

Update on the DLS PSD beamline

IFAST 10.5 – 3rd meeting

C. Burrows

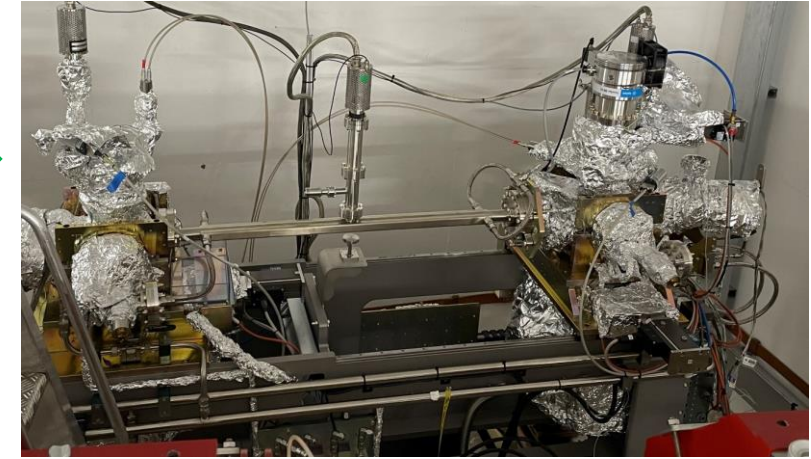
M.P. Cox

12th May 2022

DLS PSD Beamline – Test Vessel Status

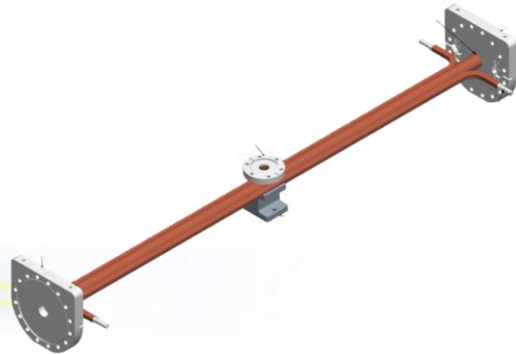
DLS stainless steel samples:

- S0a-2: NEG-coated stainless vessel - **currently installed.** →
Begin measurements in next DLS shutdown (June 2022)



Ongoing development of DLS-type OFS-Cu test vessels

- 22 mm ID vessel with integrated water cooling, manufactured from extruded material
Both vessels delivered and inspected – April and May 2022.



