



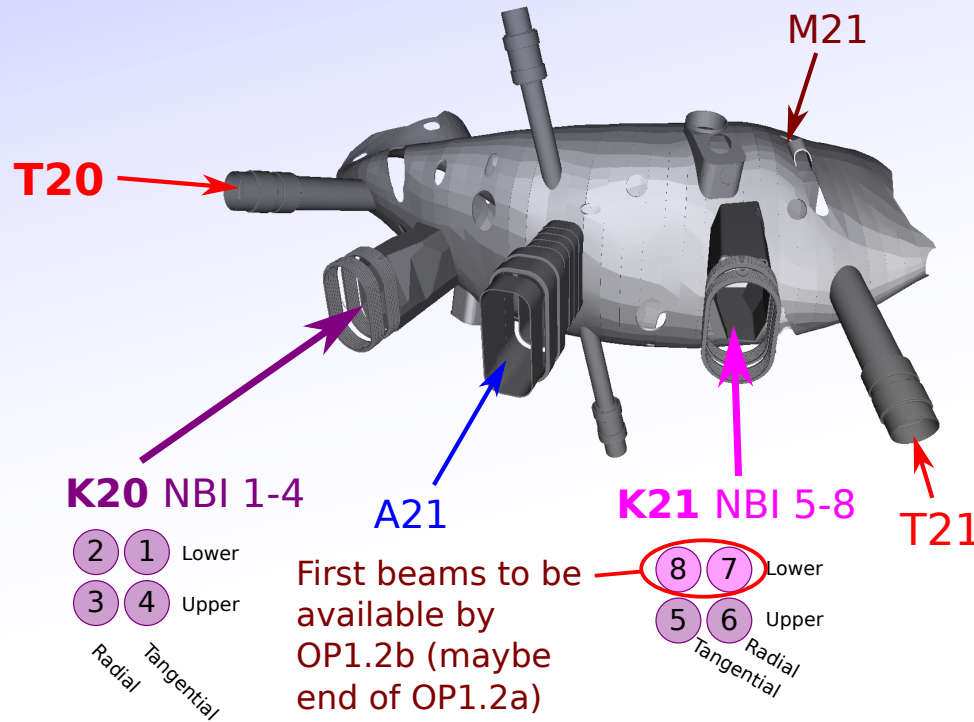
Charge Exchange Recombination Spectroscopy (CXRS) on the Neutral Beam Injection (NBI) (Ladungsaustauschspektroskopie am Neutralheizstrahl)

