3+}
var
Search, but no other major peaks. 304 9KV + 2.8KV pulse.
He BIV 275
1, ½ sec. Bombarding.

end of film.

2nd film

3 pulses ~ He B.I.V = 273, 8 KV,

(He/top W^{3+} ~8 planes Gate pulsewidth reduced to ~ 50 n

in W^{4+}.

He 3 pulses.

He out

Top flushed.

First Analysis of data:-

(in $\begin{cases} Ne \\ He \end{cases}$, W^{4+} from 4 bright rays around (1,1,0). 

was W^{4+} ~ mirror has anywhere.

Some trace of rays in W^{3+} (though not seen in thesis pulse? why)

Coarse boundary shows up in W^{3+}/vac as apparently showing ? dislocation structure: ie structure along boundary.

When attempted to verify this (film 2) top went-away.

Need to operate with image gas pressure $\leq 2 \cdot 10^{-6}$ ↑ looking for rare species, ~~as~~ (even W^{4+}) as otherwise bright ↑ areas show up.

Wed 21 May 75 Mo $3\,10^{-9}$ 78° He.

He 1, ½ DIV 235 = 7KV.

½ 1

Evapts 230 + 1KV pulse.

2 1 sec

Reduce He pressure.

(He) Mo^{2+} (?) 600nS

2 Mo^{3+} 500 nS

1 Mo^{4+}

4 Mo^{4+} 450 nS

4 Mo^{3+} ~~620 nS~~ 520 nS

4 Mo^{2+} 620 nS.

Mo^{+} ~~8280~~

blank 720

620
1+
2480
6200
8680

8.5 KV

Looking for Mo^{+} very hard to decide if any present, so take 2nd, 1 at calculated delay & 1 away from it so can compare.
2 3 & 4+ peaks clearly distinguished.

He 5, 1 sec

Increase pulse to 1350

Remove helium.

vac Mo^{2+}

Mo^{3+}

Mo^{4+}

Mo^{2+} 570

Mo^{3+} 480

Mo^{4+} 380 312 9KV

He DIV 296 1, ½ op 1700 ip

He 1 306 evapts + pulse on He

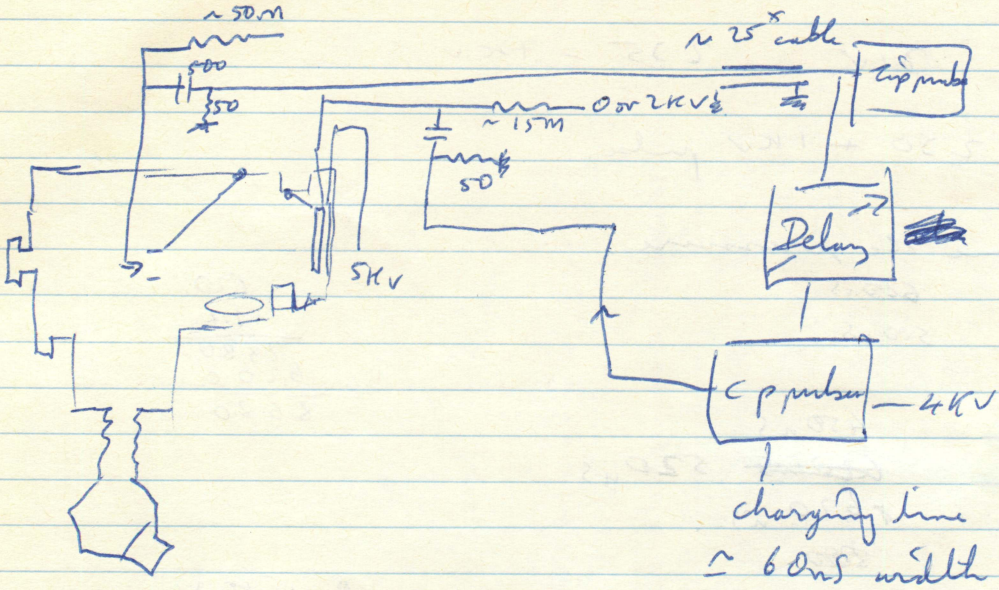
He Mo^{2+}

He^{+}

He^{+}

~~He~~ He ½ DIV

Tunistor clamp probe as at present:-



Minimum delay ≃ 150 nS.
~ 20% attenuation of pulse by delay cable.

May 22nd Thurs. Ni_3Al (single xtal ex R.T.) 3×10^{-9} Ne 78°.

BIV. Series of pics 1 ± 1 1 ... at ~ BIV 160 = 4.5 KV
Image almost stable. Using 1·8 KV pulse.
2 main species in spectrum.
Expect Al^{2+}, Ni^{2+} from Ruddy's spectra,
+ also small amount of H^+, Ne^+.

(Ne) Ni^{2+}
↓
Al^{2+}

5KV. 3 or 4 pics @ BIV. see dim & bright rings clearly.

Move specimen.
↑ Ni^{2+} Pics @ BIV
Ne 3×10^{-5} Ni^{2+}
↓ Al^{2+}
1 BIV
±
Move specimen: original s-lattice pole now at bottom of pic.
Ne 1, ± Ni^{2+}
Reduce Ne pressure to ~ 1×10^{-6}.
Ni^{2+}
Al^{2+}
BIV 1, ± Ni^{2+}
Ni^{2+} } 2 adjacent layers.
Al^{2+}
Al^{2+}
Al^{2+} } 1 plane
Ni^{2+} (4 or 5) what looked like several layers evaporating in rapid succession.
1, ± BIV 208 = 6 KV.
Ni^{2+} 2 adj layers.

Film II
Ne Bright 200 10 sec.
1 dark Ni^{2+}
Ne.
Ni^{2+}
Ne. bright top
Ni bright ring.
Ne
Ni — brighter by eye This was dim ring ring
Ne
Blank

Ne
Ni
Ni
blank
Ne
Ni first
Ne ~~1 dim~~ faint ring left
Ni ? dud
Ni ?
Ne bright ring left
blank
Ne bright
Ni from top ring
Ne — bottom dim ring cropped on to own.
?
undiffuse.

Very difficult to see when Ni from plume goes, almost appears to go as 3 layers. (??).

N_L N_L N_L N_L
N_L AC N_L AL
N_L N_L N_L Ni

Ar 20 Same trip $> 10^{-9}$.

|

½ BIV

|

2-5KV pulse
7KV = 2 5+ standing V

BIV
BIV
BIV then cp off & cd Ar^{2+} superposed
BIV
BIV
blank
BIV
a + Ar^{2+}
BIV dim ring left.
BIV + Ar^{2+}
BIV dim ring gone.
BIV + Ne^{2+}
BIV dim bdy top
BIV + Ne^{2+}
BIV dim ring gone.

Sequence

Ne | , ½ BIV He gas cooling.
{ | BIV & dim top ring {220}
| a + Ar^{2+}
| BIV bright top
+ + Ar^{2+} — Ar seen erupting.
BIV bright top again
BIV ~
BIV + Ne^{2+}
BIV dim ~ ~
BIV + Ne^{2+}
BIV bright top ring

Ar^{2+} comes off with dim 220 rings.

200 BIV bright top
BIV + Ar
BIV dim
BN + Ar
BIV bright top.
~
~ Ne^{2+}
~ cooled up I think.

Flashed top.

June 4th AC $3 \cdot 10^{-10}$ nominal cold after 12 hr bake, Ar <u>50°</u>.

Not very stable — lot of crap in vacuum system

4@ D IV pulse = 1550 on 5-6 KV tip in Ar.

in Ar (
- AC^+
- AC^+
- AC^+ bit of a pop (oxide) bottom right
- AC^{2+}
- AC^{2+}
- AC^{2+}

½, ½, ½ b IV

Rapidly acquires ? H film hopping bright spots.

3 or 4 @ D V new posns.
- 3 AC^+
- 3 AC^{2+}

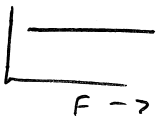
~ 1 ½ ½ B IV

2 DC oxygen + Ar some bright streaks etc, (lower gas pressures).

D of bright spot ammended to pic = ? grain from phosphor.

Run 6 At $2 \cdot 10^{-10}$ turned up in vacuum. 78°.
10 planes DC.
20 " "
20 ns pulsed hopefully.
20 "
Exp flushed.

? odd — apparently accepts DC & DC + ns pulse at about same holding field — ? to ink



Comparison $1 \cdot 10^{-8}$ Torr He 78.

$1 \cdot 10^{-5}$ He DIV ≃ 5 KV.

5
10
5 ns after energy 1 KV pulse
10
1
1

? 2+ 500 ns.
2+ "
? 3+ 400 ns
3+ ~10(110) planes.

Move DIV 1,5
Move to 100 1,5
2+
2+
3+ 3+ flushed.
DIV to) 1,5 6.5 KV Lin
2+
2+
flushed.

June Mon [illegible] 2 × 10^-8 [illegible] 78° K He.

Series of pics at JIV of ~ 2KV tip -> ~ 4KV.

Series of DC evapn desorption pics.

Pic of He JIV endform resulting from DC evapn vacuum.

New film Pics " " " " " " " ~ 7 KV.
Ps of " " " " " " in He.

Series of pics with evapn 7 + 1.3KV 800 µS pulses. multiple

prop ~ 10KV
Pics @ JIV.

Several DC evapn
He JIV of resulting endform, less zone dean in 200s.
" " after evapn in He
1 nS in He → series nS pulsed in vacuum. v bright!
Series JIV in He after 7, no z-d to quench of.
" " nS in He
" " DC in He.

June 11th Thurs W(Cr) 110^{-10} baked, cold.

BIV ~ 4KV.
3 or 4 @ BIV. He.

1KV, pulses.

Very long series of alt 5 sec BN (He pressure low)
Then BIV + superimposed W^{3+} image.

Shift posn so 111 on screen, repeat ".

New film 2.

BIV 1, 10, 5
Next frame cocked up (c p relit before camera shut).
1 BIV
5 then sequence alt He, W^{3+}
Then another series off 211 planes

New film 3
More series off 211, 111, 200.
See W^{3+} from 200.
BIV
W^{3+} from (110) 20 planes complete.
W^{4+} from (110) pop
W^{4+}
W^{4+} faster evapn
BIV
BIV + W^{4+} superimposed 110

New film 4
BIV + W^{4+}, W^{4+} + He 111.

BIV 111
He^+

pulse 1160 Tip 4.5KV, 180

Alt He, He^+ from 111.
2nd pic cocked up cos camera shut before pulses off
1 'blank'

New film 5
Long series looking alt He BIV, W^{3+} superimposed on one of
outer 110 ringsystems to see if symmetry shifted inwards, etc.

He out (5 10^{-10} plunged) Ne in ~ BIV (blank) He BIV 183 Ne 140
BIV after ~5 evapn @ BIV with 2-16 KV pulse.

Nufsen DIV
DIV
10 planes W^{3+}
W^{4+}
W^{4+}
10 planes Ne^{+}

Alt $Ne^{3}_{2}IV$, W^{3+} . DIV.

Blank

Alt NeDIV, Ne^{+}

Nufsen 7
Ne DIV 5, 15
W^{3+} many planes III
Blank
Ne 15 in DIV
W^{4+}
Ne^{+} many
Ne
W^{3+} 40 planes 110 in Ne
W^{4+} quite a few.
Ne 100
W^{3+} many
W^{4+} quite a few.

pulse 2280
tip now 137 = 3.5kV

tip now DIV 210 = 5.2kV,

pulse 1580

Neand He in DIV 5 in 110
exposed 254 DC in He ~ 1 plane 3 secs.
215 NS in He "
275 DC "
237 NS "

260
218
276
239

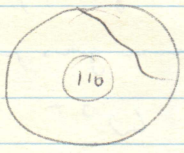
He DIV

30 ~~42~~ W^{3+} vac

30 W^{4+} vac.

111 W^{3+}

W^{4+}



gb He DIV several spectra

Nafshan . 8

Several He DIV .

W^{3+}

He

New lines W^{3+} many planes

He

blanks

looking @ $t \simeq$ ~~520~~ 520 ns.

W^{3+} many planes

DIV 1/2 1 5

Flashed → 12 KV DIV . He

15 planes W^{3+} pulse 7 KV.

DIV

W^{4+}

W^{4+} 20 planes.

June ~ 16 W/Cr ex PRH/DLI= ⇒P

He DIV ~ 5KV 1KV pulse

110 1/sec

gb 1, $\frac{1}{2}$

Reduce gas pressure

W^{3+}

He gb more

He new orient

W^{3+} ~~20~~

280ns

Triple point several pulses

W^{3+}

He

comment @ $\tau \sim 290$ns ($W^{3+} = 740$)

blank

He

? 510-540

W^{4+} flash 520 $3^+ \sim 700$

W^{4+}

Blank

PJTs @ atom probe Ir $8 \cdot 10^{-10}$ 20°K

Many pulses @ ~ DIV 15648 in He

2 pulses 1 sec 20.4 20.7 KV DC evap in vacuum

flashed.

(Same tip as produced many MS and S & TC pulses & also 4 PJT spectra, in He & vacuum)

1.7KV start — 21 kV end!

June 18 Al 7P 7×10^{-12} cold (20°K) Ne

2×10^{-5} Ne Many pics of various orientations, 1 sec – 20 sec
$\simeq$ 9 KV image
Pictures faint but fairly stable. cooling removes Ne;
Ne is probably not colloidal point.

Blank.

pulser 1.77 KV 20 KV

Al^+ 400 3 planes (111)
Al^{2+} 280
Al^+ 10 planes
Ne 10
10 higher.
(blank/Al^{2+}
Al^{2+}

Series of pics looking @ superimposed Ne-Ne, Al^+ images

Move to (100) in four pics

No Ne^+ peak seen, nor found by PFT.

Magnification 2

Series ~~animated~~ errors in ~ 20 region
Al^+, Al^{2+}

Move to region 100 v 111
Series @ 9 IV
oxide Al^+ Al^+ Al^{2+} blank
comes off

Tip gone.

Fe $5\,10^{-11}$ Ne 20°K 7P

TiVC

Ox PST, G Dunlop 1/11, 5 DIV Ne . ppts 8kV

blank

↑

Fe^{2+}

↳ 1 DIV . pressure down

Fe^{2+}

7P 5

ppts peak @ 210 ns (Fe @ 500

Ne

? ppt peak @ 465 .

Ne . No ppt

Fe^{2+} lots

Ne New ppt (small)

blank

New plate

(5) Ne

Fe ~ 12 planes

Ne New ppt

210 ns peak . bursts of ions @ .

Ne .