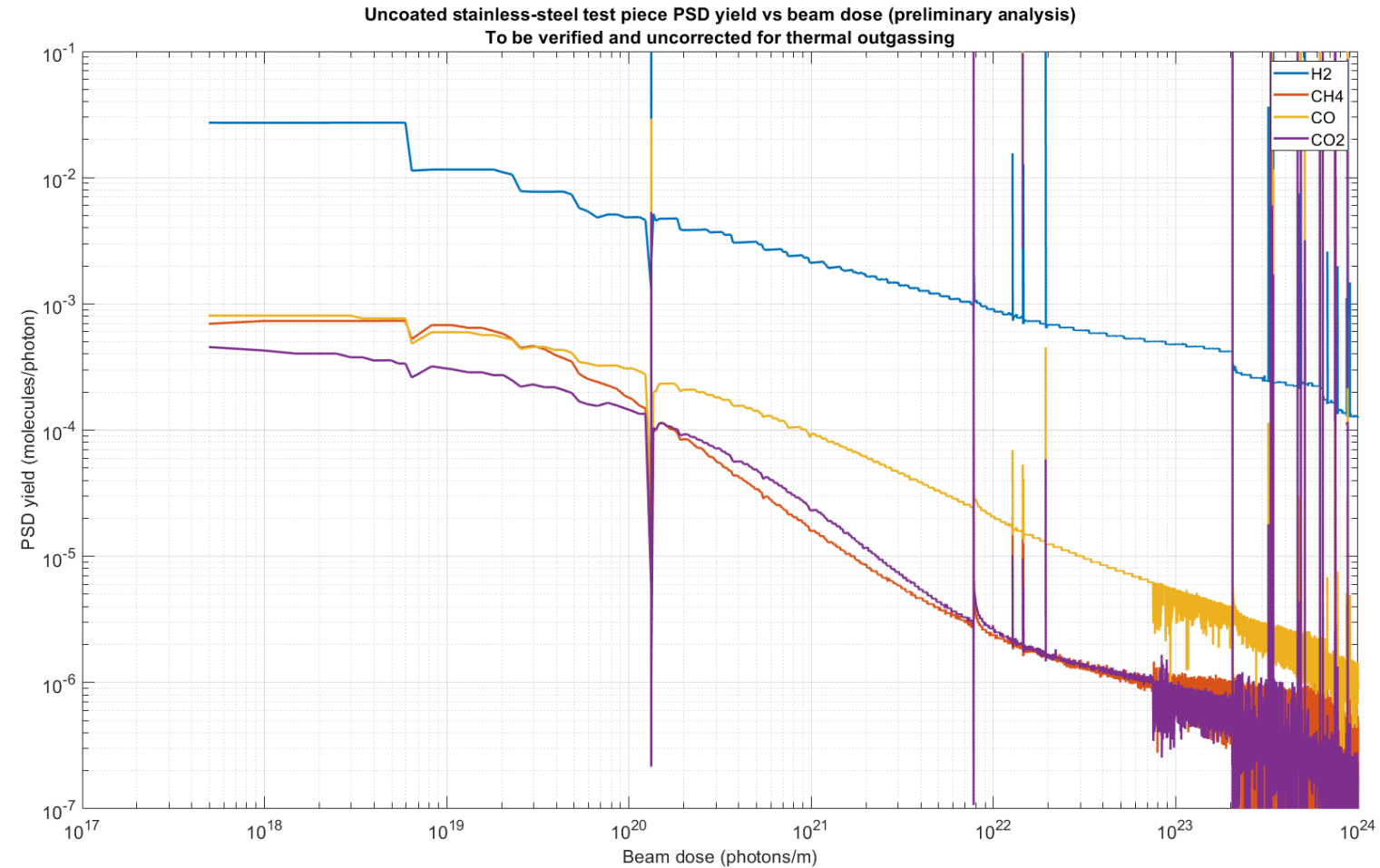
DLS PSD Beamline – Results - S0a-1

DLS uncoated stainless steel vessel - S0a-1

DN40 (34.9 mm ID, 1000 mm length) vessel previously installed on DLS PSD beamline.

Preliminary data (right), analysis ongoing:

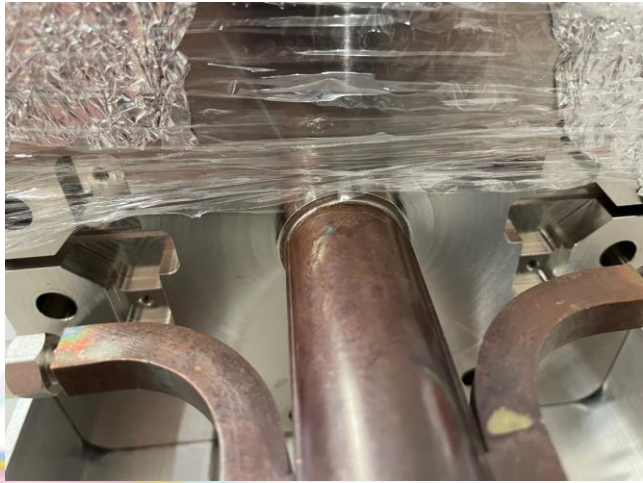
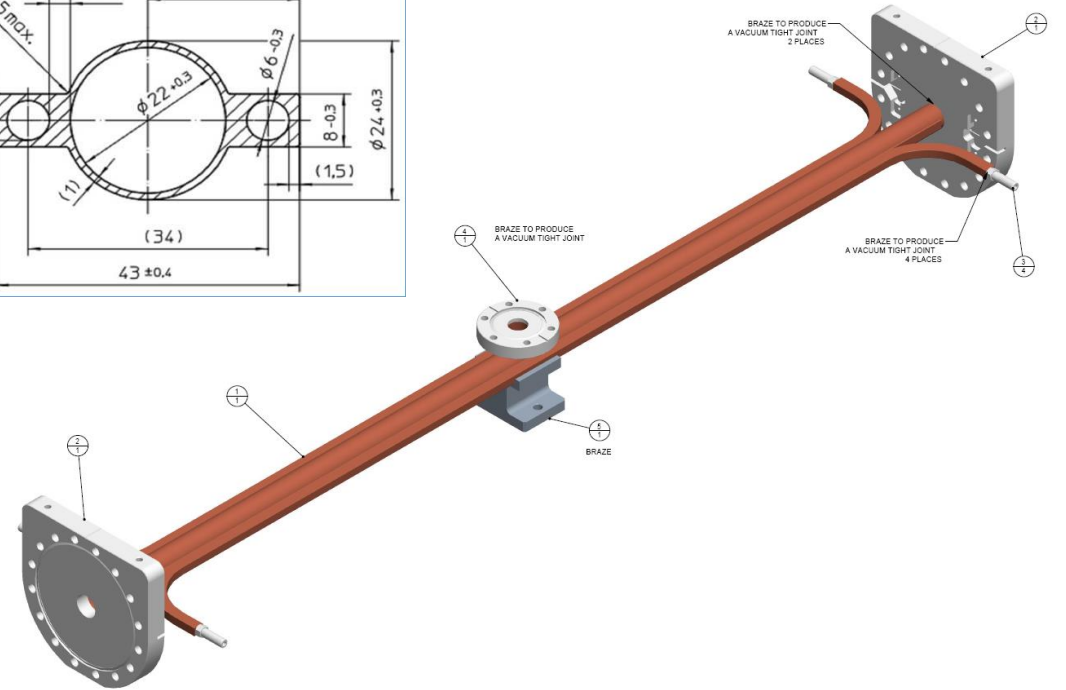
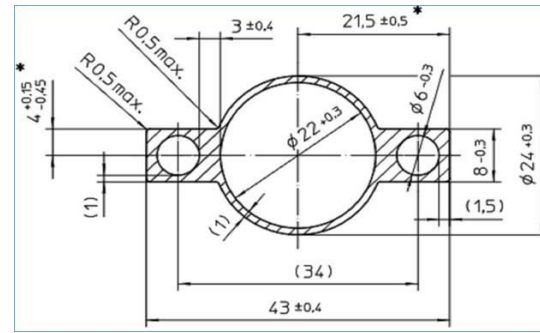
- Thermal outgassing corrections
- Vacuum geometry work
- Geometry of photon beam
- Relative scaling of RGA pressures (calibration checks)



DLS PSD Beamline – DLS-type OFS-Cu vessels

OFS-Cu vessel - 22 mm ID and 1040 mm long

- Brazed flanges and central port
- Circular central port - 18 mm ID and 5 mm hole
- Cooling channels on either side