**K3: Optical system in immersion tube of ports AET20 and AET21
of the Heat Shield Thermography (HST) system (QYB)**

O. P. Ford



AET20/T21 Ports

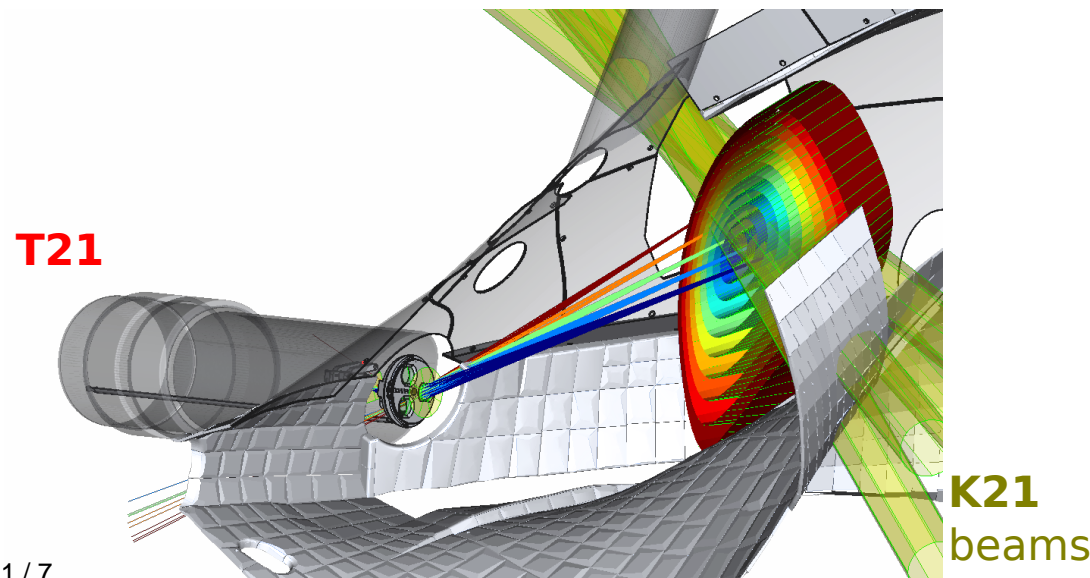


Main CXRS ports are AEA21 and AEM21.

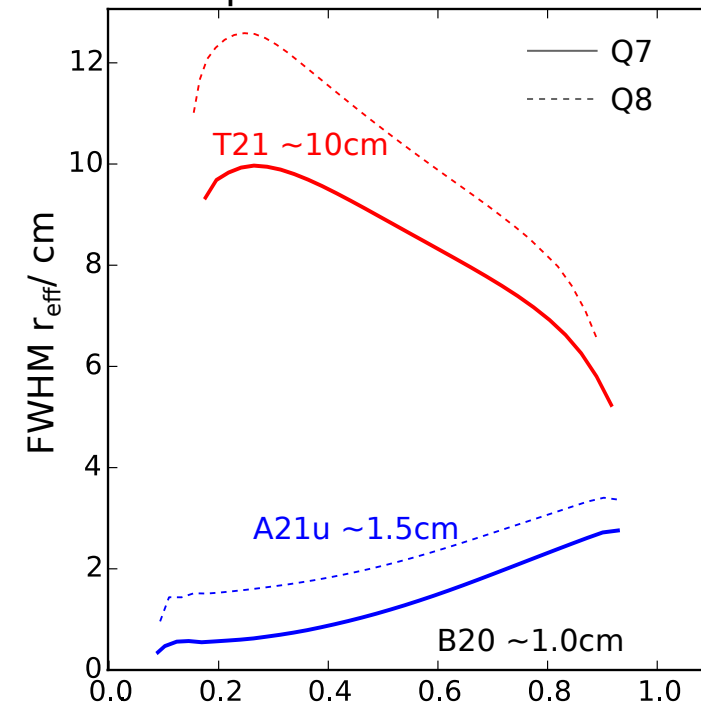
AET20/21 provide an additional view for cross-check and extra information, although have very poor geometric spatial resolution ($\geq 12\text{cm}$).

but... AET20 is our only view on K20 beams and will be needed for beam deposition information.

Add optics to the Immersion tubes already designed for Heat Shield Thermography (HST).