New plate Ne

ppt 210

Ne .

pulse to 1600

2 ppts New plate 5

Tip found to be warming up cos transfer line out of helium

Tryagain latin .

24 June Same Tip 110" 20K. Ne.
Zeb (2)

DIV 8.5 KV.
5, 1 off off-axis pole 100 or 110

DIV, + Fe^{2+}, 8 SV sequence off this pole.

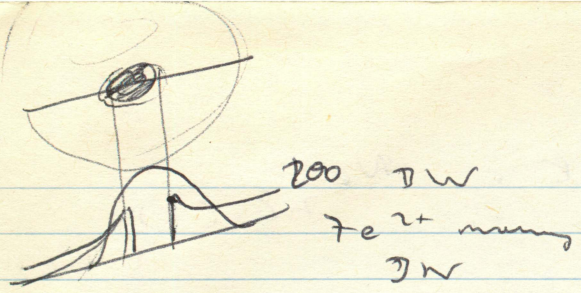
Gas pressure down

Repeat sequence several times,
Fe^{2+}, DIV.
More on boundary of some sort spotted.
Several pairs DIV
Fe^{2+}
1 on DW

Some specks @ 405.
DW
Some ~ @ 205 } ppt in one corner + ? boundary.
DIV
~ ~ 215 possible some spec.
DIV.
Some at @ ~ 400.
DW
Fe^{2+} . (~ 490)
DW
new plane 110 DIV.

Nb foil.
DIV ppt-
DIV
Zr or V @ ~ 420 nS. lowers p.
DIV
C @ ~ 200 nS
DW ppt gone.
New ppt - pole.
DIV.
Ti V
DV
Fe
DW
C.
7 V

few pairs C superimposed on Ne, c-p 1 KV spike 3rd $\frac{1}{2}$
DW



Nufilm on to centre f1·8 (+ Dallmeyer)

Series of pics looking to see if this lens combination is good enough to record single ions.
Then pairs @ f1·8, f2·8, f4, f5·6.
Some Fe^{2+} in vac.

Nufilm 4' (Common)

Fe^{2+} in Ne, DC vac, Fe^{2+}'s vac.

Oct 25th newplume, same film. 1 Blank.

Nufilm 5' Long series all Ne DIV (pulse 1800) & Carbon @ 200ns.
2 pairs @ same plume as last film.

Newplume opts
Sequence DW, C 200ns, occasional Fe^{2+}
& C, Fe superimposed on Ne DIV.

↓

Nufilm 6' Continuing sequence C, Fe etc.

Blank.
Change to opt peak @ 300ns.
Another sequence.

~~Ir 27 Shots~~ Ir 78°K 3×10^{-9} (Near sub-pump filaments)
FP

Ir polished rough in CrO_3 aq 15V AC/DC
finished in conc H_2SO_4 + 5% of CrO_3 soln, 15V DC.
good polish, sharp type.
100 or ? 311 orientation.

He 3 IV. 1 sec DIV ~ 5KV.

in He Ir^{3+} 820 ns 800 v pulse.
He^+ 210 ns
He DIV 1, +

pulse up to 1KV,
trap pressure down
Discover some decoration is a strong function of pulse height
goes away entirely using a 1700v pulse.
2 peaks @ +, 1 sec. of 200

Ir^{3+} in He using 1700v pulse. ~ 20 planes.
Several peaks Ir^{2+}/He +, 1 1
DIV 1 1 5
He^+ 1700 @ 200 odd.
& some ? peaks @ ~ 350 ish.

~~Ir 2+ should be @~~ ~~820 × 1.41 / 1.73 ns~~
85 + 7
~~≙ 4.8 × 1.4 ≙ 670 ns~~
4.8
1.4
192
480
672

2 peaks Ir^{2+} @ 980 ns 1700 v pulse
DW
DIV pulses at 1KV

He { Ir^{2+} , Ir^{3+} ← this peak seems to be stronger at high pulse voltage, He^+

Move to 1 1 pulse still 1KV

Ir^{2+}, Ir^{3+}, He^+ } 20 planes each

DIV

Nofilm 2 ~~pulse 2~~ DIV 1 10 20
pulse to 1700
DIV.

Ir^{2+}
Ir^{3+}
He^{+} } 20 planes each

DW tip now 6 KV.

Newplume pulse 2KV.
DIV
Ir^{2+}
Ir^{3+}
He^{+}
DIV
DIV
DCorBIV.

Tank to 200. aiming errors sequence. Ir^{2+}

Blank
Sequence ae's for Ir^{3+}

Nofilm 3

aiming errors 200 (He^{+}) 2KV pulse.
Blank
Pulse to 1KV.
Ir^{2+}
Blank
Ir^{3+}.
end of film

Nofilm 4
aiming errors 111
2+
3+ blank
trying several attempts to catch last few atoms on plane
Blank
Pulse tip up to 2KV.
end of film

Film 5. pulse 2 kV

DIV 111

3+ vacuum

2+

more to 100 still erupting

3+

2+ very few 2+ in 200 region al-

same evaporation rate as many in 111 region.

More to intermediate)11 plane.

3+ (the 111)

2+ half ends of specimen providing 2+.

$\vec{He}$ 5, 10.

Seeds 3+ plus small fraction of plane: 2+ / pin

In Helium 3+

2+

DIV

Seeds 2+ arcing errors in He

~~Blank~~

end of film

Film 6

Seeds 3+ arcing errors in He

Blank.

Seeds 2+ " " in He

more tips slightly

ND Repeated with pulse 1kV

2+ vac small pulse (no change observed)

3+ vac

some small coverage 3+ plus

pulse 2kV

Film 7.

Seeds 3+

Blank

Seeds 2+

3+ 20 plus

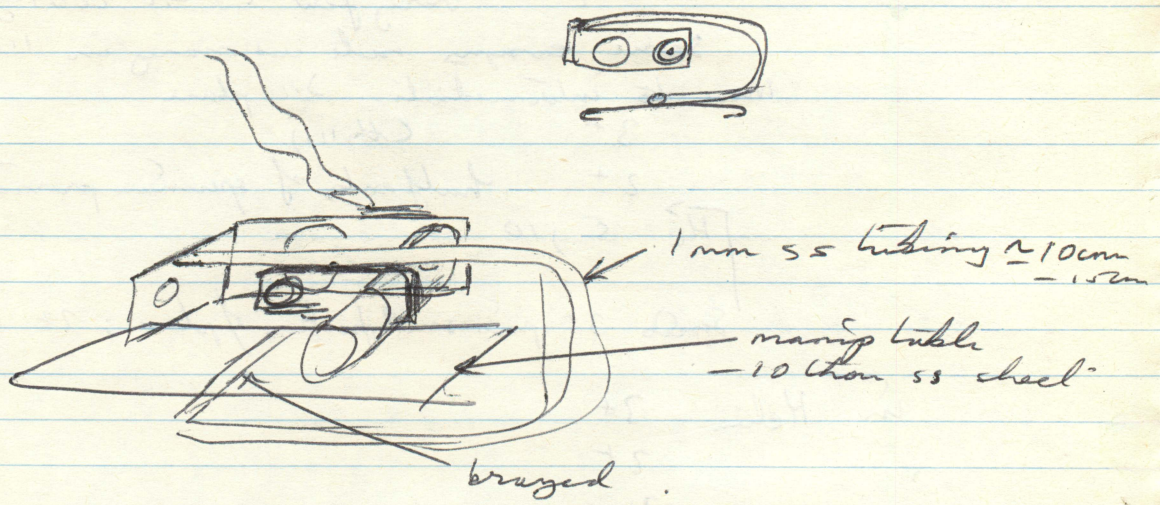
2+ ~20 plus. Less 2+ from highest-field region

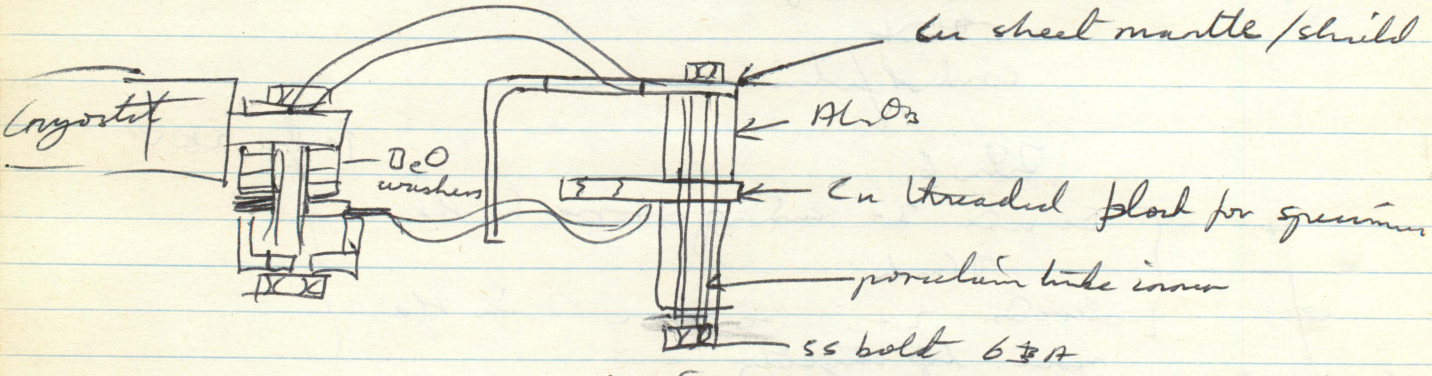
Seeds 3+ arcing errors. (2kV pulse)

Tip @ ~ 7kV.

Rebuilt manipulator & radiation shield
to a/ up KV
b/ cooler specimen
c/ reduce radiation input so less He consumed.

V effective (see Study 17 below for parts)





July 8 75 Same 1+ spec as before rebuilt,
~ 4 10^{-7} baked overnight
Apparently much cooler than previous "78".
(foggier pix before evap?)

2 KV pulse B1V 100 1, $\frac{1}{2}$.
2^+
3^+ } 20 planes each.
He^+

III 1 $\frac{1}{2}$
2^+
3^+ reduced g^{-5} few 3+, mainly from centre.
He^+

few looking at 1+ 3^+ many errors 200 ⊕

III 1 $\frac{1}{2}$
2+ vac ~20
3+ vac 20 planes.

200 vac
1+ 3+ 20
1+ 2+
few pix 1+ 3^+ small doses.

III 1, $\frac{1}{2}$
3+ 20
2+ 20
2× 3+ small exp
2× 2+ " "
1+ 3^+ 3 planes.

350 vac +ns
325 He +ns
$\frac{25}{350}$ 7%
10

Evapt like run with 2 KV pulse, t_{sp} ~ 8 KV
→ running III
Ref run 2
1, $\frac{1}{2}$ bin
3+ 20 planes
2+ "
series 3+, short exposures.
1, $\frac{1}{2}$ $1 \; 10^{-9}$ at end.

all 15 planes gone

July 10 Ir 1×10^{-9} 78 He/Ne mixture

Ir ? void, distort
DIV Ne promoted image
Ir^{2+} ~ 5 planes
DIV — — —
Ir^{2+} ~ ~ 14 planes.
DV glitch gone
more DIV
DIV 44 He + 5×10^{-7} Ne
Ir^{2+}
Ir^{3+}
blank He^+ ← 2KV pulse
→ Ne image 7 pps 8 KV DW He

lots of Ne, no He / Ir^{2+}
Ir^{3+}
Ne^+ ← same time so first one also Ne^+

replace Ne with He above
He^+ min @ 47_a on helyot
He^+ from promoted image — only ✱

Refill
He/Ne min
DH 220 He^+ } promoted image above bin for 220
Ne^+

move to 221 He^+ 1 KV pulse
Ne^+
He/Ne
He/Ne DIV promoted

showing replacement of He by Ne under promoting conditions
? He^+ very low
Ne^+ ? } 2 KV pulse
~ DV

311

~~He~~ Ir^{2+} still He/Ne 50/50

Ir^{3+} 3KV pulse

Ne^{+} DW for [illegible]

pulse 1KV He/Ne

Ne^{+}

Ir^{2+}

Ir^{3+} lots

He^{+} lots.

200 DV 1KV pulse (unstable)

He^{+}

Ne^{+}

Ir^{3+} -

Ir^{2+} ← most. ? [illegible]

Ir^{2+}

DW

3KV pulse

no He^{+}

Ne^{+}

Ir^{3+}

Ir^{2+} most

DW [illegible] centre to plane.

[illegible] [illegible]

several DW

BW

blank tip helipot 240 = 8.5KV

266 pulser 3KV.

261 He/Ne mixture

257

265

DW

210 = ~~A~~ Ir^{3+}

[illegible] Ne^{+}

Ne^{+}

BW tip 350 same pulse.

249

253

25

263

DW

blank ~~[illegible]~~ [illegible] He,

260

260
256
249

dud
200

tops 70

380 all 2+ 200 region } ~ same energy rate
34 ~ all 2+ + oxide

soldering camera & wait turning on.

$\frac{40}{400}$ 10%

11 Fri Ir 110^-9 78° He 1,1 DIV bit spotty.

1 ± 5 Ne typ 298 Ne DV

accepted 363 = 29 KV + 7 KV pulse (less 208)

Ir^2+ 2300 20 planes
2375 ~
240 ~
227

Ir^2+ 20 planes 218
Ne^+ 20 – 114
Ne DIV 298

Ir^2+ 234 20 pl typ 377
277
229
225

Ir^2+ 214 20
Ne 114
112
116

typ 387 Ir^2+ 220 20 planes
221.5 ~
218

3+ { 209
213 3 same reside

Ne 110 ~~reside~~

400 226
216

205 1 sec
205 20 planes.

Ne 96
100
110

17 July

Ir 20°K ~ 1 10^-9 Some contamination from ? H_2 — could be, & was, frozen out at v high He flowrate.

He DIV 321 × 2
200 × 2
nS 3 KV pulse + 10 KV DIV.
odd pin, no z-d

3+ (188)
No of prints short exp showing
3+ ~ ~~to~~ 5–10 planes
v difficult to set evap rate

3+ 20 planes.
111 DIV 5, 10 ~~[illegible]~~ secs
20 3+ 185a
20 2+ 197b

311
3+ 580 nS
2+ 670 nS
? 4+ 144b } 20 planes (520 nS)
?? 115b (470)

N film 2

321 BIV ~10^-6 He
200
111
111 3+ He
2+ He
3 or 4 prints of 2+ small coverage
111 BIV 1½
200 DIV ½ 1
3+ ~ 20 planes
lots of prints short exposures 3+
2+ 20 planes
BIV 10 KV pulse still 3 KV

311 3+, 2+ ~ 20 planes each

? 321 3+ 2+ 2+

200 series W^{3+} aiming errors
1" " " "

[illegible]

Series trying to get 3+ aiming errors from 321 ? evaptn or desorption of anod from shank or insulators

evapn in He @ ~ 445 + 3kV pulse. ~465 in vac

111 3 pics @ DIV = 344
Rd $1r^{3+}$ vac
$1r^{2+}$ Flash
He in tip on
move to 200 pics DW, de + ns evapn. He
1, 2 after ns in vacuum spotty

various $1r^{3+}$ pics but v difficult

various pictures in He

More attempts $1r^{3+}$/200/vac
but not progressing.

