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An update on ANSTO Alphatross operations

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Accelerator Technical Forum 7
2014



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Working with an Alphasource Ion Source:

Progress and lessons learned managing operational and servicing constraints on the ANSTO Alphasource system. New challenges and ways forward will be discussed.



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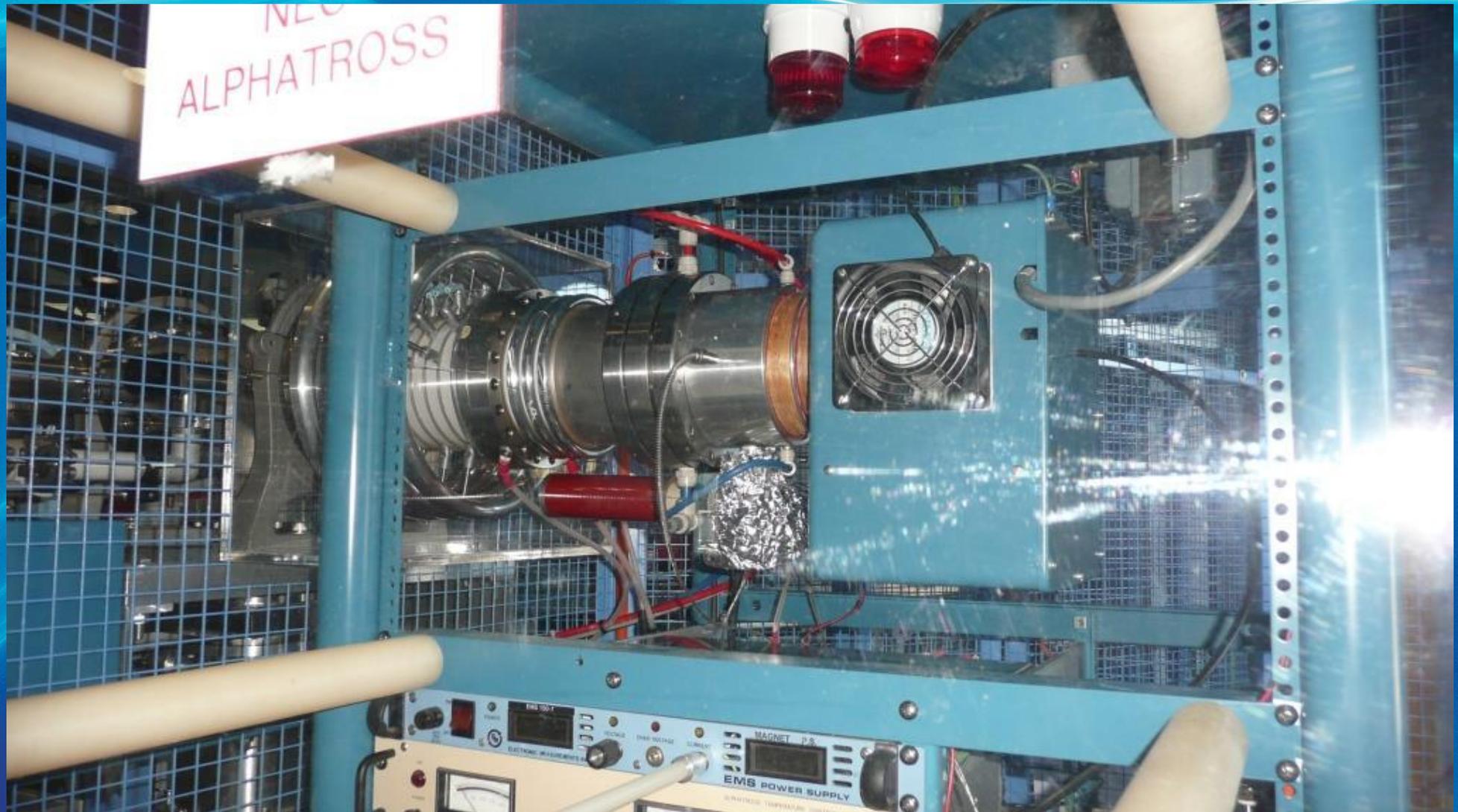
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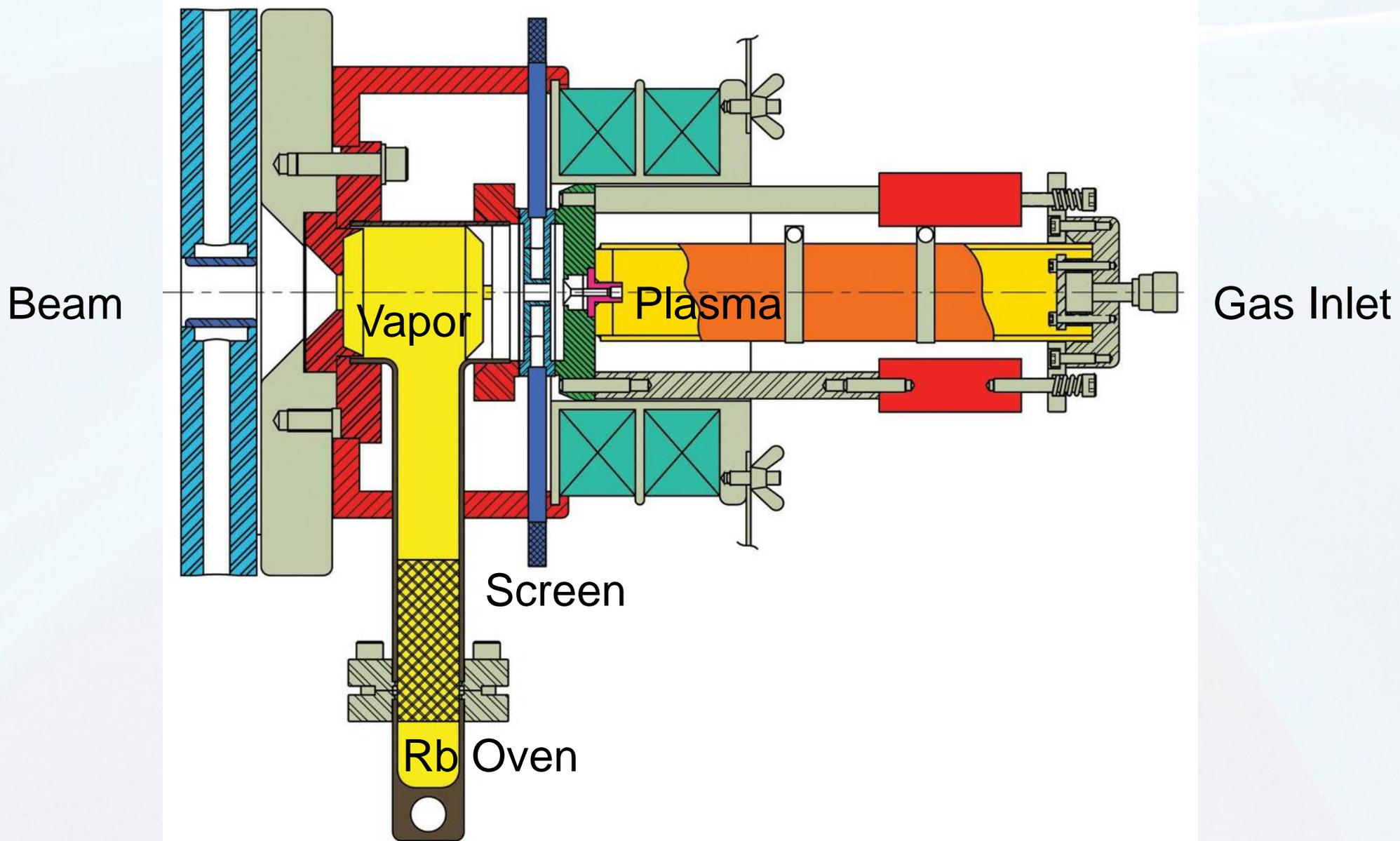
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Alphatross installed by March 1998