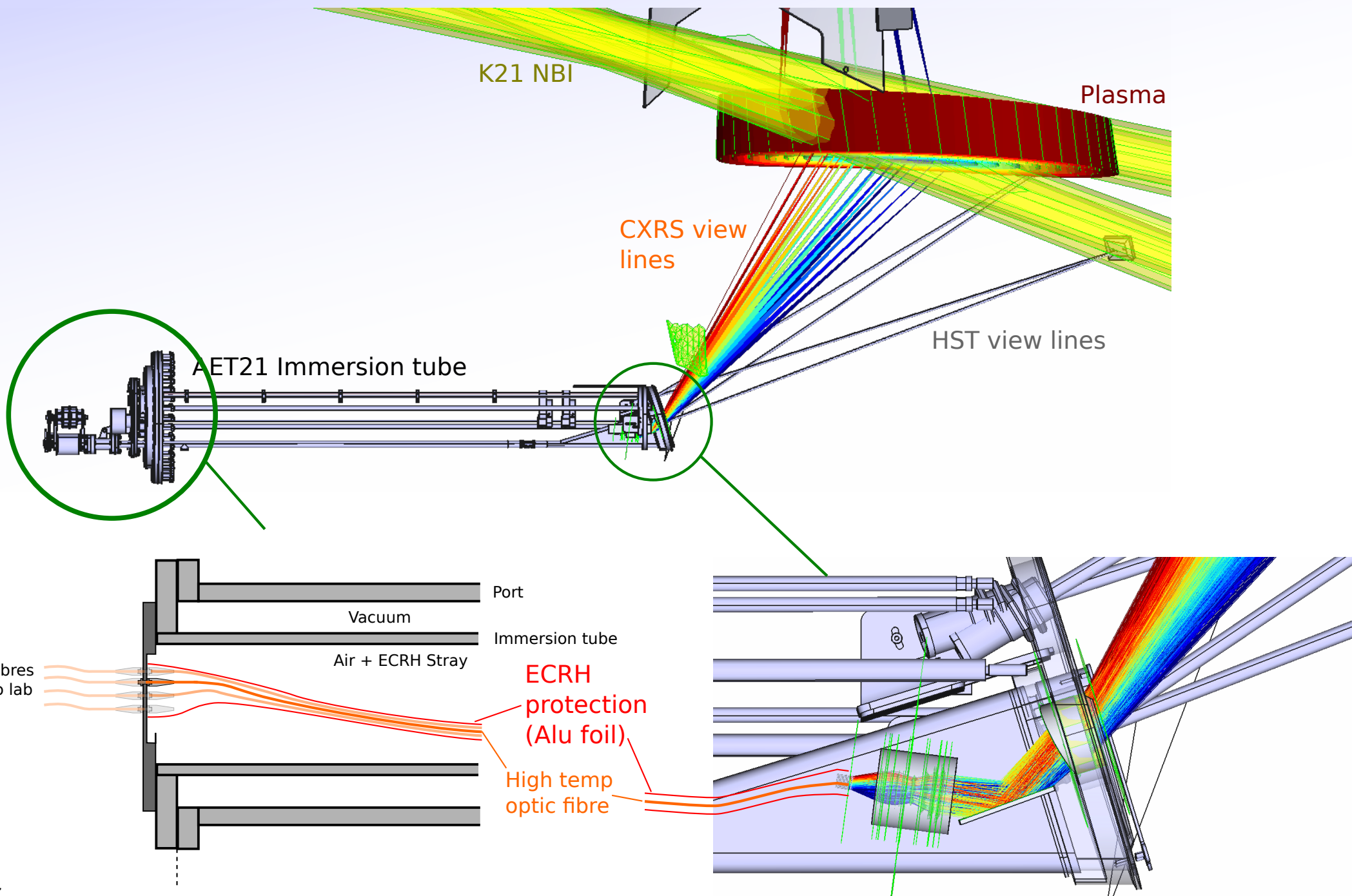


Spatial Resolution

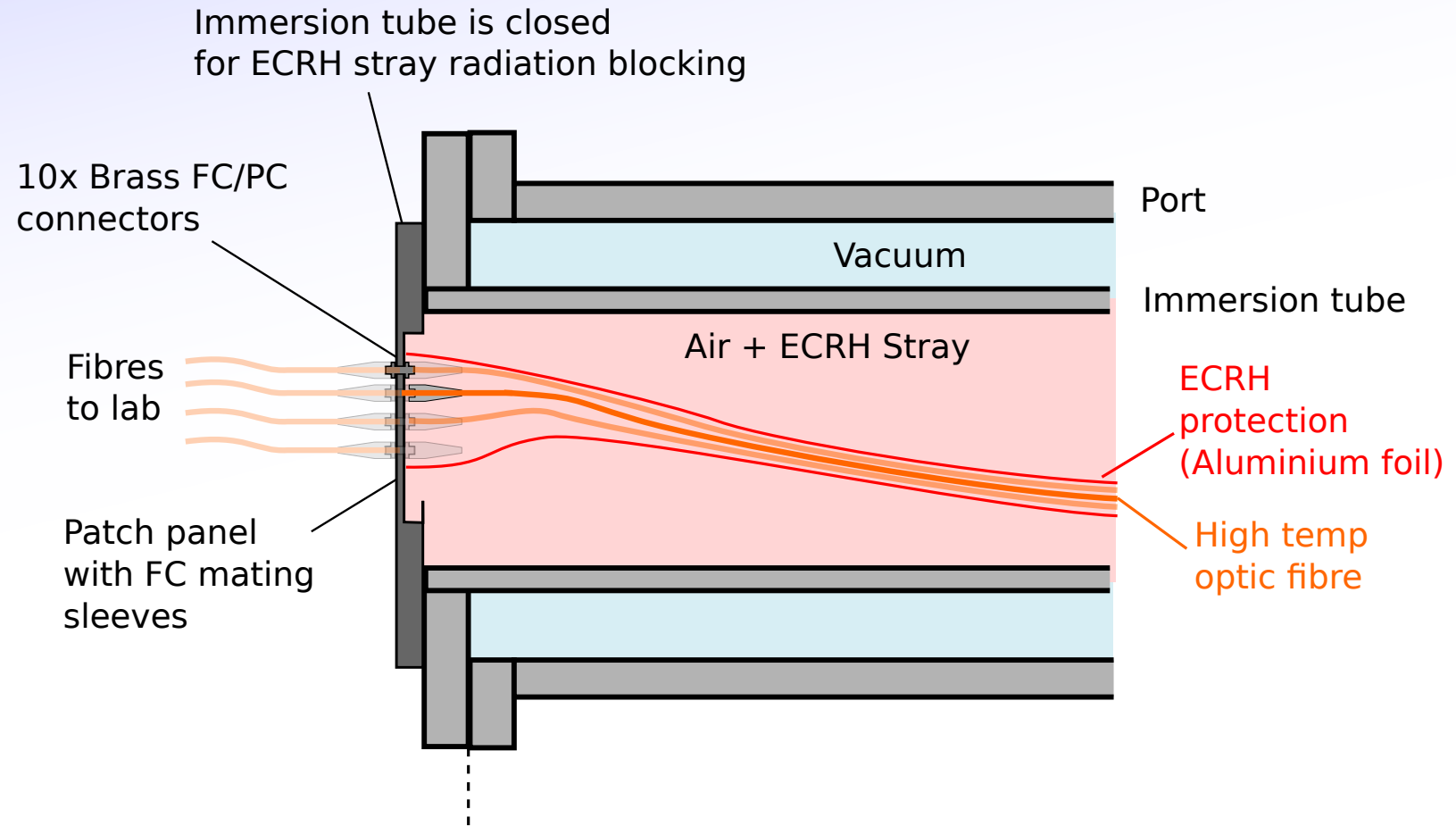