Tip eventually went away.

1) On evapting (pulsed) in He, cold, it was found that the same type of oscillating behaviour occurred as was noticed for W at <20% : evaptn occurred alternately from low & high field regions, & was v field sensitive (1 part in 400 made a considerable difference to rate)

2) In vacuum, was extremely difficult to get regular evapn — seemed to occur lopsidedly from 100, ? shape change considerable after He endform.

3) In He, saw evapn occurring as removal of small clusters of ions, rather than as individuals sequentially.

4) In vacuum, irregular spotty pic instead of rings, until central plane evapted all at once, when surround planes also evapted, giving  effect in des pic
this must be origin of rings in desorption pattern –

July 29th Au 20° K $3 10^{-10}$ mbd

12% Fe ex CDJ, oxford instr.

Flushed.

4 1% Rhodium x TPP $3 10^{-10}$ He He cooling (~40 min)

191 $\xrightarrow{3+}$ 64 820 ns →

so Rh $\xrightarrow[103]{2+}$ 51 → 730 ns

Version DIV He. 5 KV 1 KV pulse

3+ ~~err~~ counting errors

Then Rh^{2+} counting errors very few ions seen

Sept 24 Thurs with David Brandon.

W 78 ~2 10^{-8} at start

g-b

pulse 1700

BIV 1,5

W^{3+} ~ 5 planes? ~650 nS

BIV 1,5

W^+ 1120 W^{2+} 795 W^{4+} 562

K^+ 523 740 510

475

W^{3+} 5 planes.

W^{4+} ?. n.

HeBIV

He

All He / W^{3+} ~~ammm~~ errors around void

BIV

?. W^{2+} @ 740nS.

BIV

W^{3+}

BIV

BIV 12KV Several BIV along boundary right to left

3^+ 3planes

15 planes

> BIV

BIV

673 nS

Nafion 2

PW

4+

PIV

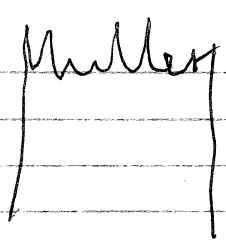
2+ } hopefully.

2+

3+ 20planes.

3^+ 550 $^{12+}$

pulse 2KV



puls 2-8 kV

4 +

2 2 +

DIV

3 + 570 630

4 +

BW

2 +

BIV 10,5

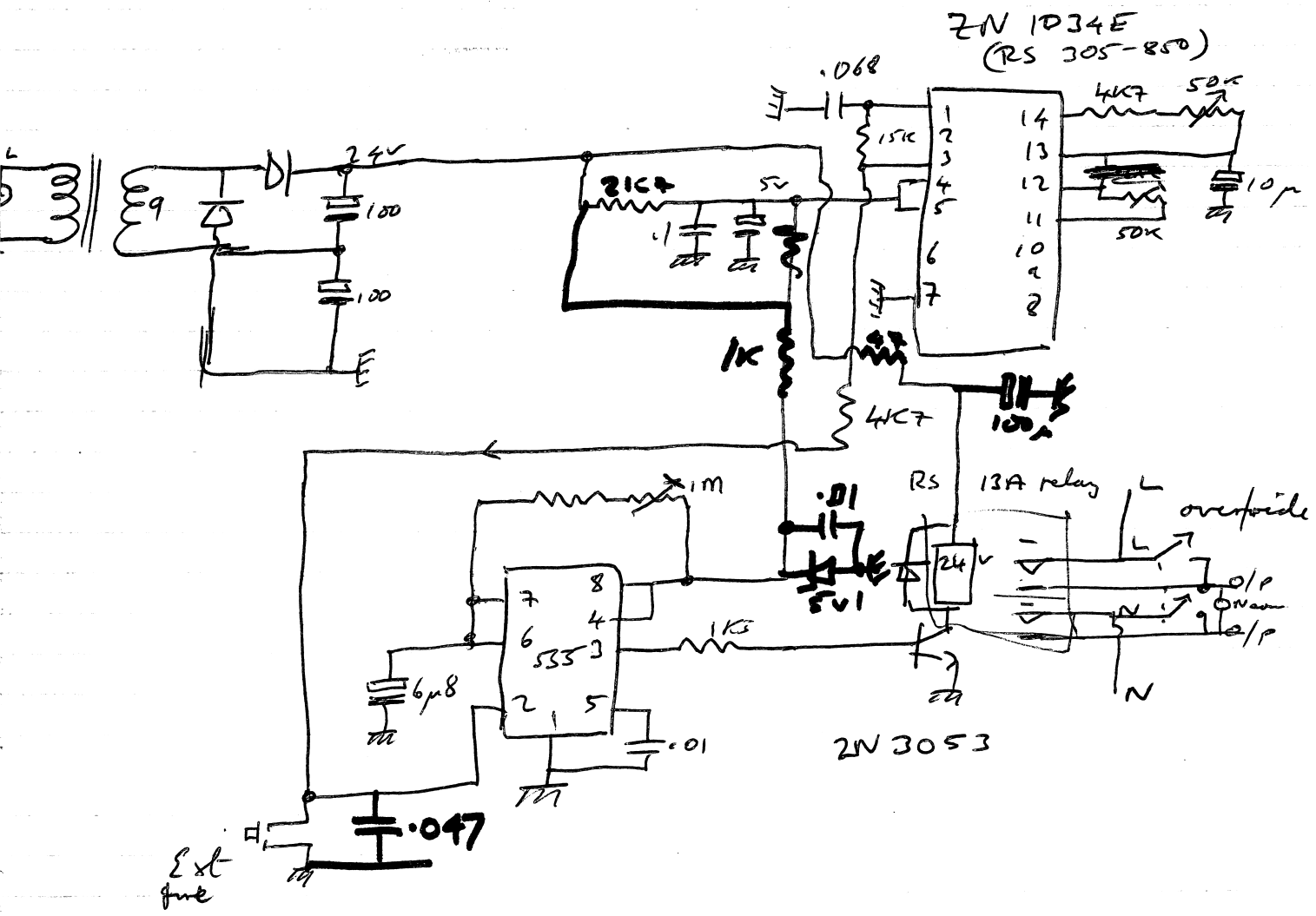
Nov 7 Building Pa-p time.

continued from before. programme
- Finishing paper on energy deficits
- Working on paper on field desorption.

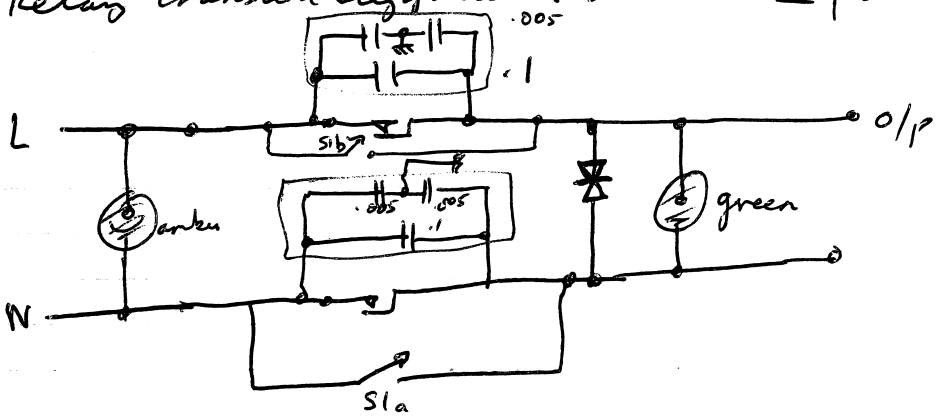
5 Jan 1976 Philips 300 e-m course.

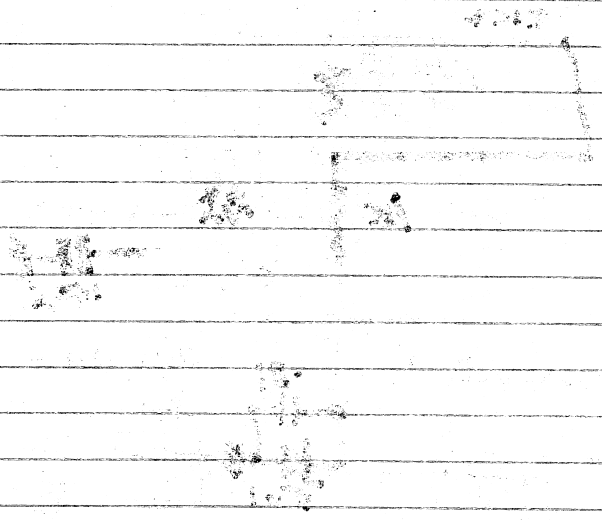
6 Tuesday EM 300 contd.

Timer for sub-pumps built, to replace lousy crowgt clocks :-



Relay transient suppression :- — prevents 555 resetting.



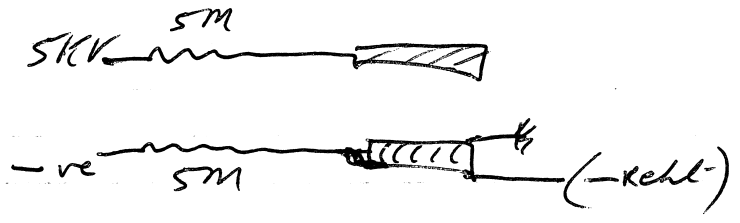


20/1/76.

Mullard arrayed-channel plate installed on SM?

P11 phosphor screen, electrophoretically deposited.
OK at 5KV — gap ≈ 3 mm as short of correct size of spacers.

Plate shows signs of life at ≈ 1KV if
— moderately high gain @ 1500 V, good, but unsaturated, gain @ ≈ 2KV typ (≈ 1000 v on plate)



Resistance of plate ≈ 50 M under vacuum, ≈ 50 K in air.

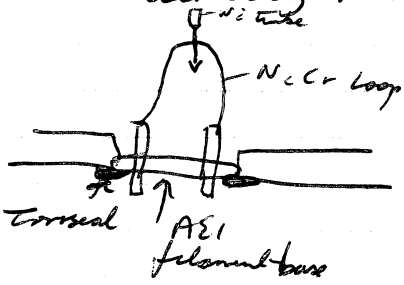
Some dark current, & occasional lit-up channels.

'Streak' across plate @ high gain — ? something to do with electrodes, as slightly movable when tip moved.

Typ Ir 78° 3.5 KV 3×10^{-8} background at start.

Jan – Feb.

Great deal of time spent trying to make epitaxial Mo films à la EDB only Mo & Ir substrates.
At too high $Mo(CO)_6$ pressures ($\sim 10^{-3}$ Torr) get grotty film apparently full of carbon.
At too low pressures (ie heating tip before admitting carbonyl) get corroded specimen, no film.
Some successful films, but v. few. Best pressure in oil pumped D.J.R. atom probe head $\sim 2 \cdot 10^{-7}$ Torr (cold trapped) with specimen directly & welded to NiCr loop



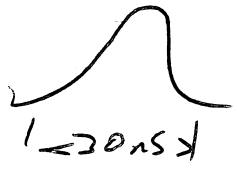
Done for Pt Ir project (never again!) for ? P.J. Fraser

March 17th Another go at mullard c-, plate.

This time using SN 7 int-circ amp at ×100 gain (100 MHz bandwidth) using 50Ω input resistor

At 2.1KV c-, volts output-, across 50Ω, Ω between 10 mV and 80 mV ÷100 ⇒ 0.1 – 8 mV input-

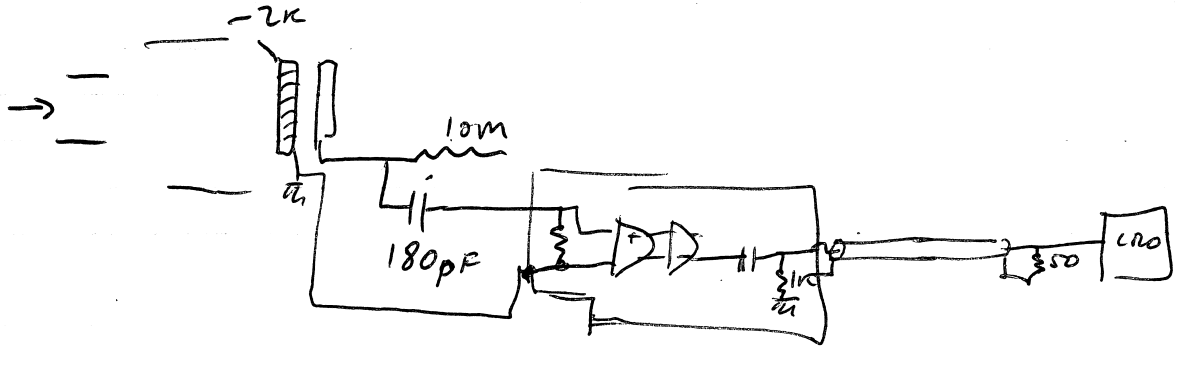
Pulse shape Ω gaussian today,



Seems to be some afterpulsing @ t = ~~~ 250 nS approx after initial pulse, then at ~ 900 nS.

i.e

Not a lot different when Ne → He, when c-pv → 2 ⇒ 2.2KV, or when V screen 100V ⇒ 3KV.



2. What happens if input grounded.

Seems to work much better other way round.
@ 2.25KV off Ω ≃ 130 mV & mostly quite well saturated.
Afterpulsing seems to have gone away. However there Ω now a large duff area on the c plate

Dead area Ω due to deflection of ions by leads inside converter – as V_{trig} → 5KV goes away.

Now run with 5KV on screen, 2.7 KV off on plate
O/P ≃ 180 mV, v well saturated.

2kV (nominal) 33 23 48 39 38 5047

+ 050	~~481~~	912	931	946	900	939	283
100	4160	3982	4089	4005	3984		
150	9114	9277	8885	8904	8873		
200	14501	14312	14303	14023	13736		
250	19732	19547	18959	18944			
300	23218	22916	22533	22826			
350	26440	25964	25813				
400	28712	28716	28014	28326			
450	29164	29807	28638	29394			
500	30802	30083	30145	30485			
500	46	29	34	35	39	37	28 noise level

These are counts/1 sec using ratemeter set to 50 nS o/p pulse.