Brazing joint – DN100 flange



Central port –
5 mm hole



Vessel in support frame

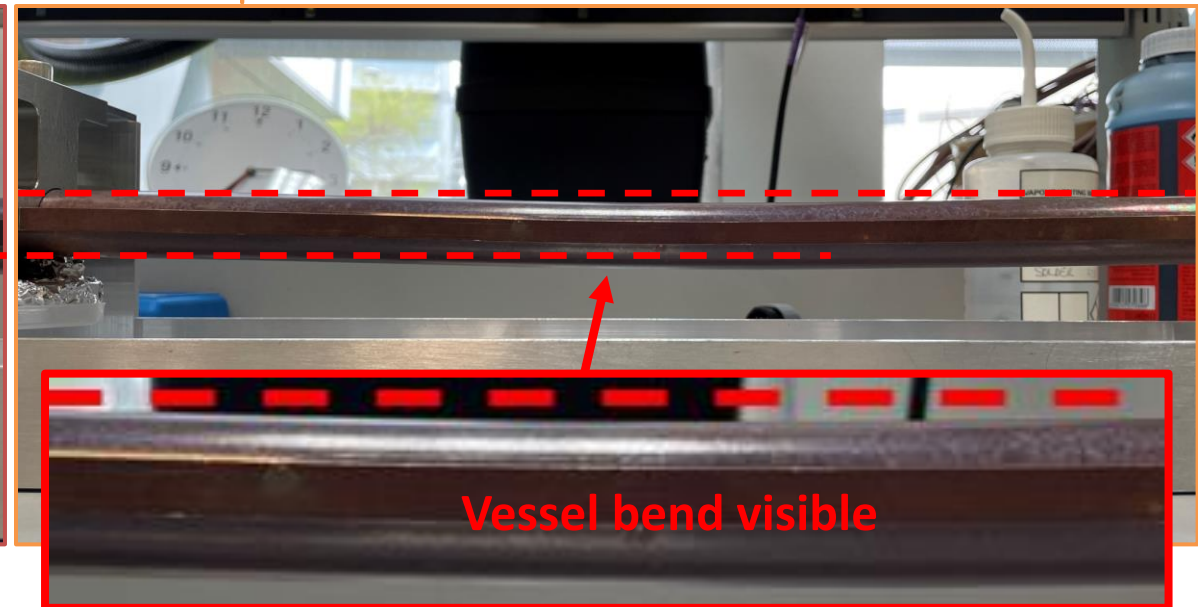