NEO
ALPHATROSS





From log in red:

“First beam from the Alphasross
14:15 Friday 13 March 98”

- 1st Rb change 31st March 1998. Learning about the need for 10g of Rb on recharge to successfully operate.
- 1st negative ions from the Alphasross 1st April 1998.

Expectations

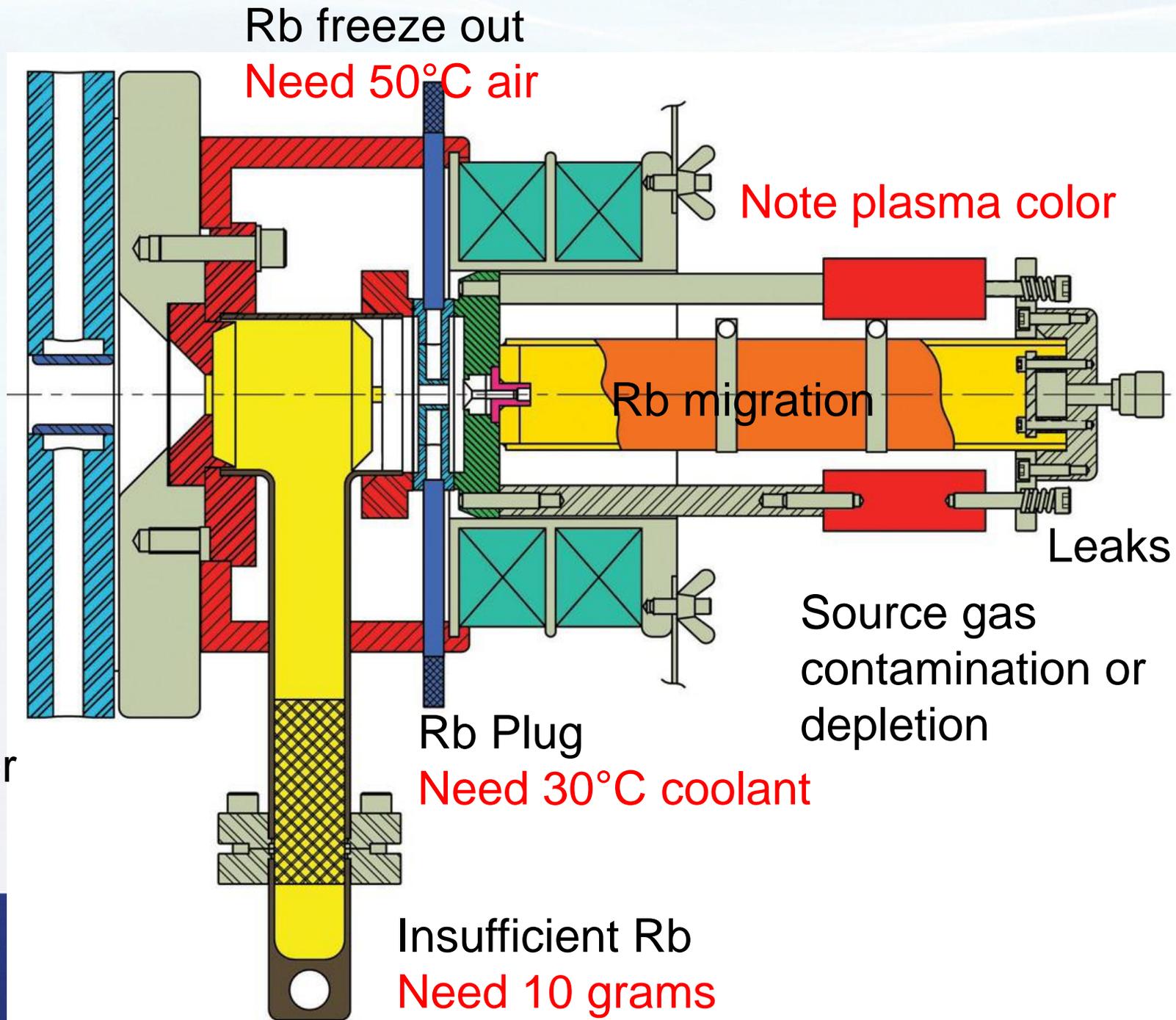
- 2-3 μ A He⁻
- >25 μ A H⁻

Random
Gate Valve
Trip

Rb Plug

Random power
supply failure

And we get





Looking like this.

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Blocked “plug”.

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QEX Chamber aperture.



QEX Chamber and blocked aperture.