Circuit used is R. Pages amplifier, with a 68Ω c/p resistor shunted by 2 diodes, and a S11 'and' gate on o/p feeding ratemeter, ~~threshold~~ of amp set so that there are v. few 'afterpulses' (tend to get 2nd pulse @ $t \simeq 100$ nS after start of first – amp characteristic rather than c-plate), $\simeq 1$ in 1000.

Cross used – Fe ≃ 5kV comes from Ir @ 78°K.

May 1/76 VG Mix $p \leq 1.10^{-11}$

Ar 3.10^{-5} t-g.

AC. (Eds specimen)

Series of pulses @ f4, 31V, 78K.

1 @ 50K

blank

Series @ 50K.

blank

Series 4KV bias + 3KV pulse endform.
Notice last different.

blank.

Pulses found to be knackered.

1KV pulse + 4KV
series 1/4 — Base + 4.
build up 110's, mark rounder

end of film ((beginning To Martin Balls steel space on atomweke, 18KV, 48 50K, Ne)).

Nafion 2. AC 1/May/76
ARW

1 as before
1 blank.
1200 v pulse
series
series reverting to DC endform

1320 v pulse
series
→ reverting. Tip now 5.5 KV bias.
1500 volts needed to get knife pin out of - plate.
1600 pulse → series

Nafion 3
Nafion 4
Nafion 5

finish Tip @ 8KV reverting
good pins with 6.5KV + 3KV pulse.

Starting from ordinary DC endform in argon (contrasty) with a largest pulse voltage (say 25-10%) as knobs raised spec shows to evaporate from 110's - little change in endform. at a slightly higher voltage 110's flatten & 111 develops (also 200). At higher DC still DC evapn of central 111 & 200 begins, leading to a bright 3 or 4 fold broad zone down (not v. stable, but bright, for 200). In good case, DC evapn the 200's look pyramidal (ie central region only is developed).

With pulser going, lowering DC from rounded endform evapn voltage, nothing happens, but on raising again the centre of 111 evapts as if by DC, unless sufficiently large DC is applied — ? some form of film collected @ low field.

Evapn rate needed to get round endform is not high, less than 1, plane / 5 secs is quite adequate. Evapn rate is v. insensitive to field in the central region, unlike normal argon behaviour.

Reversion to DC endform on evapn of rounded end is quite rapid, only some 5×111 planes make picture almost DC again. Less stereography is visible with round endform (see end of film 5 for comparisons).

May 11 / 76 W $5 \cdot 10^{-10}$ (baked, during TSP) 78K.
dynamic.

few pulses @ ~ 3 1V 7KV.

Pulse 1.33 KV. + delay line.

W^{3+} @ 20K. 10 plateaus W^{3+} (He) ~~1.5~~ $1 \cdot 10^{-7}$ Hc
$5 \cdot 10^{-7}$

W^{3+}/C ~ 10 plateaus 15 2
dual
10 plateaus.

12 May 76 W $5\,10^{-10}$ (baked) He $7\,8^{2}$

110 not central, ? bent tip.

DIV ~5KV 110 several pulses
111 ~
110 pin.

+1KV pulse

He^+ nop
He^+
W^{3+} 215 10 pulses (110)
W^{4+} 183
W^{3+} 20 pulses
He^+ 41 7KV Bkr
W^{4+} 170

→ 111 several ~~pulses~~ pins
pulse to 1.88KV
DIV 6.5KV.
He^+
He less gas
W^{4+} ↓ 160
~~He^+~~ W^{4+} 192 } (111)

200 1, ½ of 4. DIV 7KV
W^{3+}
W^{4+} quite common
dud
He^+
blank

211/?411 ½ 1 ¼ of 4 7KV pin
W^{3+}
He^+
He^+ faster
W^{4+}
end of film

Radn shield had warmed up slightly.

Next run 2
211 — 111
2 pulses
W^{3+}
W^{4+}

delay for He^+ not long enough ← blank
Other delay line inserted He^+ @ 45 (W^{3+} @ 174 now)

Image in Neon (cont'd). 78 still
pulse to 3 kV,
DIV ~ 6-5 kV,

holding near Ne DIV,
2 pulses 110.

pulse to 2500 cos won't go properly @ 3 kV,

15 plumes ω^{3+} (10) 179
ω^{4+} 152

continue get-Ne? pulses misbehaving on top
high above DIV.

lips flashed

14 May 76

Co + 1% N6 ex AH,

DIV
143
199

50°

DIV
162

520 -10

9.5kV + pulse 1.6 kV

134 lot
189 ? segregant. but-lumps @ +4.

blunt

132
182
182

DIV DIV
dud
blunt
174
123
bw
~~+~~ 174
171

Tip was contaminated somewhat by topping spots.

Grotty endform, as also 2nd specimen,

Eventually looked at other specs, which had been stored in dry CH_3OH, & found that tip of each specimen was corroded/blunted. Furnace why.

5 Sat / May / 76 . W 520 ~ 10

290 W^{3+}
250 W^{4+}
70 He^{+}

2@ DIV , He .

W^{3+}
He^{+}
W^{4+}
DIV ×2
DIV ×2 (111)
W^{3+} 224
W^{4+} 203
He^{+} 56
DIV .
~~W^{3+}~~ DIV 100/211
W^{3+} 219
He^{+}
W^{2+} 178
DIV .

~6 KV + 1 KV pulse .

6.5 KV DW + 1 KV puls.

→ dumb .
DIV in He/110 ×2 .
50° $2 10^{-6}$ He + $.5 10^{-6}$ Ne

Pulse 1.8 KV + 7 KV dc ≈> DW .

W^{3+} 20 plumes 209
W^{4+} 176
Ne^{+} 115
He^{+} ← He^{+}
DIV
end of film

Nufilm
in DIV pulse to 2 KV
W^{3+} 189
He^{+} v rare .
Ne^{+} 106
W^{4+} rare 158 .
100 DW
W^{3+} 171
W^{4+} 149 quite common .
Ne^{+}
He^{+} ? 64 ? ? dunno what queries this really is .
64 definitely .
dumb
dumb
He^{+} 40

Det effic: pulse + dc bias
+ lens aperture
(via Dallmeyer)

DIV 100.
DIV 110
f·95
1·4
~~2·8~~ 2
2·8

} W³⁺ comparative det⁻ efficiencies.

cp DC = 0.

f ·95
1·4
2
2·8

} cp = ~~8~~ 0 V DC.

·95
1·4
2
2·8
4

} cp = 1KV dc.

·95
1·4
2
2·8
4

} cp 500V DC.

→ ↓ % det⁻

Hg only

Neptune 110 DIV
W³⁺
W⁴⁺
W³⁺ 20 plumes.
DV
200 DIV
W³⁺
W⁴⁺
W⁴⁺
111 BIV varying.
110
flushed.

typ ~1KV
pulse 2-4KV

May 17/76 W 50K 3.10^{-10} He

DIV 110
W^{3+} } in He 30 planes 5KV +1KV pulse.
W^{4+}

DIV
gas out-
I^+ 30 planes 225
4^+ ~ 185 253 = 6-7KV
110 DV ^ possibly @ I^4 +1KV pulse
111 DV
W^{3+} 30pl 209
W^{4+} ~ 177

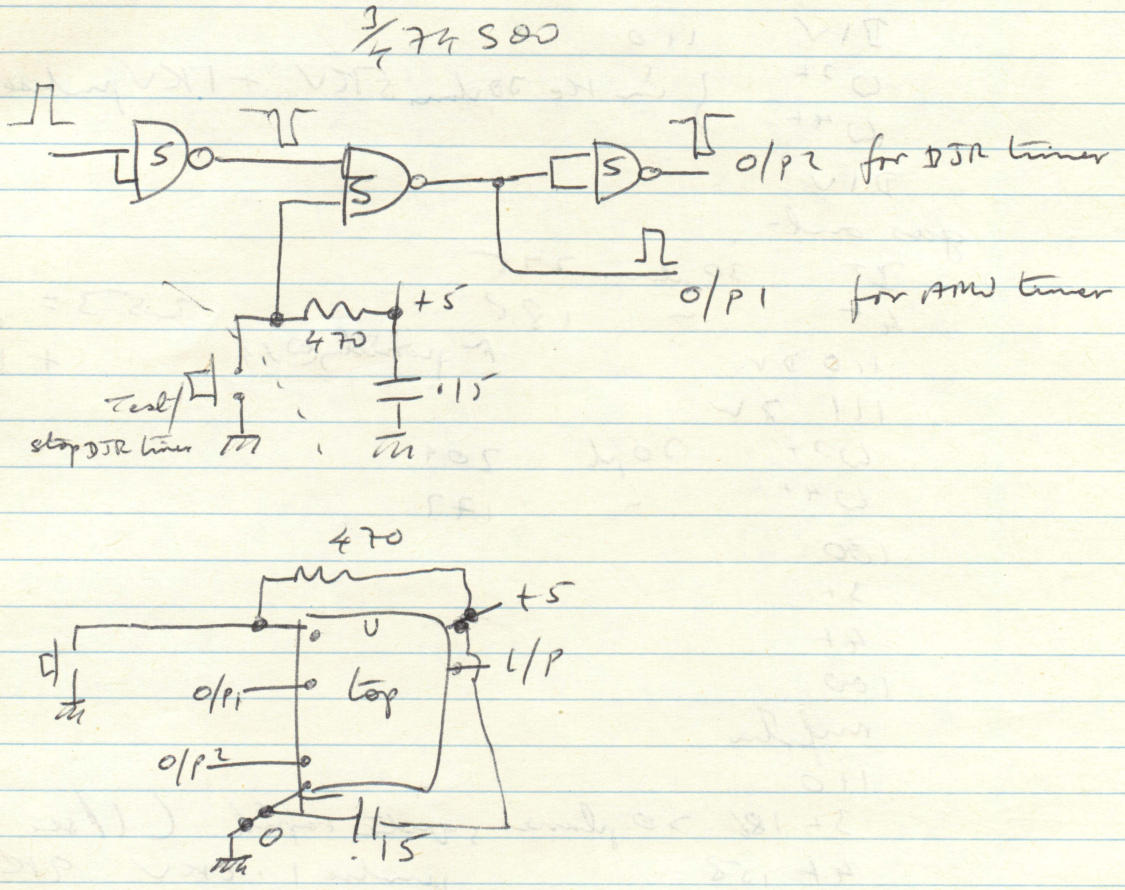
190
3^+
4^+
100
mixture
110
3^+ 186 >0 planes, quite rapid (1/sec)
4^+ 158 pulse 1.2KV 9KV dc

211
3^+ ~ 50
4^+ ~ 60
4^+ "
BW pulse 1-5 KV
110 DV. ~ 8KV

C-p dc to 2500 i/p
DC evap ~20 planes 110
nS ~ 25 " " all species.
110 DIV
111

111 DC → flashed.

May 20 Add-on amps for K-Page alpha-probe amp :-



Spent long time fixing 100MHz timers (DJRs & Mine)

DJR — shorting leads as usual. + Developed tendency to punch out groups of 7 characters (ie extra long times), dunno why.

KP's 100MHz clock with shorting wires in mine — fixed.

Now works OK with one pulser & with 2nd between .7 KV & 1.3 KV on top pulser; with full 4 KV i/p to c-p pulser leads to give spurious counts on no. of pulses - counter (any old counter). Minimum delay time & minimum dead time are still too long.

Tune I Turn Co/1% Nb 520°C baked Ne 50,

Not very stable.

12KV bw + 2·4KV pulse.

BIV

108 ~~Ar+~~

~~182 Xe~~ flushed.

Al/4[illegible] $3\,10^{-10}$ Ar 50

3 × Div 110 @ after ms pulsing 9 + 2·4

110 Th Al^2

182 $2\,Cu^+$ or Ar^+

Div

177 75 = 560 + 50 = 610

110 47 = 320 + 70 390

74 34 = 280 nS.

Div x 3.

Cu^+ 73

Al^+

Cu^+

Cu^+

Div

Div

flushed.

Al^+ 34 = 240 + 40

280 × 1·4

112

392 good.

390 × 1·4 = 3900 + 1560 = 5460

390 / 18 / 57.

27 × 1·6 = 270 + 162 = 432

27 × 26 = 162 + 540 = 702

For some reason this tip was v. grotty & grotty & unstable. looked as if solv treated rather than aged.

Cu detected all over the place, no obvious zones.

Wed 2 Thurs Al / Ag 3×10^{-10} 80°K.

Much stabler & argon image than last tip.

Polished DC + current in 10% perchloric (methanol, dropped off & backpolished at 15 v ac (short-lived)

15-20 v

Work plate @ 5 kV ~ 7 kV.

62
62
144.

pulser 16 kV

$27 Al^+$ @ 141	= 62 (obtd)	= 500 nS	8 | 100 decimal
$\simeq 107 Ag^+$ @	$500 \times \sqrt{\frac{107}{27}}$	= 1 μS.	12 144
			1

No of pulses ringing to admit silver.

Eventually DC + pulse on c-plate to try & see whether Ag^+ anywhere: found that a streak (attached to tip!) of ? Ag^+ (~~Cf~~ Cof 70 obtd = 520 nS = 2 × ~~Ag~~ Al^+ (~~Cf~~ 36 Sh) kept appearing: not obviously attached to any particular ppts (v. small ≃ ½" across) ? some oddity of top/side shape deflecting ions from a large ppt up shank somewhere. Took ~~to~~ some pulse-time exposures @ 10–20 secs.

Part of problems with Al specs traced to ~~xxxx~~ channel-plate outgassing – ~~the~~ plate & screen had it been severely outgassed & $p \to 3 \times 10^{-7}$ with field emission from remains of Al/Ag tip.

— ? origins of $IrNe^{2+}$ (i.e $IrNeH_6^{2+}$ or conceivably IrO^{2+})

Outgassed exp for ≃ 2 hr with bright ? picture, pressure (& gain) dropped a little. Part of trouble to screen outgassing under electron bombardment, as pressure ~~is~~ halved by dropping screen volts to level of c-plate output at brightness of typical ? picture ≃ 1×10^{-9} from c-plate & from screen.

Thurs Baked grave Al/electrophoretic screen to ≃ 400° in air & pumped for 45 mins to dry & get rid of any organics in screen.

With pure Al tip, 50, 2×10^{-10} starting pressure, Ar ion image would only last 10 secs or so before becoming unacceptably distorted.

Same film. New Screen.

Variety of pulse of MO $\sim 1\,10^{-10}$
in neon DC exp / fast rise → rounded endform.