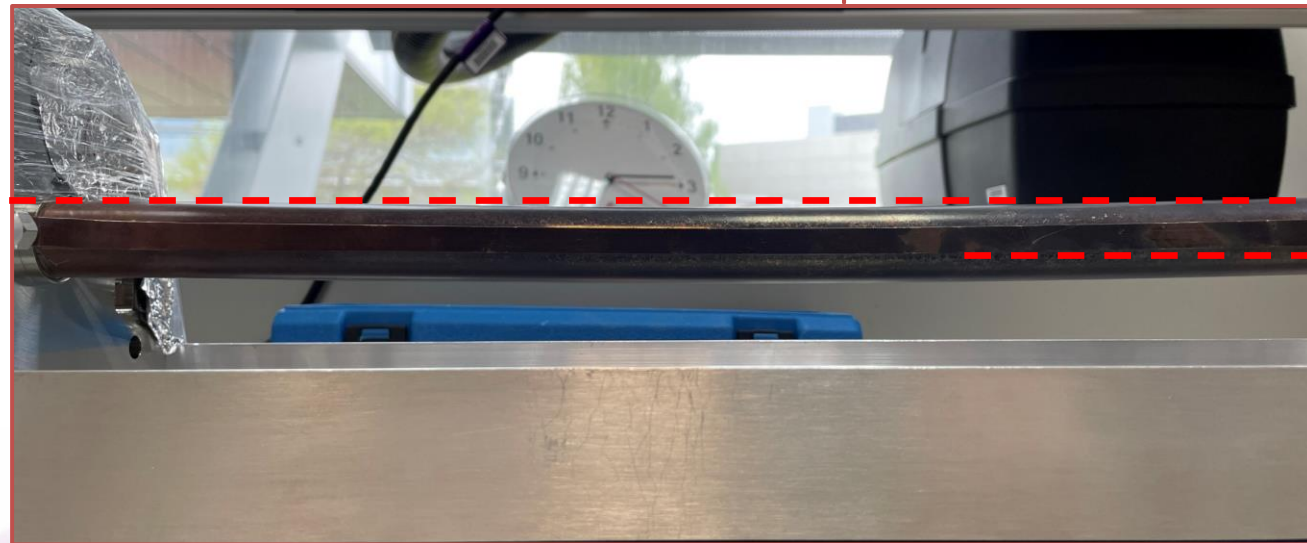
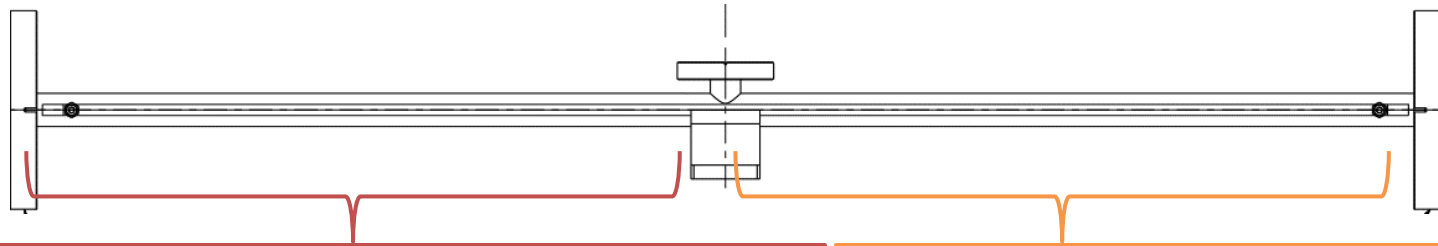
DLS PSD Beamline – DLS-type Cu-OFS vessels