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Drain canals trap more Rb

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Outside view of QEX chamber



Cooling flange



The empty reservoir

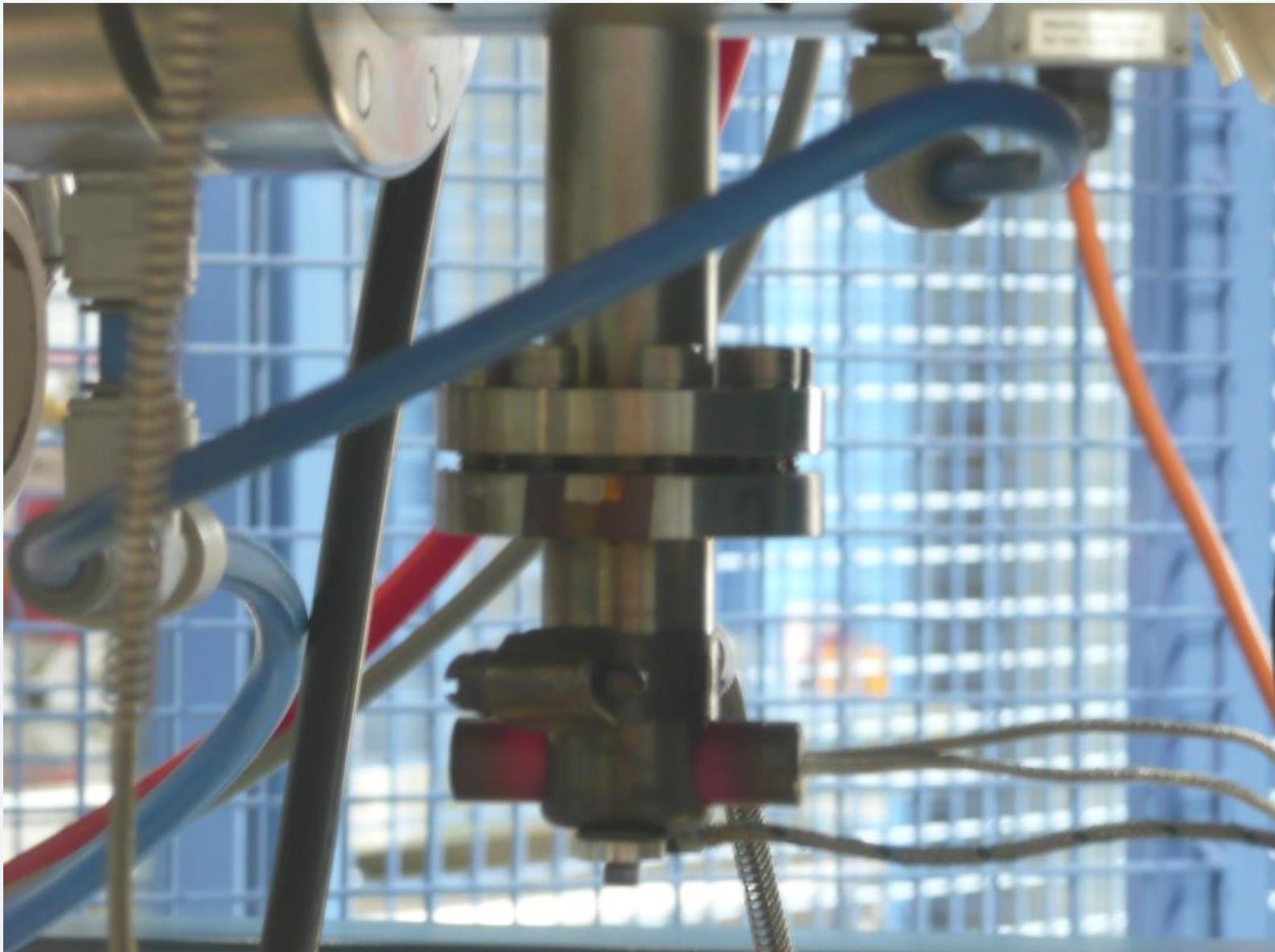
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Servicing

- Usually every time the Alphantross is in use.
- Range of disassembly from a Quartz bottle and insulator change to the preacc needing to be cleaned.

Frustration with the current output of the source leads to experimentation with the Rb reservoir temperature.



Overdriven Rb QEX Cell heater

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**Current did peak out up over 400°C
But the source was a mess.
A major clean including preacc in February
was followed by another one in June.**



Einzel body insulators cleaned and baked.

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Preacc stripped down, cleaned & baked.

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Blanking off the gas line helps pump-down.