	Nafilm	ortol
14KV + 2·4 pulse	100	46
	~~75~~	34
	116	53
		~~25~~
		52
		41
		33
	DIN	~~50~~
		41
20KV		32

June 9 Al $2\,10^{-10}$ Ar $4\,10^{-5}$

Series of pulses of 110 ft 1 sec
a) DC evap
b) ns pulsed ~~7.5KV~~ 7.5KV + 2.4KV

blank

Pulse to 1.4 KV

$1\,10^{-6}$	40 secs	Al^+	122	53
~		Al^{++}	81	35

$3\,10^{-5}$ Ar 3 DIV pulse 2.4KV.
$1\,10^{-6}$ Al^+ 117
dud
Al^{2+} 77 36
20 secs ft DIV

~	280 Evp	40s 111	Al^+	119 52
	340 Evp		Al^+	107
	350		Al^{++}	75

pulse too small to fold in centre
properly (cos delay pulse stops of pulse 3KV)

~420 plume		Al^+	109
Evp 53		Al^{++}	70
~9KV		Al^{++}	

110 + rapid evap, high Ar pressure
1+ so high background
14 + 3.
7+
blank -> knocked down.
$3\,10^{-10}$
plume 15 DC
15 ns 2.4 pulse
Al^+ 98
Al^{2+} 63
Al^+ ft 1.4 25 plumes
Al^{2+} ft —

12KV + 2.3KV pulse Lot of short tails of Al^+ showing wings :-) hopefully
50
13.5KV + 2.3 pulse Al^+ ~ 20 plume 84
Evp DC = 0 Al^{2+} ~ 52 all above with evp 300V + pulse
Short tails of Al^+.
blank

0	.95	1.4	2	2.8	4		
+300	.95	"	"	"	end of film		
" Newfilm	2.8	4					
600	.95	1.4	2	2.8	4	5.6	
900	"	"	"	"	"	"	f8
1000	"	"	"	"	"	"	"

Series DC exp, then S exp [illegible]
Al, f2 lens of 111, 110, 200.

654
530
newfilm Series of photos in Ar of DC / as S endform, series exposing rapidly DC in Ar. showing streaks.

10/6/76 Rhodium 50 $2 10^{-10}$ He

< 8 IV 1 sec ~ 4KV tips ? some defect on 111

* 3 or so orbit

$3 10^{-5}$ Rh^{2+} 26 planes 263 =

40 268 = 131

1KV pulse. 40 257 = 126

40 260 131

gas to $2 10^{-6}$ shorter charging time

35 247 looks like Rh^{++} in cubic

35 251 $RhHe^{2+}$ outside

still a g-b or something

No of pulses of various poles, + rapid DC comp also Rooms 65.

Tips ? burned when pulse applied – no pulse went rapidly away.

Mg $3 10^{-10}$ Ar

Series of pulses

9.5KV + 2KV 104

103

No of pulses at '8 IV' – ? oxide pushed out right-

58 58

12KV blank 103

series of double comp on 1sec

blank

88

58

8 IV

88

58

Ar out blank

DC comp → flash

NB 12/6/76 See 3 pages ahead →
AhCu

22
20

14/6/76 Fe/C Martinelli 50° ^{256} C^{2+} 6 ~ 200 n

C_2^+ 24

C_2^{++} 12

570 ^{10}/Ne 6 KV

6 × DIV 50°.

104 $^{7}Fe^{2+}$ orbit 46 = 380 ns 27

^{110} DIV 2 × 56 30

38 21

DW

DIV

amplifier { DW

DIV

100

38 = 22

DW

dead

38 22

47 = 46

DW → 64 33

46

DW Night

DW

~~38~~ 22 ← 1 blank 1 dead

~ 12 KV 82 42 Fe^{2+}

27

27

41 flash

~~~~ +2 KV pulse.
~~~~

23/6/71 Al $<10^{-11}$ VG Mix Recooling

$3 10^{-5}$ Ne 10KV DIV ± 1 2 10 ± } DIV
~ 1 2 10
l/min DC erupted endform.

series 10KV + 2KV pulse
~ 10KV + 3KV ~
blank
little removed x — 200 first series
more ~ ~
~ ~
~ end of film

Nuclear 2 DC endform series, cp → 900V
12.5KV Ne out → $3 10^{-10}$
cool a bit more $3 10^{-5}$ Hz
14.5KV ± 1 blank 2 10
l/min 2KV pulse v rapid eruption (DC imm!)
↳ ± 1 6 DIV
1500 v pulse series.
1 ---
20 l/min 1 5 10 20 cp 900 ≤ DIV
Nuclear 3
Hz ± 1 5 10 11 KV
blank 11 KV + 3KV pulse → zone deep
few pulses, 15 pulsed
Hz mostly out, Ne in
→ blank
few pulses of Ne / 18 endform — zone deep

DC eruption ~6 pulses
flash

7/7/76 Fe IC 60° Ne 3×10^{-10}

ex Martin Ball

3 DIV 23 KV after several flashes.

No of pulses of Fe^{2+} pulse 2.4 V sec. 067 height

? no visible segregation in the pulse.

Eventually flashed.

labelled 12/6/76

51 = ~~820~~ 410 nS
1010 = 640 ~360 -

Tues Al/4 Cu 130° < 100Å

$3(0^{-10}$ Ar

DIV ½ ¼ 1 of 2 8 KV

Probe 1.4

128 Al^+
DW
76 Al^{2+} also 360
DIV
128 $\frac{2}{-}$ Cu^{2+} v little
Al^+ ~~122~~ 113 . also 510
$\frac{2}{-}$ Cu^{2+} ~~122~~ 122 probably Al^+ 540
9KV $\frac{2}{-}$ Cu^+ 190 ~~4~~ 1010
+1.7KV DIV
114 52 Al^+
183 101 Cu^+
3 K DIV
+ 51
Cu^+ 100
Al^{2+} 35
DIV

Neptune

Ne $3(0^{-10}$ Recording.

Several ~DW

Al^+	92	43-44
Cu^{2+}	97	46
Cu^+	152	70 also

DW
DW 200 at bottom
~~65~~ Cu^+ 65
Cu^{2+} 45
Al^+ 43
DW
DW
Cu^+ 63
Cu^{2+} 43
Al^+ 41
Al^{2+} 27

DIV
DIV

Cu^+
Al^+
Cu^+

Nufilm 3
DIV 220
Cu^+
Cu^+
Al^+ pops
DIV
Cu^+
Al^+ ortrl? 7
DIV
blank
DIV
Cu^+
Al^+
17 KV + 2.1 ↑ 2-4 ↓ Cu^{2+} slight pop
DIV
DIV 200
Cu^+
Cu^{2+} ?
Al^+
DIV × 2 [+ set of 111, probably]

Nufilm 4
All Cu^{2+} or Al^+ or DIV — v low Ne pressure.
— occasional pops.
Fences don't show up after evaps in vacuum.

Tip warming up 'cos probe out of helium in dewar — end of run tip at ~ 16 KV.

Wed 7th
Nufilm 5 Ar/50 Al^+ 40 'ioc'
Cu^{2+} 50
Cu^+ 63
Al^+
Cu^{2+}
Al^+
Cu^+
Al^+

No of Pcu's @ Ar ~ 0.1 V after DC erasing (rapid,
Cup @ 15 kV in argon.

Out of pulse, out of helium, → lattice specimen a
200 regions can't be cleaned by rapid erasing, —
✓ transitions fit on them.

Aug 12th Thurs Mo 60 He + ? contaminant $\sim 10^{-10}$ (+?)
bright spots.

110 × [illegible]

Pressure down 2×10^{-6} ×1.
7 KV + 1 KV pulse

	orbit	
20 plumes	102	2+
20	64	3+
~	53	4+ ?
30	75	2+
30	68	3+
~	50	4+
	70	2+
	56	3+
	47	4+

1

Div 4 — helijet 10KV 400 + 1KV

Gas out → 5×10^{-10}

66	2+	pulse 1.4
56	3+	
47	4+	

30 + lots of short pulse, rapid

end of film

Next film 111 Div

gas down ~30 plumes 2+ 62
~ 3+ 52
. 4+ 44

~ 111 Div

2+	62
3+	52
4+	44 prop.

2

Then Trip finished.

Dlmth.

3

Nutip Mo 3×10^{-10} He 60° looks a lot cleaner.

110 1 f4 7KV BIV.

200 1, ½ f4

Pulse 1KV

2+	77
3+	60
4+	52
He^+	20

DIV

to 110/222 DIV × 2

2+	77
3+	57
4+	50
He^+	20

110 centre

2+	67
3+	52
4+	45
He^+	16

Few pts 110 annular zones – pulse mulching 2+

11~~0~~ ~~/~~ ~~222~~

2+

3+ lots around 111

Flushed.

Fri 12½ Mo 60 4 10^{-10} He g–6.

B1V 1½ 4 f4

Nufiltr ,

B1V

gas down 2+ 60

3+ 47

B1V

flashed .

Blank

Nutip Mo 5·5KV .

D1V × 2.

dead

4

1N 2+ ~20 106

3+ ~30 73

He+ ~40 20

2+ 76

3+ 62

4+

gas out → He+ 20 D1V

2+ 62 70

3+ 56

4+ 47

gas in, to 200 D11V × 2

2+ 71

3+ 56

4+ 47

He+ 20 10KV + 1·0

gas out

vac 2+ 64

3+ 52

4+ 46

to 110 He $2\cdot10^{-6}$ + $\frac{1}{2}10^{-6}$ Ne 60°.
Pulse to 1·4KV Trig = 10 KV

2+	66
3+	52
4+	46
Ne+	42

No He+ ~~detected~~.

To 111, gas down a little

2+	66
3+	52
4+	46
Ne+	41
He+	20 a little near 111

DIV
→ 200 2×DIV
Nuclear
DIV Pulse @ 1·8KV +10KV.

2+	68
3+	52
4+	44
Ne+	40
He+	16 with @ 200,

DIV.

S

He out, Ne early. Pulse to 2·4 KV.
Blank
Pin - uniform after rapid trigger as pulsed. 1, 4
a normal - a slow trigger 1, 4
Rapid 25 planes omitted

2+	62
3+	47
4+	44
Ne+	37

↑ Pulse reduce to 2·3KV

DIV slow

2+	60 ~~50~~.
3+	47
4+	44
Ne+	37

( ) DIV uniform
DIV
→ 111 DIV ×2

2+	57
3+	47
4+	42
Ne+	36

110 4 × 3+ ~~aiming~~ errors.

Sat 14th August Same Cup No 60 4.00^{-10} some spots ? neon from yesterday.

12 KV + 2 KV pulse.

He. 110 DIV

		actual
~45 ph	2+	52
~40	3+	46
~45	4+	40
~45	He^+	13

DIV

111/211 DIV

2+

3+

4+

→ He^+

Slight pop →

200 DIV ×3

2+

3+

4+

He^+

Gas out.

2+

3+

4+ 200 DIV 14 KV . . 633 15 +

111 DIV 15 KV 2+ He 617 15

3+ ~3% He .

4+

110 DIV

2+ ~35 plumes

3+

4+

3+ rapid oxygen, series ½, ¼ on ring rings.

flushed.

Mon W 5×10⁻¹⁰ He g-b (film from E's a/c)
→ void in 7-P
8KV + 1KV pulse DIV
W 3+
DIV
W 3+
DIV

Eventually back to good surface with a g-b init
Series of pads down length of g-b @ DIV 7KV.
W 3+ 186
DIV
W 4+ 73
DIV
Mon DIV
Pulse to 1.9 KV
W 3+
DIV
W 4+
DIV
Move DIV
W 3+ 103
DIV
W 4+ 71
end of film
DIV
W 3+ 25 pl
DIV
W 4+ ·
DIV 9
W 3+ 25 pl
DIV
flushed W 4+

a

17/8/76

W 60 Multip 5×10^{-10} He g-b (pulse from Es' a/c also) — 3rd on film (above "a/c")

Series of puls of g-b left-right of centre, ~5 kV.

5+ pulse 1 kV 110 W^{3+} orbital 130 20 planes

DIV

W^{4+} 112

$DIV \times 2$

Move $DIV \times 2$

W^{3+} 25 pl

DIV

W^{4+} slight pop

DIV

W^{4+}

DIV

W^{3+} 25 planes

DIV

Series looking at spiral / 110 + aiming errors — central (above "110")

Move to RHS of tip $\{110$

$DIV \times 2$

New film

$DIV \times 1$

$\simeq \{ W^{3+}, W^{4+}$

Flash

g-b is flashed end @ 15-20 kV

$DIV \rightarrow W^{3+}$

$DIV \times 2$

W^{4+} ~~scope~~

DIV

W^{3+}

W^{4+} several

Pulse @ 2-3 kV

W^{3+} 15 planes

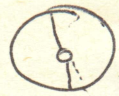
W^{3+} series of single, short exposures

end of film

New film series W^{3+} W^{4+} DIV

tip up to ~ 25 kV @ end, 2-3 kV pulse.

Quite rapid evaporation, ~20 planes W^{3+}, 4+ at end.



Tues W 310^{-10} He 78? v low angle g-b (1 pic 2's a/c)

7KV DIV × 2 . ordered
Pulse 1KV W^{3+} 20 pl 110
Pulse to 1.2 KV DIV — off centre
W^{4+}
DIV
— flashed.

~~17/8/76~~

1$_F$ 60 He.

Popped to ~15 KV .

Series of pics 420 111 200 311 @ ~ DIV
after NS pulsing in He .
200
2+ 20 pl
3+ 20 pl 52
He$^+$ 10 pl
200 DIV
111 DIV
2+ 15 pl
3+ 15 pl
He$^+$ 10 pl
111
420
2+
3+
He$^+$
Series short pics 3+ .
end of film
DIV 17KV Whole film 1$_F$ 3+ in He aiming errors 420 311
Myfilm 311 DIV × 7
2+
3+ 15 pl
He+ 15 pl
Series 3+
DIV
Tried to get remaining pics — flashed.

29/8/16

Thurs Ta 110° He 60°

2 × DIV = 8KV

Pulse 1KV DIV orbit

2+ 124
3+ 104
4+ 72
He+ 20 9KV + 1KV.

200 DIV ×2

2+ 120
3+ 77
4+ 70
He+ 20
?H+ — 13-14

111

2+ 113
3+ 75
?4+ v little 66 10-3 KV + 1.5 KV
He+ 16
?H+ 13 or less = 46 helpful

110 DIV 11 KV + 2KV

Nb 3+
2+
3+
4+ — flush → dwell 65
4+ 55 (3+ now 65 (2+ 100)
He+ ~15
H+ ~13

200
211
411

200
77
65
54 14 + 2
DIV ×2

200
211 Mode 5 411 × 20 IV
2+
3+
4+
N3 H+
He+ 41) helpful
DIV

211-111 DIV×2
2+ 76
3+ 63
4+ 52

He +
H +
DIV

to 110/211 Series aiming errors.