FE10B Cu test vessel #2

Delivered 27-04-2022

General visual check of vessel straightness - annealing during brazing softens the vessel

Most likely that vessels bent during shipping - potential issue for all (softer) Cu-bodied vessels?



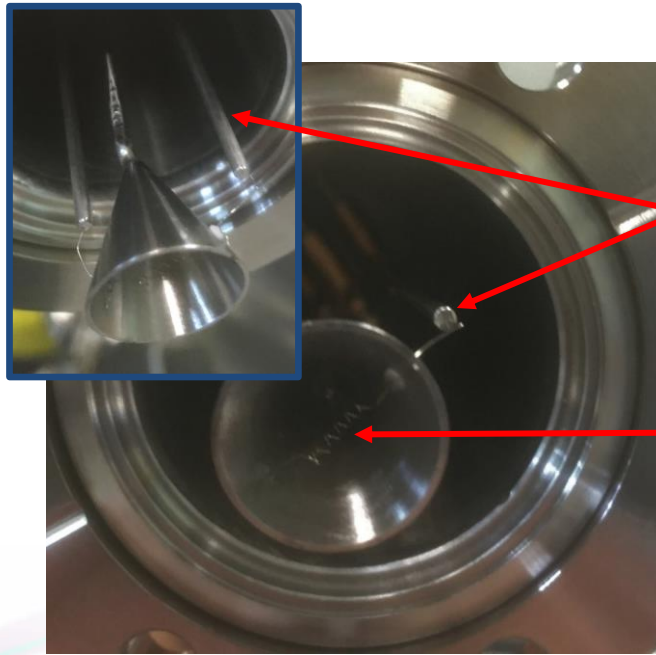
End flange

Central port

End flange

DLS PSD beamline – conditioning cone

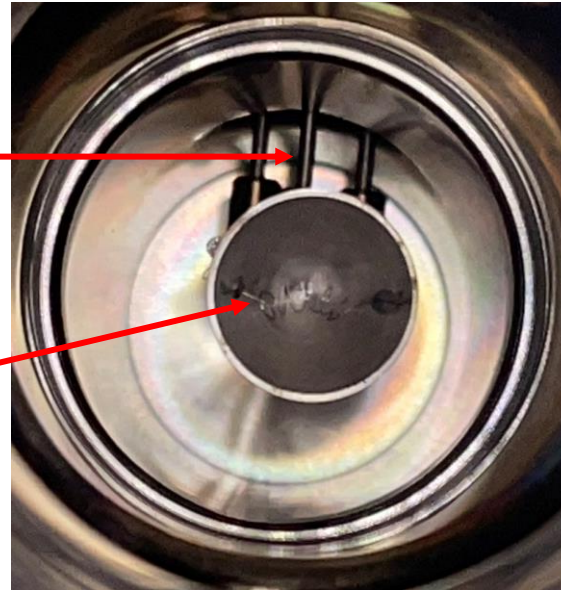
- Refit prototype conditioning cone testing complete, final conditioning run to start soon
- Filament operated at ~ 13 W (1.88 A at 6.80 V) with 300 V bias - 10 mA drain current with 10-fold increase in pressure



Cone v1

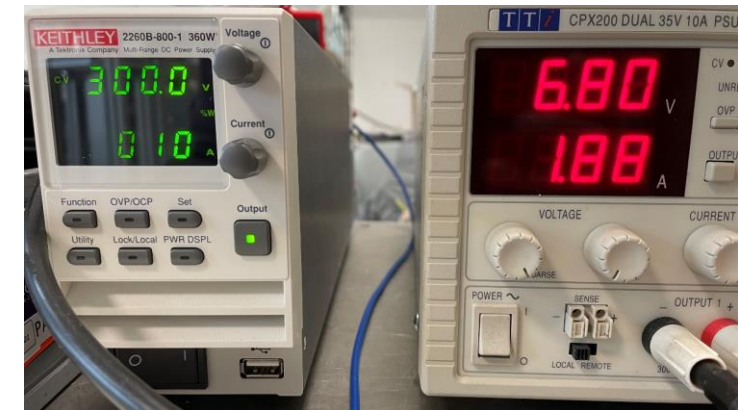
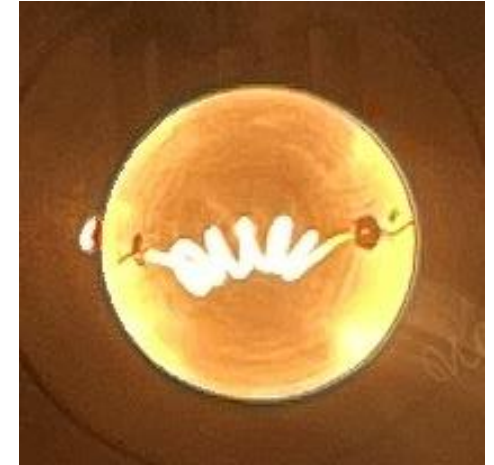
Stainless steel supports