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Then we started again

- **David noticed the plasma seemed weak.**
- **Discussion followed.**
- **What about the RF tubes?**



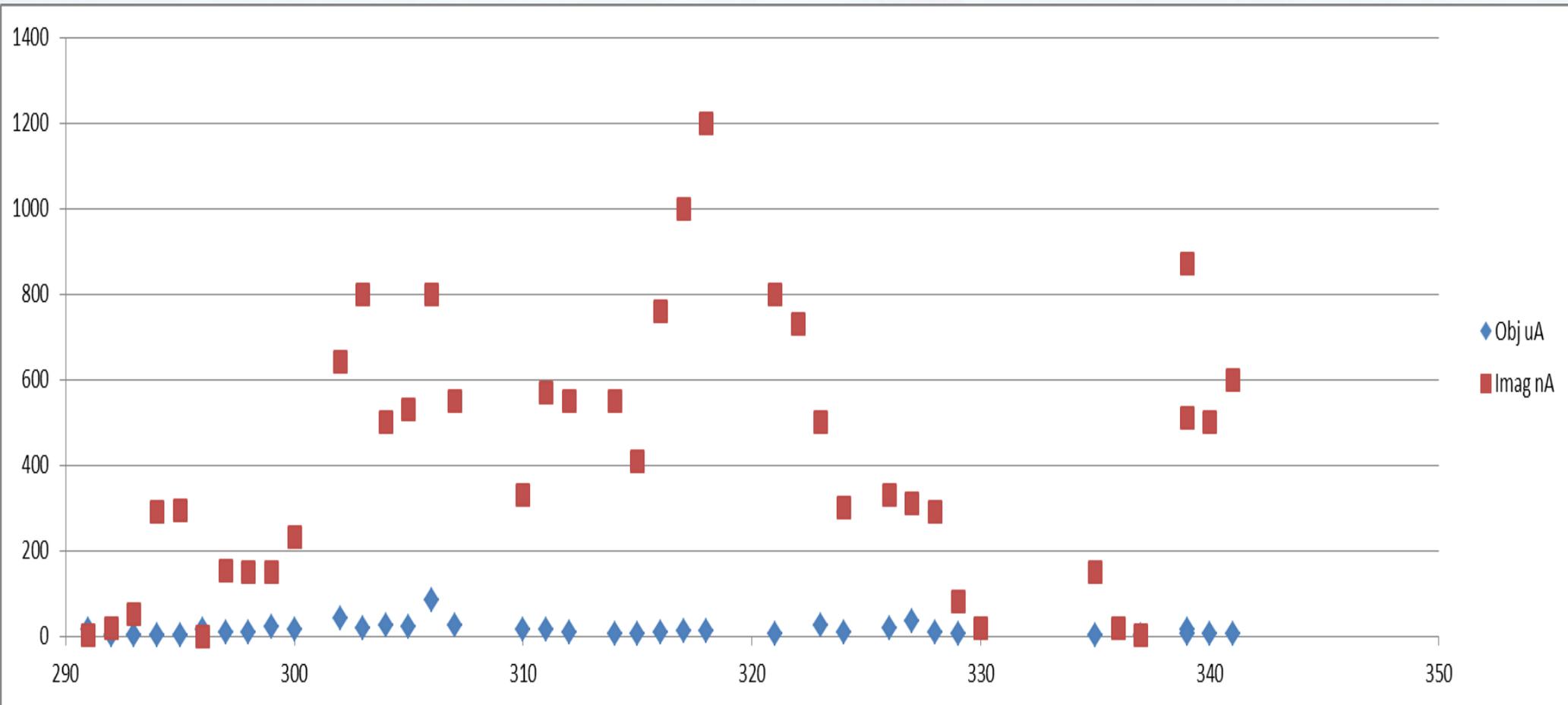
RF tubes.

Old and older, National Electronics & Eimac

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Results: He Image Current from Logsheets



While we were at it...

- Eimac 2703 data sheet recommends good air flow be maintained for reliable long life operation.
- Maintain core temp at 200°C with inlet air 50°C.
- Good tubes not as easy to get these days.
- Wouldn't it be great if they kept their gain longer.
- So... A dedicated fan?
- And... BTW... What's with the magnet now peaking around 3.5A?