110 centre DIV × 2 16 + 2

654 Gasout 2+ 71
3+ 60
4+ 52
H+ Helgrot 139
DIV × 2

200 DIV × 2 . 15KV DIV = 608

Gasout. 2+

Nufolin
3+ 15 planes
4+ "
H+
2+ "
DIV × 2

211/411
2+ 71
3+ 60
4+ 52
688 H+
DIV × 2

211/111 DIV × 2
17.5KV + 2KV DIV × 2 after escape in He -> duster aiming
2+
11 3+
700 4+
H+
DIV × 2

642 = 16KV 200 DIV × 2
110 DIV
200 after 1 plane emptied.
2+
3+ Prop
DIV now 21KV
3+
4+
2+
2110 2+ 52
3+ 46
4+ 40

DIV

DIV 110
DIV 11ñ after crayon
110 " "
N after 110 " 23kV ↑ pulses at 2.0 sec
? 3+ } couldn't find 2+
→ 4+
43 ← 47/50

No of pics of curious 110 rings Ⓞ oralfish

Fri 20th

10^{-10} Ta 60 He

DIV ~2 6KV + 1KV pulse
2+ flash
2+ 125
3+ "
3+ " 102
4+ v little 72
He+ 20
H+ 12 8KV + 1.7KV
BOV
DIV 200
2+
3+
4+ small pop
He+
H+
DV
repeat 3+ ~no 2+
4+
DW
DIV 111 Tip pulse 10 to 100
2+
3+
4+ little
He+
H+
DW
78° DIV 211 pulse 2KV
2 flash
3
4
He
H
2
DW
12KV 110 2+
3+
misfire
4+
again 3+
14KV He+
H+
DW
guess at 2+
3+
4+ flashed ← 4+ looks like 2+ / think ? $M_2^{6+} \rightarrow m^{2+} + M^{4+}$

23/8/76 Ir/oxidised by DAC / $3\,10^{-10}$ Ne

2 × DIV ~6 KV

DV added

V_p 1·8KV Ir 41 — must be Ne^+

orders 51 O_2^+

Series @ DIVS of interfere ⊙

Pulse now 2KV DIV ~10KV.

Ident.

Melted 42

" 32

Several × DIV

metal → flashed.

now 104/32

240

64 172

If $\tau_{a^{3+}} = 75 = 610\,nS$

$m/e = 60$ (11)

Then 41 = 330 nS

$= 60 \times \left(\frac{610}{330}\right)^{-1}$

24/8/76 Ta 310^-10 outgassed @ 1 10^-5, 350°C for ~2 mins.
60 (Pix from Cs' Ac H ? defects following a slight flash during rapid evapn).
↳ but looks rather warmer & but unstable ~ 80°?
DIV 8KV + 1KV pulse.

3+ 105 ~ 30 planes?
2+ 122 very little
4+ some (~60 amu)
He+ " ( )

No H+ peak easily discernable.

DIV
100 BN

microfilm 2

200 DIV × 2

3+ 104
2+ 124 v little
4+ 67 fair amount
He+ 17
H → no pins cos almost zero, ↑
DIV ~ 8.9KV + 1.7 KV pulse

111 DIV

3+ 101 ~~+102~~
? 3+ heliride 104-105
No 2+
4+ a little 67
He+ 17
H+ a v little 13
DW × 2

211 " "

Seen @ DW nS evaporating 211 planes — on bright side of plane see 2 edges to plane — on dim side 1 only: as top layer goes see briefly a few atoms of next ~~layer~~ plane down which evaporate rapidly.

3+ 76
4+ 63
He+ 16
little H+ ? 3+ Heheride 100

DIV

110 DIV

3+ 75
4+ 63
3/Heliride + 77-100
He+ 16
DIV

Constant aiming error

microfilm 3

~~to~~ Ta^3+ aiming errors 110 axial

Gasont. 110   3+   72
4+   62
??? helide   75 — tail on 3+ peak still.
He   DW nSendfor
D'v   DC ...
Some sort of slice across tip
3+   72
4+   62

<u>Nufilm</u> 4

Whole film DIV 11KV v slowly (35 pics plume) evaporating — retained spots on 110 at line of bounding.

Nufilm 5

DV   bounding. a rotation of ≈ 30° about 110

Ta 32 F
≈ 100
? 132

eventually flashed.

4th Wed

Mo $2\,10^{-10}$ He 6 KV + 1 KV pulse 60°

211 Series 3+ annealing errors

~~Black~~

Nafion 2

More 211 Stainless errors.

Black

Series 2+ annealing errors, 10 4

Nafion 3

110 DW

Dark

Series 3+ a/es 64 7 KV + 1 KV.

Dark

Series 2+ a/es 100

Dark.

111 DW × 2

Nafion 4

111 DW

2+ 100 ~~70~~ 50 secs

3+ 57 60.

4+ 50 100 2

He+ 17 180 -

DW

grease 2+ run

3+

DW 4+

100 DW × 4 series

Pulse 2 KV +10 2+

3+

4+ } several

4+

He+

DW

run 2+

3+

4+

Damaged - Series @ DW

3+

segregated 22

Nafion 5 Current not working on.

DW 32

segregated 34

Mo^{2+} 50

DW

3+ dark

Seg ~~3~~ 4

Mo ~~3~~+ 50

DW × 2

u

Seg

Sea 30

3++ 47

DIV × 2

~~Zb~~ 30

3+ 47

1 dud
embedder → DIV × several

seg 31

3+ 47

v low gas
pressure
4+ 41

2+ 60

DIV

seg ~~Zb~~ 32

3+ 47

DIV

move slightly DIV

32

47

52 → as background level ~ but several
small 'pops'

Mufits 6

DW

DW

move DW

32

32

47

31

DW

DIV along b'dary

31

47

DW

32 quite fast ~.

47

DIV

DIV × many = 15KV

Mufits 7

DIV along b'dary 1

32

3+ 4~~7~~

32 ?

17

4 = He = 150

8 = 210

= 25

DIV × 2
move ~ × 2
32
32
3+ 44
32
DIV
move DIV
32
44
32
44
32
44
DIV
22 speculative.
DIV
27
42
27 } ?
42
27 × 180 secs
3+ 42 60 ″
DIV × 2 17KV pulse 2 rev still (controller 1800 v)
DIV
~~misfile~~ 8
DIV
27
42
27 | roughly equal no's of O/Mo
42
27
42 15 planes }
DIV
26 } ← Somewhere here gas out → vacuum
40 10 plane
→ 26
~~22~~
Series 3+ rapid less than 1 plane.
DIV × 2
DIV along Boundary
still OK.
8.20 pm. dinner time!

Also Spectra + Pics from DST's a/p. 3 spectra along b'dary.

Thurs 2 Sep 76 Mo 60 outgassed at ~250 for ~2 min in He. evaporator at $1 10^{-5}$ Torr.

? clobbered – off assy & flushed.

blank

2 pnds ~30 secs 1KV pulse + cp pulsed looking at dark signal of cp.

blank

'100' secs = '1464' pulses but counter not working properly

'100' secs = 113 secs actually ×27 Hz = 3051 pulses.

~~100~~ secs real 2700

200 secs 5400

blank,

3 pnds of 100 seconds each at 27 Hz

blank.

113
27
791
2260
3051

all above with tip pulse 1KV, tip bias 0, $2 10^{-5}$ t·g of He, cp pulse 2KV, cp DC 5KV

7 = 320 = 27.
12 = 260 32

γ/900/20 min WQ — ~6 days ago.

2+ 15/4/76 7e/C Ex MD 80 ?2 10^{-9} Ne

DIV x 2 f1·4
x 2 f4 17 KV
$7e^{2+}$ 47 30 sm
1 n
Pulse 2 KV

DIV
2+ 46
32 = C+ ?
2+
DIV .
DIV
2+
C+
C+ 27/30/31
2+ 9
DIV
Dlund
DIV
20
2+
20
7e 2+ 45
20
DIV
ended fin
C^{2+} 20 all ~50nm
$7e^{2+}$ 45
C^{2+} 17
C^{2+} 17
$7e^{2+}$ 43
DIV f1
DIV f4 1, ±
more DIV f# 1.
C^{2+} 50 sm
$7e^{2+}$
C^{2+}
C^{2+}
DIV
C^{2+} 20sm
n
n
60 n .
DIV

Pulse 2·2 KV
20 = ~~E3~~ 160
45 = 370 = 27 mms
20 2 mms 5.
6 = 175 nS = 21

60 secs Fe^{2+}
20 secs ≃ 10 planes.
DW.
move DIV
C^{2+} 20 secs
" "
" "
" "
Fe^{2+} "
Fe^{2+} "
C^{2+} "
C^{2+} "
Fe^{2+} → 60 secs = 10 planes
end of film gas ≃ 0 at end.
DW.
move
DIV. 15 KV + 2-3 KV
C^{+} ~25
Fe^{2+}
C^{2+} 17
2 C^{2+} B
Fe^{2+} 10 planes counted
C^{2+} ~ same time
DW f4
DIV f4 × 2 (C) (B)
N pole on left of image (C) 1 DIV × 3. (A)
C^{2+} 10 secs runs
"
" — flash — tip gone.
Blend.

24.5 pF / .014 G

$C_{cp/screen}$ 29.0 pF

$C_{scr/gnd}$ 4 6.4 pF.

$C_{cp/gnd}$ 136.6 pF // .173 G

$C_{cp/gnd}$ screen grounded 150 pF // .173

Thurs 14 Oct Mic rebuilt – a/c bent so tip not as cold as it might be

Mo. DIV in He . 78°. Gunning rate – unbaked.
Film looking at unwinding of spiral on 110
Some sort of ppt? off to one side of tip.

Ded
60°
$5 \cdot 10^{-9}$

Mo He DIV × 100 000.
Mo^{3+}
15 planes Mo^{3+} helpful-87
24
× dud.
24
flashed.
} probably a scratch on the c-p.

X ~ 27/10/76

Mo 20°C ≡ 3×10^{-10} baked.

+1.4 { 10, 20, 25 planes; 20 round, +2 } in ~~Ø~~ 5 mm – 15 mm
DC evap @ ~ 16 KV.
110 oriented.

rings locked ⇔ sort of.

2 × nS pulsed – 2KV ungated.
popped both times.
flashed.

2^1 96 = 670 nS.
4 16 = 273
33

Iridium 1.5×10^{-9} 60° He.

Lot of pics of q-b + segregant @ 3 IV ~ 11KV

1
Ir^{3+}
Ir^{3+} 67
Ir^{2+} 103 10 planes counted.
Set to 33 = amu 16 (O^+) – 40 ms.
DIV × 2.

DIV × 2.
Ir^{2+} 100
Ir^{3+} 63 ~ 15 planes.
DIV

N. pits

2
DIV × 2
Ir^{2+} aiming.
Ir^{3+} → 3 bunches / 135
23
54
55
Ir^{2+} 77 15 planes
DIV
Ir^{2+} 15 planes
Series short exposures of Ir^{2+} showing b'dary ⇔

3 Nafoth — Series @ ~DIV showing spread @ centre

Series @ alt DIV / Ir^{2+} @ 75

+2.

Nafoth

Move 4 DIV / Ir^{2+} .

BW .

In the Ir^{2+} 15 planes 1/sec 75

DIV

Ir^{3+} 15 planes 1/3sec . 61

DIV

75 = 610 = 96 so 16 = 250 = 31

61 = 490 = 64 = 245 = 30

8 = 175 = 22

20 secs @ 30/31 – slight gap .

DIV

more DIV DIV

37

22

32

32 } 30 secs each .

DW .

Ir^{4+} would be ~ $\frac{192}{4}$ = 48 → 430 = 53

52 . 30sec .

↑ good delay

↓

15KV + 2-3KV

Blank

Top of oppo .

DIV ×2 .

Ir^{2+}

Ir^{3+} gap

DW

Ir^{3+}

He^{+} 14 DIV

Nafoth

Series @ DW Ring matching chi

5 Series alt Ir^{2+} / DIV

Back to center, now full 200 instead of 111

3+V

Ir^{2+} 70 intermittent pulses

6

Multiple

DIV

Ir^{3+} 15

Ir^{2+} 15

He^{+} 10 pulses.

Dalton of Ir

Ir^{2+} 10–15 ph

Ir^{3+}

He^{+}

He^{+}

DIV

Long series @ DIV developing at ring matching ch

Flushed.

2×10^{-9} @ end.

Mon 1 Nov Rh $1\,10^{-9}$ He 60° 200 oriented.

DIV ~ 5 KV ~ 10 pairs

Flashed.

Tues 2 Rh $6\,10^{-10}$ He 60

Pairs @ DIV ~ 7 KV. [111]

Relax 1 KV Rh^{2+} @ 103 = 670

so Rh^{2+} @ 550 ⇒ 65

Rh^{2+} 20 planes 100/101
$RhHe^{2+}$ 20 planes 101/102
? Rh^{3+} @ 63-65 v little of any
DW

$RhHe^{2+}$
Rh^{2+} No He^+ visible (but plate moving)
? Rh^{3+}
Rh^{2+} both, 20 planes.
DW

Spiral on? 421 Series @ DW (0.5 KV)

Rhythm
series of spiral.
Rh^{2+}
DIV
Move DIV spiral moved.

220 20 planes both.

111
17 planes both.
Flashed.

2

Dlunch.

Thurs Rhenium $6\,10^{-10}$ He 60°

11$\bar{2}$0 or 88 st 10$\bar{1}$0
looking @ alt bright & dim rings
aka Melmed. 12.5KV DIV + 2KV pulse,
end of film

Wed 3/11/76 Same tips $6\,50^{-10}$ He 60

Series @ DIV

2 Re^{3+} presumably @ 70 = 560nS. 62amm 93 = 2+

Series aiming errors on 10$\bar{1}$0.

New film

More a'es.

11$\bar{2}$0 - or 10$\bar{1}$1

3 10$\bar{1}$0 Re^{3+} ~ 3 objectives (guess) 67 = 550
He^+ " 20 = 160
50 2+ @ 670 = 1880 107
4+ @ 480 = 60

4 Re^{4+} at 57
Re^{4+} pop
Re^{2+} 101
Re^{2+} "
3 IV x 2

10$\bar{1}$1 3 IV x 2
Re^{3+} 65
Re^{4+} 57
Re^{2+} little 75
→ above DW He^+ 17
DW

D IV 18KV
Pulse to 2-3.