0.125 mm W filament



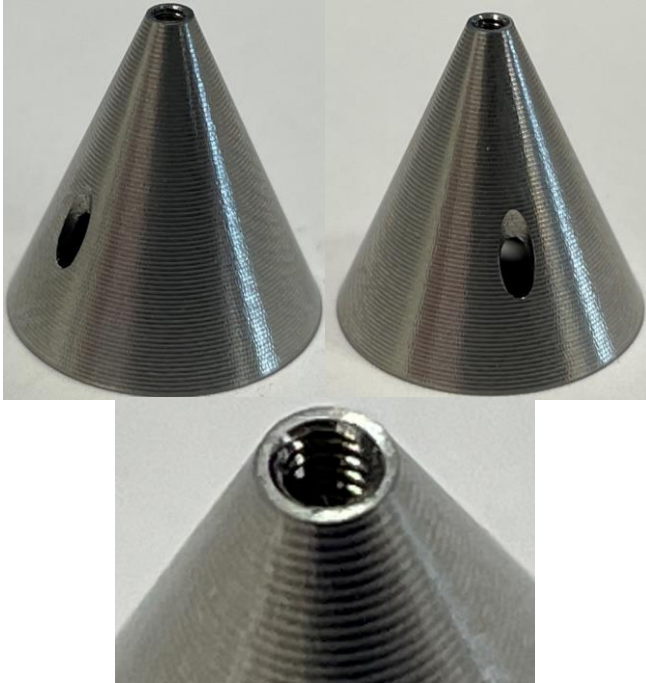
Cone v2

Filament glow at 1.88 A

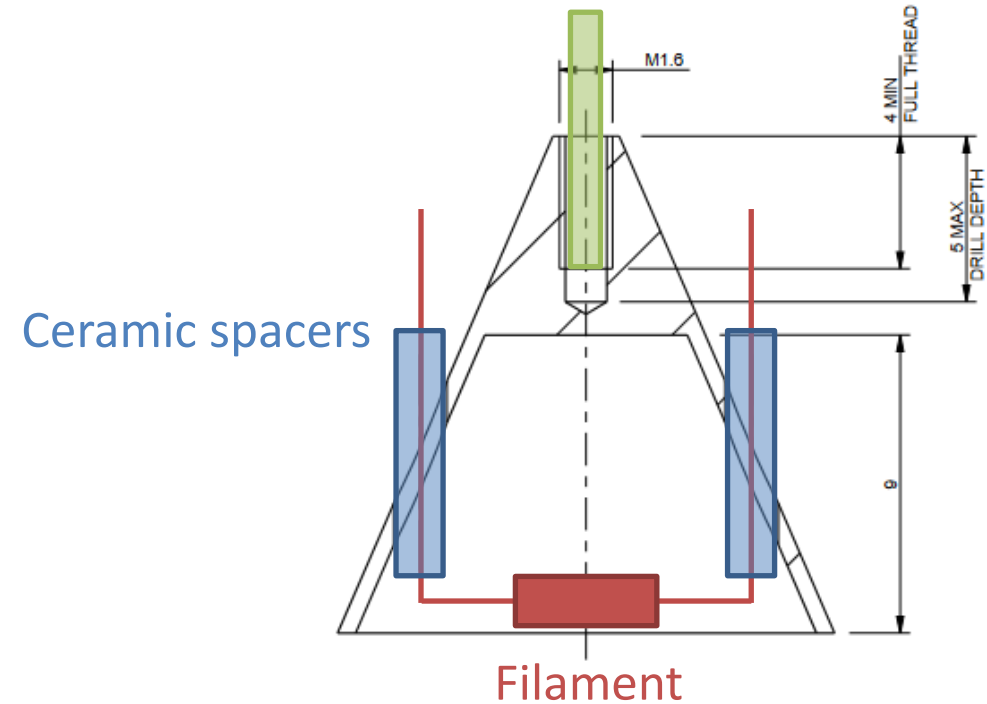


Degassing cone

New DLS-style conditioning cone intended for vertical filament mounting



Central threaded support (inc. bias)



15 mm diameter is incompatible with I.FAST style central port, new filament arrangement to be investigated

Replace cone with flat stainless or tantalum sheet?

DLS PSD beamline – status

- **S0a-2**: Stainless steel DN40 DLS-type sample vessel with NEG coating
 - Currently installed, non-activated measurements to start next shutdown
- **DLS-Cu1a/-Cu2a**: DLS type Cu-OFS samples arrived – vessels to be surveyed before possible return to manufacturer.
 - Coated and uncoated measurements.

DLS Shutdown Schedule:

1st June 2022 – 3 July 2022

[DN40 non-activated NEG]

12th August 2022 – 3rd September 2022

[DN40 activated NEG]

21st October 2022 – 13th November 2022

[Cu vessel]

Offline Rigs - Status

Coating Rig:

- Running but untested for long coating runs.

Measurement Rig:

- Final stages of build currently underway, operational commissioning to follow shortly.