RECEIVED : 2013-05-06

4CX250B
EIMAC

MONDO
ELECTRONICS

Tel +61 (08) 9330 9000
mondo@mondoe.com

HARA3177

New Eimac RF tubes through Mondo (Thanks Tony)

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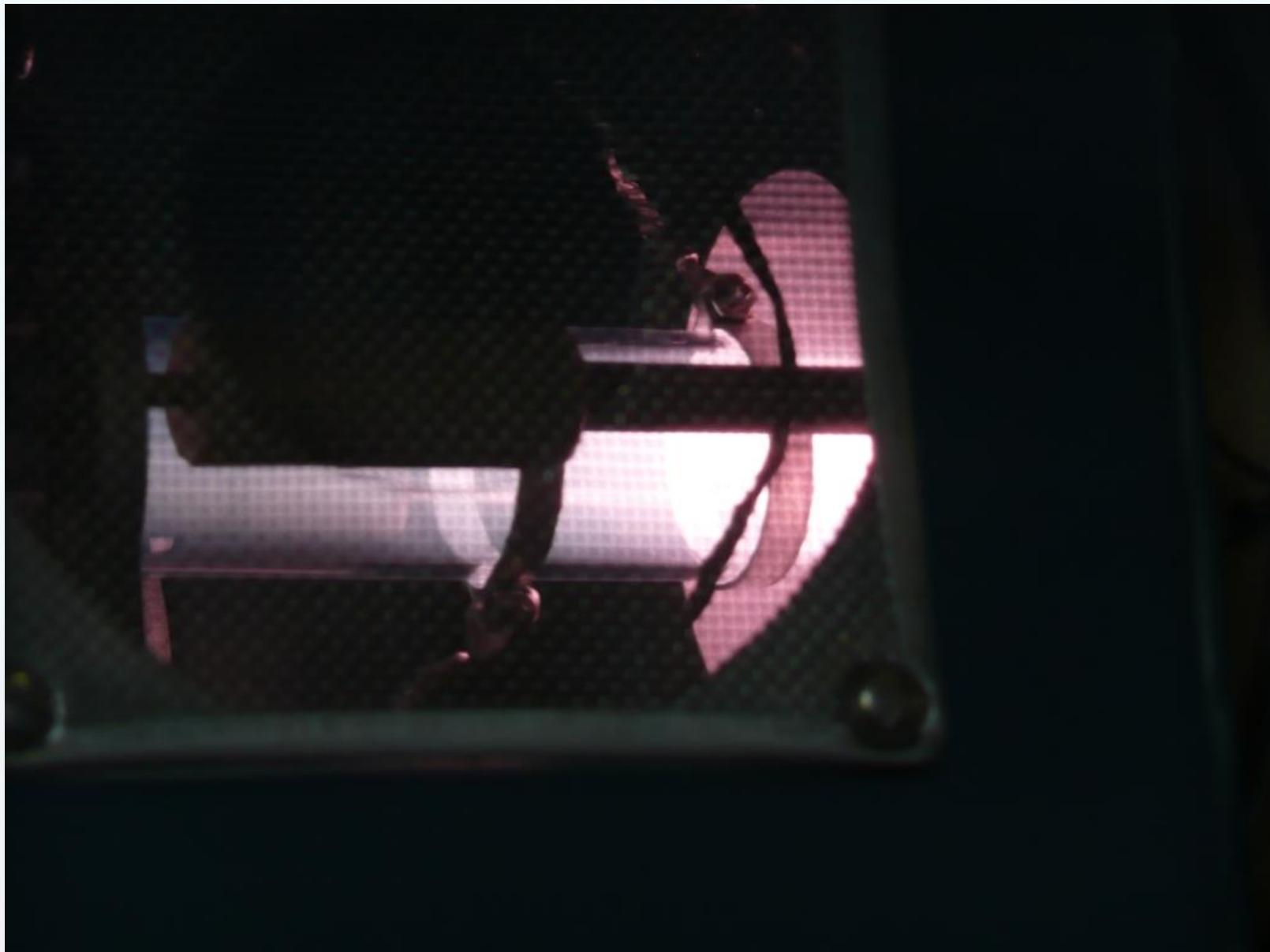
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Extra Fan and power lead. (Tony, Philip and I)