11$\bar{2}$0
Re^{3+}
Re^{2+}
Re^{4+}
new film

5

DIV
Re^{4+} pulse jumping ~52
He^{+} (3+=60
DW
more DIV 14KV

lunchtime.

10 T 0
3+ ~~???~~ 57
4+ dud (pop)
4+
2+ 71
~~10 T 0~~ 11 T 0 DW

10 T 1 DW
3+ 55
2+ 72?
4+
4+ 47
He+

11 T 1 DW x 2
2+ 3+
4+
3+ 2+
He+
DIV

810 on heliport

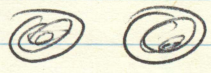
DIV all around
10 T n
3+
4+] vac.
2+

6

Nufile
Series 3+ showing " cluster
820 nS vac 2 x nS des image vac, (CPD)
760 nS He
Lots at DW 17KV. (vac nS and fam)

10 T 1
3+
4+
2+ dribble
nS des image - popped.
He won't take it : tip ~27KV

Rh 60 $6\,10^{-10}$ he

Trips marked on way into mic → 

Came good after evapn & pop or two

→ full of ? clusters & stacking faults.
lots of pits @ ~ DN, 3 fathers.

Mostly small evapns, some larger.

Thurs $7\,10^{-10}$ he 60 Same tips.

4 Nov 76

Series of small evaps of funny-looking pits.  ~ 10 KV DN

Nofathom.

2 More pits of defects.

13 KV Aiming errors Rh^{2+} @ 62. pulse 1.75 K

Rh^{2+} ~ 10 planes

3 Nofathom.
DN
Rh^{2+}

More
Rh^{2+}
More
~
more.

4 Nofathom (or ?)
Surface 2+

15 planes
DN
Dhard

Lot of sorts of small clusters of atoms
which went bright at low field & darker @
high, obviously moving in & out of the surface

7 Session 10 planes 24 60.
D I V 15 KV
- end of film
lunchtime

Tues 9 Nov 76

Analysis of EAMI/SAP helium bottle.

On diff pump $P \sim 1 \times 10^{-9}$ cold (60°).

$P_{He} \sim 1 \times 10^{-5}$ T-gauge

2.4×10^{-5} He Q4.

1	10^{-9}	C
.5		N
.5		CH_2
.5		CH_4
.2		OH
.5		H_2O
0		Ne
8	10^{-9}	CO/N_2 $\sim 1 \times 10^{-8} = .1\%$ — too high!
0		O_2, CO_2, A

Rh 1×10^{-9} He 60 Same tip.

$Rh^{2+} = 60 = 480$ nS 50 $Rh^{3+} = 390$ nS = 47

Series of lines Doming at DIV = 14 KV.
Pulse @ 1.75.

DIV.

Rh^{2+} 60
Rh^{3+} 47 ✓ little.
? background 2+ @ 65

Rh^{2+} 40 secs ~ 3 secs/plus
Rh^{3+} 100 secs
DW
DIV Pulse to 12 KV was not quite enough

more Rh^{2+} 40 secs
Rh^{3+} 80 " @ 46
DIV x2

8 421 2+ 20 planes at bottom of rise
3+ Spurious (?) cos gas pressure high
3+ out
DW faint, ...

? warmed up a bit
recool
... 'vacancy + interstitial'
...apparently
...one
Mufitar
More @ DW
421 Rh 2+
9 Rh 3+ @ 42-44
Gas out
Rh 2+
Rh 3+ slight pop in corrector.
Rh 3+
DW × 2

Move to 200 Rh 2+ 10 planes bright center.
Rh 3+ ~ ~
vac Rh 3+ ~ 20
Rh 2+ 5 planes, much slower
DW 200
~ 111 peripheral
Rh 2+
vac Rh 3+
Rh 3+
DW
311 DW
12 planes 2+ } roughly same
700 = 16.8 3+
3+ × 2

DW
small amp DC → flutter 100, 111 DW

D lunch.
DW
Mufitar
200 DW
2+ 10 planes.
pulse to 2.2 3+ 42 ...
He+ } 16 or so, v little.
He+ 10

14 DIV

2+ ← less than for 200 10 planes

He+

3+ v little

DIV

421 2+ 15 planes

~~3+~~ He+ 15-20

3+ ~40 very little -

DIV ×2

DC crypt DIV ×2

DC crypt at 733 in He 699 ns

DIV in 1.10^{-5} Neon 585 ~~600~~ = 14.5 KV

DC crypt @ 698 - 695 ns

DIV in Ne.

200 2+ 53

Ne+ 33

~~3+~~ 42 slightly

3+

DIV

14 DIV

2+

Ne+ 2 at +4

~~3+~~

421 DIV

2+

Ne+

~~3+~~

DW

end of [illegible] ~ 18 KV crypt, 15 KV DW in

Background $1 10^{-9}$ $1 10^{-5}$ Ne t-g

$= 1.5 10^{-5}$ @ 4.

$= 1 10^{-5}$ partial Ne

? v broad H peak $1 10^{-7}$

CO + N $5 10^{-9}$

$neE_m = \frac{1}{2} m L^2/t^2$

$t^2 = \frac{\frac{1}{2} m L^2}{neE}$

8KV ~~7~~5 = 610 nS

$\Downarrow$ 3+Ph = 42 @ ~~18K~~ 20KV = 34 amm, @ 10KV = 485nS (<340nS)

so 610nS = 53 amm

Hf = 180

So, prob 3+.

11 Thurs Nov
8×10^{-10}
New helium bottle
(2l)

Hafnium 60° Ke 10KV (11$\bar{2}$0)

11$\bar{2}$0
10$\bar{1}$0
10$\bar{1}$1
11$\bar{2}$2

} 2 points ea @ DW

also pts from Σ a/c 9/11
polished as for Te in
2% perchloric / butoxyethanol
at ≈ 25 v DC

11$\bar{2}$0 DW
Hf^{3+} 74
DW
flashed.

Repolish — lost inside ed a/c.

<u>Rhenium</u> — flashed.

Ablosharger rebuilt with extra 20" diff pump (Santovac 5 oil) added to prepump before ion pump valved into outer chamber.

Dec 7th Tues N_2, Al single xtal ex RJT
Baked ~200° for 4 days → < 1.10^{-10} static @ 60°K,

Neon. ~10 pulses @ DV across end of span.
Tips not quite vertical, (points uphill).

Thurs Dec 9 Patented steelwire ex Stefan.
60° 5.10^{-10} static 2.10^{-5} Ne.

~10 pulses @ DV, 6KV.

Fe^{2+} 65
DV

Species expected @ 6, 18 (Carbon) 14 (Si^{2+}) ~32 (?, S+)

Fe^{2+} @ 65 = 530 ns = 28 amu
6 amu → 246 ⇒ 31
18 425 ⇒ 52
14 374 ⇒ 43
32 568 ⇒ 71

C^{2+} 32 60 ms] rate ≈ 1 plume/2 secs
" 30 "] so ~ 30 plumes/min
" 30 "
Fe^{2+} 63 50 secs = 13 plumes.
C^{2+} 60 secs
N^+ @ 41-42 (or ? C^{2+}) 60 secs
P, S ~ 70-71
DV Fe^{2+} now @ 60-61
end of film. 6 @ 225 = 26 14 @ 340 = 42 12 @ 40 18 @ 340 47

DV × several
C^{2+} 30 secs @ 26
Fe^{2+} 20 secs = 15 plumes] @ 61

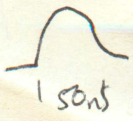
51-52
51-52
? C^{2+}
DV ×2

PW 1.0 extend 7KV
Blanks 7-turns

$\nabla \cdot v = 2$

flushed

17/1/77



−300 + 2KV
Screen 3KV

0 50 0 30 0 0 0 30 20 90 80 0 0 0 0 0
20,140 0 70 0 many 0 0 0 120 200 Many 0 60
0 50 110 80 0 20 0 80 M 70 0 0 0 0 0 50 0 160
980 70 0 M 0 0 0 0 60 190 0 M 0 60 980 20
880 210 0 0 0 0 40

730 27A

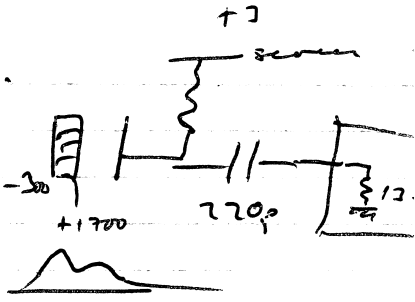
−300 +1700 190 x0 12A — all short (20-30nS)

$\frac{dm}{n}$ $\frac{2dt}{t}$ $\frac{2.30}{5000} = \frac{5n}{27}$ $\frac{6d \times 2d}{5990}$ .3mm

−300 +1700 .05V
1800 .09V Screen +3KV
.15V
.22V

18/1/77

o/p Testing curved-channel plate.



i/p -300 o/p +1800 Screen +3KV

end of a film — series of pairs of noisy single o/p pulses .5v/cm 50nS/cm

N. film more pairs as above (trig set to catch large noisy pulses lots of superimposed pulses

D Counter

i/p -300 o/p +2000 screen +3KV

Series at .5v/cm 50nS cm, single large pulses showing after-pulses.

Series with trigg level set to catch normal pulses.

Series of overlapping pulses, all heights.

Series " " " " ", 10nS/cm, .05v/cm (unsw

End of film.

8.5KV He^+, 3×10^{-5} pressure (W 78)

Try again, 'cos pictures undercooked.

-300 +2000 series superposed, good calib 50nS/cm
small large, after-pulses. .05v/cm

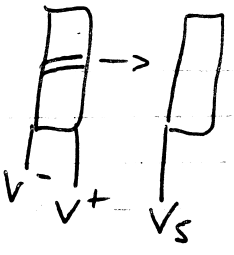
-300 +1700 small large pulses — few after-pulses .05 unsat
small superposed, less well calib

10nS/cm superposed.

end of film.

19/1/77 Same setup.

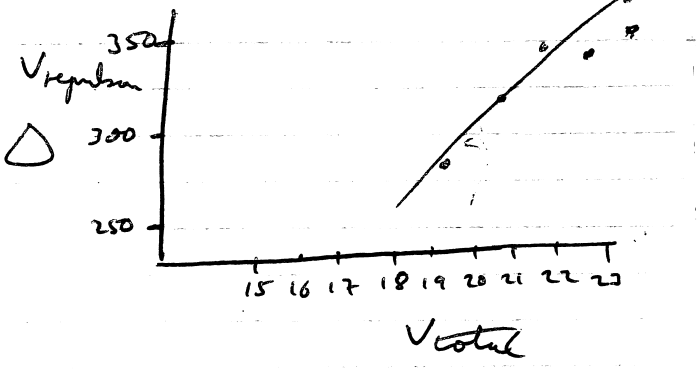
Energy of electrons from c-p



$V_s < V^+$

V_s min for some V^- delta

V^-	V^+	V^s_{min}	Δ
300	2000	1570	430
	1800	1450	350
	1700	1380	320
	1600	1320	280
	1900	1570	340
	2000	1640	360



19177 Ta baked in mic

— spinning endform — evaporated -> voids & ?
dislocations.

15KV $1\ 10^{-10}$ static He 60° (but warmer I think)

BW around end of spec. (tail end of pol. st. wire filter)

<u>Nafilm</u>

Small arrays of odd spiral on ? 111.

Flashed

Thurs 20 Jun 77.

Ta 1 10⁻¹⁰ Stat He 80 / separated by baked specimen.

HKV 15-17 21 DIV 107 130 ? Hydrogen

110 DW / 104 20 plus ? 3+
120 ≈ ~ (less) 4+

number 1.0 1 bkd → 20 He
14-15 H
67 4+
DIV

200 DIV

N film

200 DIV × 1 or 4
105
120
66
14
20
DIV

≈10KV

111 DV
3+
number 1.47 2+
4+
He+
H+
DW

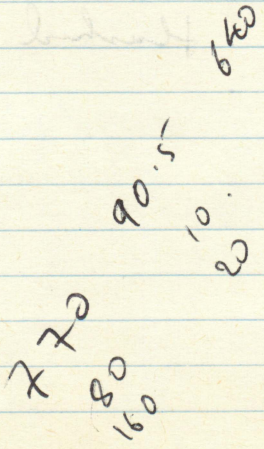
211 DIV
3+
2+
4+
He+ flushed.
Dlunch.

21/1/77 Ta $2 \cdot 10^{-10}$ He 60

Div looks a bit closer than yesterday all around.

200 Div 6KV + 1KV.

3+ 112
4+ 67
He+ 22
Div 7KV
Div
3+ 25 planes
4+ 25-30
He+ 25
flushed



25/1/77 $2 \cdot 10^{-10}$ (dyn) ($4 \cdot 10^{-10}$ ~~dyn~~) He 60 Ta

Pin slightly grotty, & III low mass atom, although supposedly outgassed,

DIV Series 5.5KV. III

4 3 2
110 121 142 1KV pulse.

3	114	100 secs.
2	132	"
4	180	v little.
He	22	"
H	15	"
DW	×3	

1

211 3+ 110 = ~~6+1+1~~ = ~~60~~ 64+8 = 720
2+ 132

4+ 620 4+ pop ← blank
56 ×
×6 4+ "

give up trying to find 4+ & more in 200/211 = 411

70 ×? 4+ 60 secs, not v much
106 3+
2+
He+
H+ — lots.
DW.

Take tip out to rebake.
Dump.
New tip, rebaked, warming, still full of H.

III	3+	50 secs
	4+	"
	2+	"
VHe	H+	"
	4+ faster	"
	3+	
	Mystery	
	3+	
VHe	4+	
	2+	
	DW	
200	DW	

2

3 +
4 +
2 +
H +

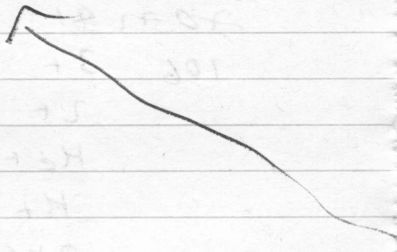
50 secs q. rapid.

211

3 +
2 +
4 + flash
4 +
H +

2 KV pointe

17 KV



26/1/77 Ta 2×10^{-10} stuck Hc 60
outgassed, evaporated, @ 400 in evaporator.

10 KV + 1.5KV

3+	77
2+	~~62~~ 117
4+	66
H+ flash	
H+	
He+	

1

gas out-

3+	
2+	
4+	
H+	

211 D.V

3+	71
2+	107
4+	64
H+	<15
He+	~17
D.V	
3+ flash	
D.V	

14KV + pulse to 2-3

~~time tip outgassed~~ 3+ flashed.

Another Ta tip, outgassed, 2×10^{-10} Hc 60

Series @ D.V (16 KV) of oxide

Multiplier?

2

3+17 DV 110

3+	~20 plume	60
2+	v~	73
4+	v~	51
He^+	~	
H^+	~	

gas out-

3+
2+ flash
2+
4+
H+ flash
H+

DIV 1, ½

DIV 1/1 ½ after DC aging in He.

DIV 200 210 111

DIV 200

	3+	15 planes	56
18.5 + 2.7	2+		~~34~~
	4+		50
	He+		
	H+		
	BW		
gas out	3+		
	4+	flush.	

gas in DW after NS aging in He at 21 + 3 kV

End of film.

Flashed.

When pin first observed, was faint. As DC raised, a 'shadow' moved off top (left to right (i.e. centre to edge)) v slowly, with a sharp edge, as if a thin film of something otherwise invisible was being stripped off.

27/1/77 Ta E_s a/c 110^{-8} He 78.

series DIV ~ 7 KV

gas out DC evapn series.

~12KV DIW f4

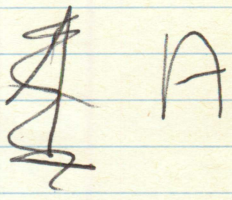
cool to 60°

DIV — slight 'vanishing film' effect as evapt.

series DC evapn f1.8

DIV

DC evapn

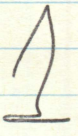


flushed.

Tgp not deliberately outgassed.

As ~~started~~ to DC evapt each time a film of something (? He or ? something else) came off surface before evapn proper started. Not recorded on prints.

SAP Ta 210^{-10} str He 60



9KV DIW 110 111 200 110.

+1.28KV [2+ 116 3+102 67 v little 2+ or 4+.]

200. 3+ 100 20 planes
4+ 65 ≈ ~
2+ slight pop ~110-120] v little seen.
2+
He+

rdge 1.96

No discernable H+.

11KV DIV ×3,
3+ pop.
4+ 10 plumes
4+
3+ 20 plumes
4+ 20 plumes.

No other peaps.

100 110 111 211 DIV ,

DC crypt 110 111 211

12 kV

nofilm

DIV 211 200 .

2

211 DIV

	3+	40 secs	67
12 + 2 kV	4+	"	60
	He+	.	~15

DIV

gas out	3+	pop	20 plumes ~
	4+		
	3+		
	2+ ?	vv little	

NO H, He .

DIV	211	111	110	100
DC crypt in He	211	110	200	111

111 DIV

3+		66
2+	a little	~~64~~ 103 ?
4+	almost none .	54
He+	some .	

DIV

110 DIV — N film 3

3+	64	12 plumes
4+	55	slight pop at bottom
2+	76	3 some
He+		
4+	another pop	O at edges of scan
4+		

He

14 kV +2.3 ↑

DIV

3+	61	110 secs ~ 10 plumes ?
4+	53	
2+	pop 70	
2+		
3+	10 plumes	@ 1 per 3 secs
3+	pop	↓
4+		↓

DIV 110 200 211 111

110 after NS in He .

Series aiming errors 110/He/Ta^{3+}

End of film

aiming errors 3+ 110 He . 4

200
Nufilm
aiming errors 3+ 200 He . 5

20 planes 3+ 200 .
DIV allround
End of film

Tip at 17 KV.

Extract, to try to get overall disorg pics.

In E's a/c Series @ DIV, 60, He
Nufilm
DIV ~ 14KV here,

Series of DC des. images, +1·8, then +2·8. 6

Series of ?odd endform @ DIV .
series of DC " " DIV ? working on exposure (+)

nufilm

More @ & below DIV, ~ 17KV, 7
Pretty picture, within limitations of TV screen.

Tip surviving, but dimmer-tone.

28/1/77 Ta Same typ Es' ar.

8

AES DIV (60) He, $1\,10^{-8}$

nS pulsed energy ~15 KV + 3 KV pulse (via RS delay line from SAT)

Flashed during 2nd pic.

31/1/77 W 78 2.10^{-5} Hg He

PJT o/p + curvy channel-plate

-300 +1700 on c-p (discharge at side of chamber)

Series of pics 50 nS/cm .5 V/cm (.05 + ×10 probe) to show amplitude of single-ions pulses
– some background noise from discharge as well as ions.
1 ½ ¼ ⅛ 3 secs.

Series @ 1 μS/cm coupling in He He^+, W^4, W^3 visible

Move to delayed ∃ timebase 100 nS/cm, sel for W^{3+}, Series

More with brighter trace – triggers for single ions on each pic

Series of superimposed pics – ie multiple ions, multiple sweeps.

1 μS/cm, rapid sweep – superimposed thin single shots

End of film

Movie for ~~and~~ Omnibus Lawrence : Moore

Hr.

Trying to oxidise Hr between 1mm & 30 min @ 700 C
— no successful trip — few pulses of r
unreliable spectrum.

16/3/77 Ir 1% Rh ex TFP.
60° 10^{-10} Hc.

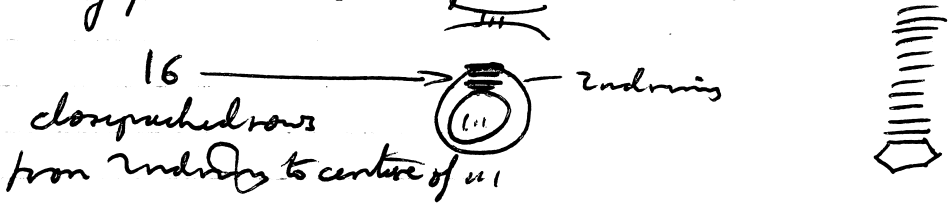
1 film looking @ 111, 200 small groups of atoms.
tip ~ 2.5 kV.

Nufilm 2

Series of pics of 111, all small retained group, then pic after group had been pulsed off, showing ~ same 2nd & 3rd ring — i.e looking at change in magnification of 2nd ring in removing central plane.

Blank.

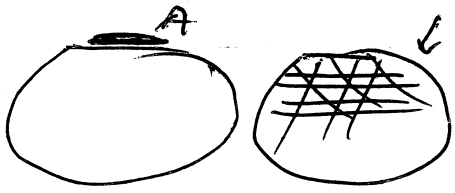
111 @ bottom for 311 @ top of pic.
counting no of close packed rows to evaporate, to get scale of picture & comparison with Drechsler radius.



Blank
16–17 cp rows 2nd pic
from 2nd to centre ≃ 11 from edge of 1st ring to centre.
??
Blank
Series chipping off 1 × — row at a time
on last pic we are looking at the innermost 111 ring

Nufilm 3

1st pic = last on Nufilm 2.
last pic just after central plane gone, with ≃ 3 rows left to go to centre.

i.e 

& pics taken just after row A has evaporated

← started 311/111/422 ring centre.

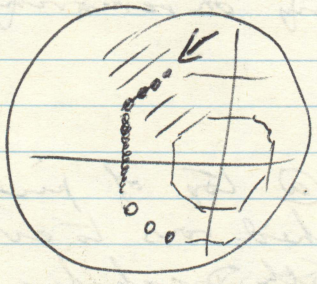
to give distance scale across pics
Tip @ 4 kV ≃ 530 v pulse
Blanks xx

Nother screen, starting on 4th 111 vary
— letting edge get brite, then latching photo —
except edge, let get brite, " " " —, etc.
until 4th layer entirely gone ≈ 3 or 4 runs overlaid once
on 2nd to last pic, as central plane went all in one go,

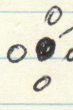
Blanks.

157/132.

200 screen chipping @ 4th 200 vary
on near closepacked edge



Then 200 plane looking @ halo effect.
looks like



retained atom stabilizing a group of Ir atoms.

Trip 4.5KV + 750 v.

95 Ir^{2+} @ 157 = ~~[illegible]~~ 7 + 40 + 64 = 113
63 Ir^{2+} @ 132 = ~~[illegible]~~ 2 + 24 + 64 = 90

17

so Rh^{2+} = 515 → 810 = 121
101 8

Trying to calib Rh^{2+} on 200, 111 -

Nafion

More pairs of ^{88}o halo effect.

^{88}o also seen — 2 photoelectron peaks.

>> ^{90}o

Series Rh^{2+} on 200 (@65 o'clock)

Nafion

all Rh^{2+}/200 superposed.

DC cycling till small duster left, then 25 pulsing

200 DIV

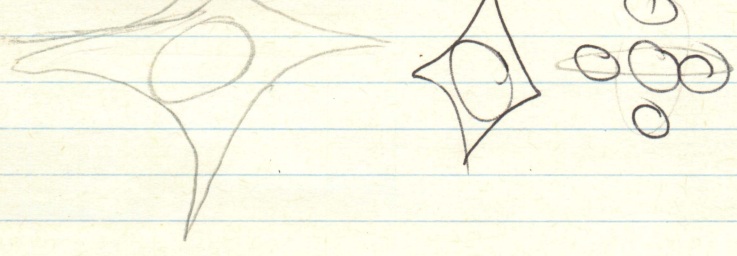
Nafion

PLEs of 421 — pretty.

(220) a-es 8KV +2·65

PSU's tripped out — 8·20pm — going home time!

$[2E_{AB} - (E_{AA} + E_{BB})]$

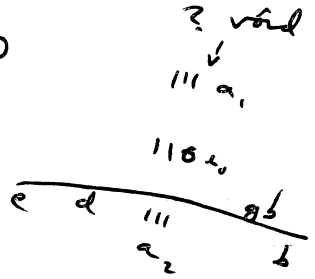


8 Mar 77 W/Zygm Cr ex RRH

g-b — pics from E's a/c 17 Mar 77 .

$2 \cdot 10^{-10}$ $3 \cdot 10^{-5}$ He 60

DW
9.5 KV .



Slow erosion on boundary

Neufchâtel
DW
DIV (d)

Void — bw
Erupt slowly thru void .

Back to g-b — DW

10 KV + 2.7 KV

amm
60 W^{7+} 75 = 610
45 Cr^{6+} 67 = 550 → 500
4 He 11 140 → 110

50 Cr^{2+} → $\frac{52}{2}$ = 26 → ~~500~~ 400 = 50

74 W^{7+} 60 secs ≃ 8-10 plasma .
dark Cr
?450 "
60 W^{4+} "

More slightly DV × 2
74 W^{7+} 110 secs 10 plasma
BW × 2
Cr^{2+} 100 secs — SFR .

Neufchâtel
DIV × 2
W 4+ 62
? DIV ~~B~~ He+ 15
DIV

More

BW

surfaces of pairs of bright atoms on b'dary (after not complete a lattice)

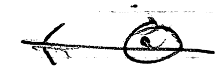
W^{3+} — drinking big flash.

Lots of voids.

Surface exploring these voids

Manifolds

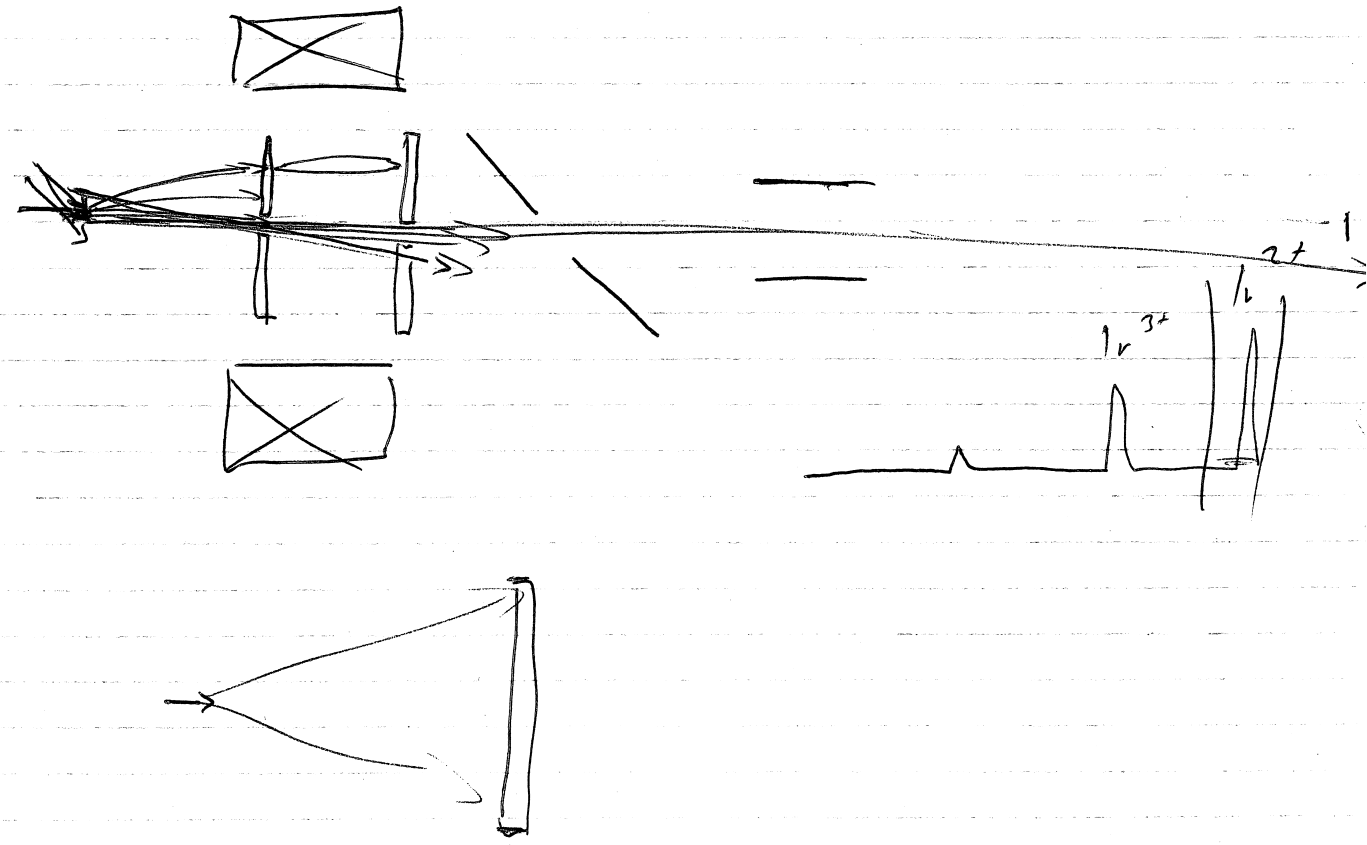
Surf vol ow.

110 - relaxed atom 

W^{2+} 64 → 520

15kV Cr^{2+} 340 ⇒ 42 30secs — initial

W^{4+} — flashed.



10nS