Results – cont'd

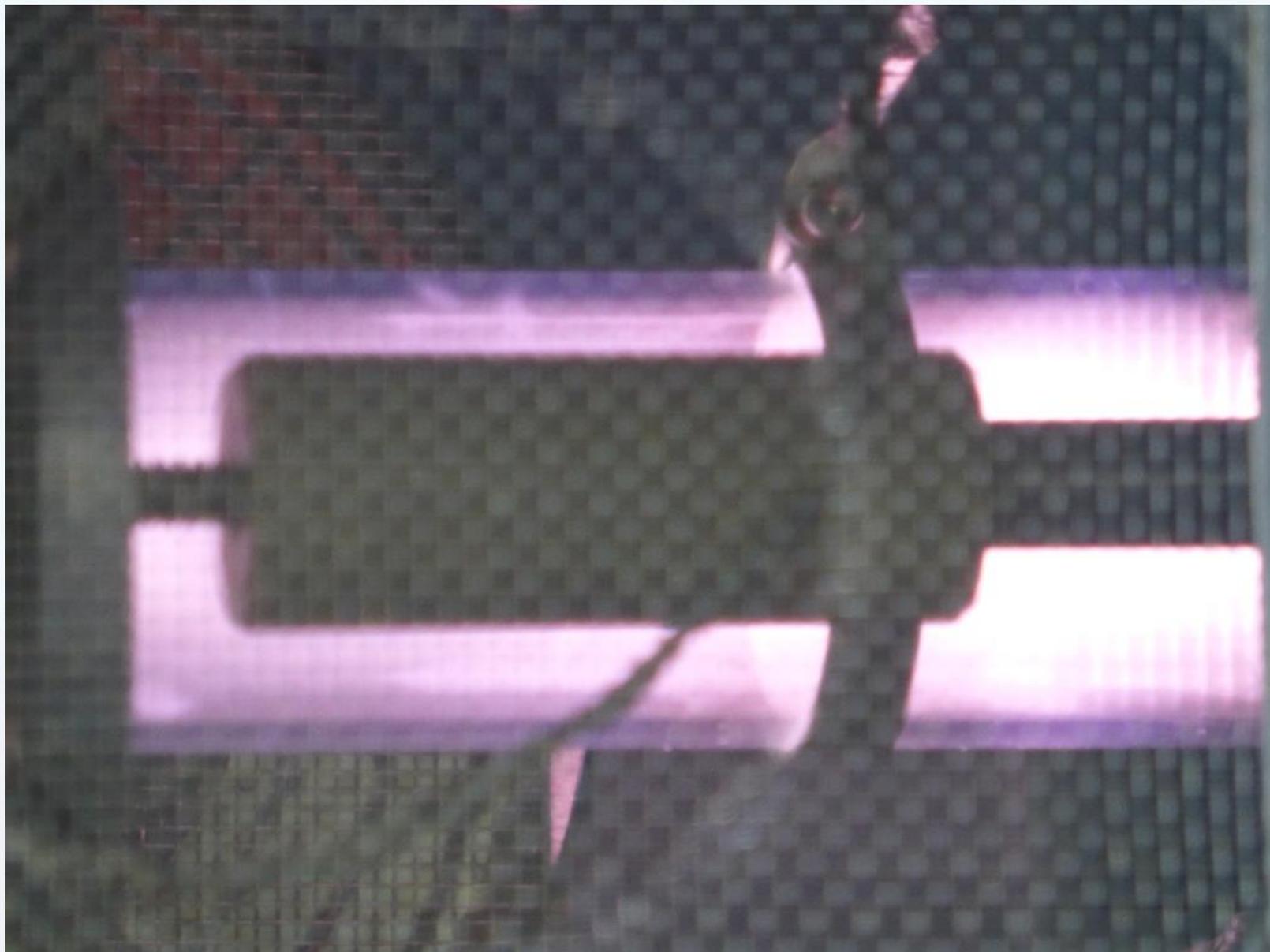
- * First Image beam at or above 1uA.
- * For me anyway.



Plasma is Grey after newly installing clean bottle.

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Plasma is Pink while running in.

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Plasma is Teal when running He.

Slight cherry tinge in the quartz between RF electrodes.

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NEC Recommends (at SNEAP):

For Longest Source Life

- Do not ever turn off
 - Continuous rf plasma
 - With Rb oven turned down
- Rb last on and first off
 - Follow the manual
- Avoid drafts

Conclusions

- Need datalogged process variables.
- Need a “safe” automated shutdown process.
- Defence against random vacuum trips.
- Uninterruptable power supply.

Challenges & Possibilities

- We have another Alphasross arriving soon.
- Maybe fibre out to a Dave Button control box?
- ?

References and utilities...

- NEC
- SNEAP
- Eimac Data
- Mk 1 Eyeball (Thanks DG)

Acknowledgements

- David Garton (ANSTO)
- Michael Mann (ANSTO)
- Tony Mowbray (ANSTO)
- Philip Chatfield (ANSTO)
- ZP, RS & DP (ANSTO)
- John Fallon (fmr ANSTO)

Questions...





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Thank You!