AET20/T21 Ports



AET20/T21 Flange and backplane

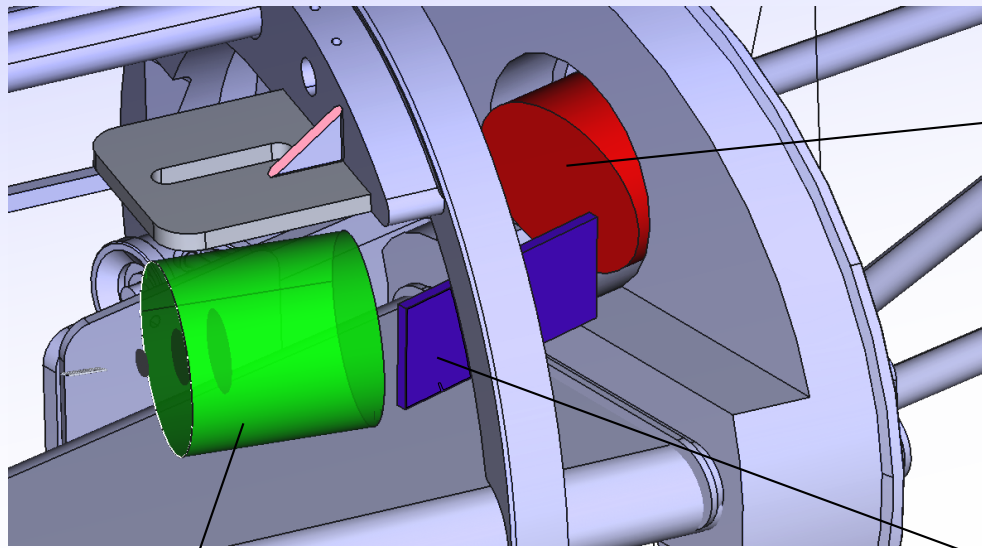


Connectors:

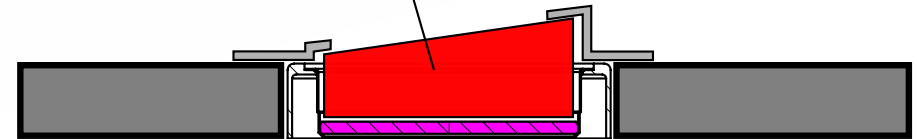
Brass ($\mu_r = 1.02$, 500x = 7k€)



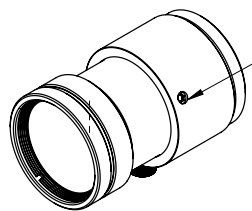
AET20/T21 CXRS Optics



Prism must be held near/against window.



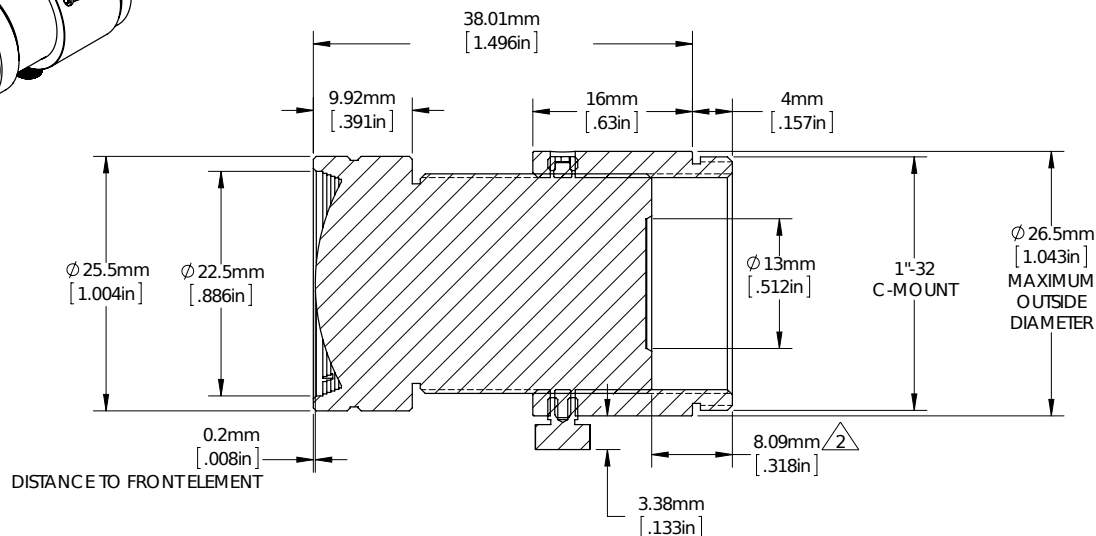
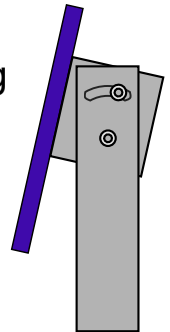
35mm c-mount lens, e.g:



(2) M3 SET SCREWS WITH NYLON TIP FOR OPTIONAL FOCUS LOCKING @ 120° FROM LOCK KNOB

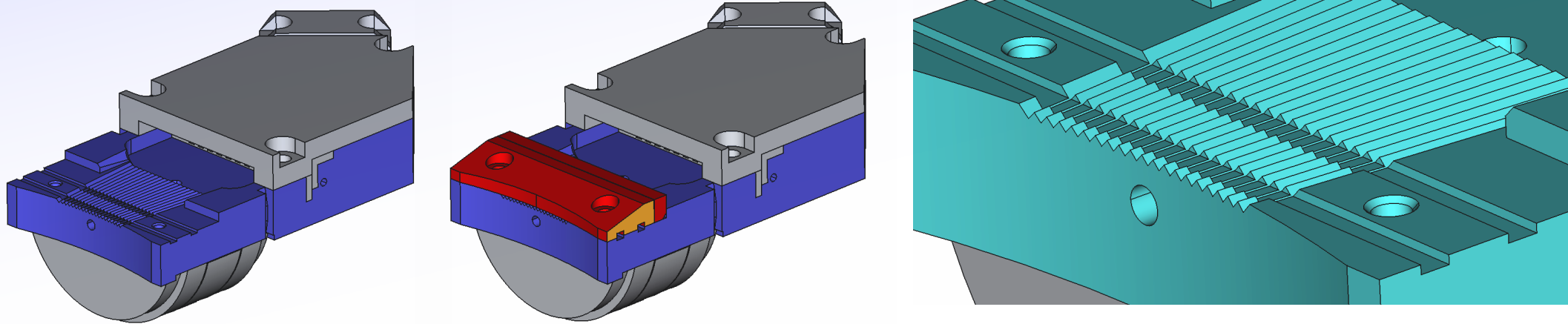
Mirror needs to be tilt adjustable (slots on mounting bolts will be sufficient).

Mirror thickness ~3mm

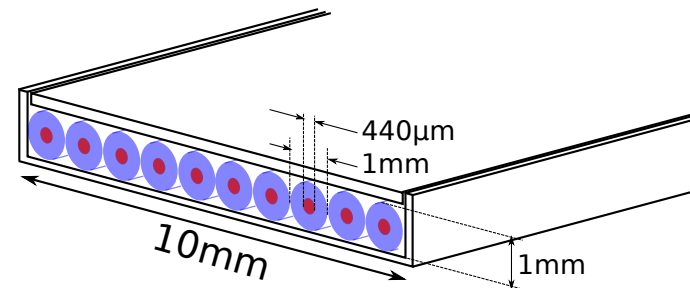


AET20/T21 Fibre mount options

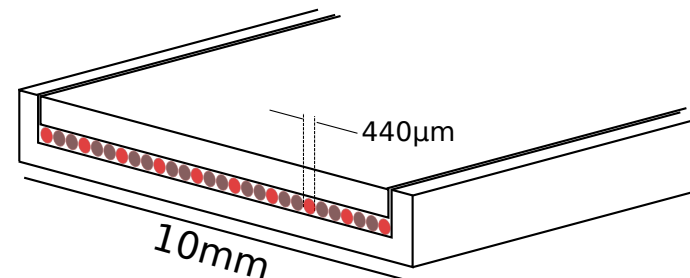
- 1) Something similar to the ASDEX Upgrade COR design:
 Fibres laid in grooves, two rubber(?) strips and clamped by single plate.
 + Fibres individually adjustable along grooves with clamp loosened.
 + No glue, so fibres are ECRH stray radiation safe. (rubber strips?)



- 2) Keep cladding on fibre, lay together side by side.
 + Simple construction
 - Not very precisely aligned
 - ECRH stray radiation on cladding??
 - Hard to adjust individual focus.

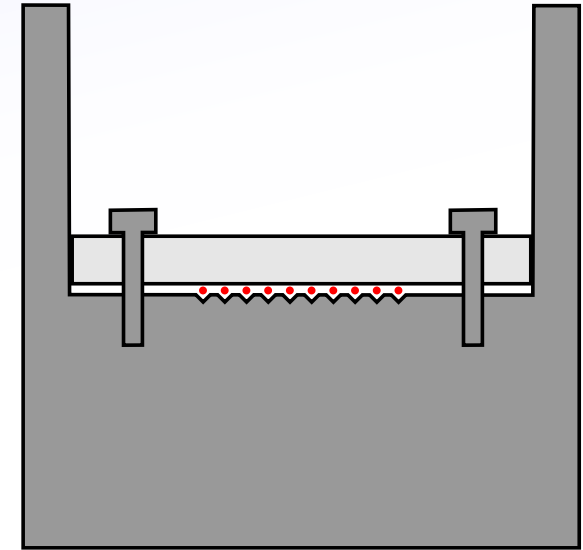
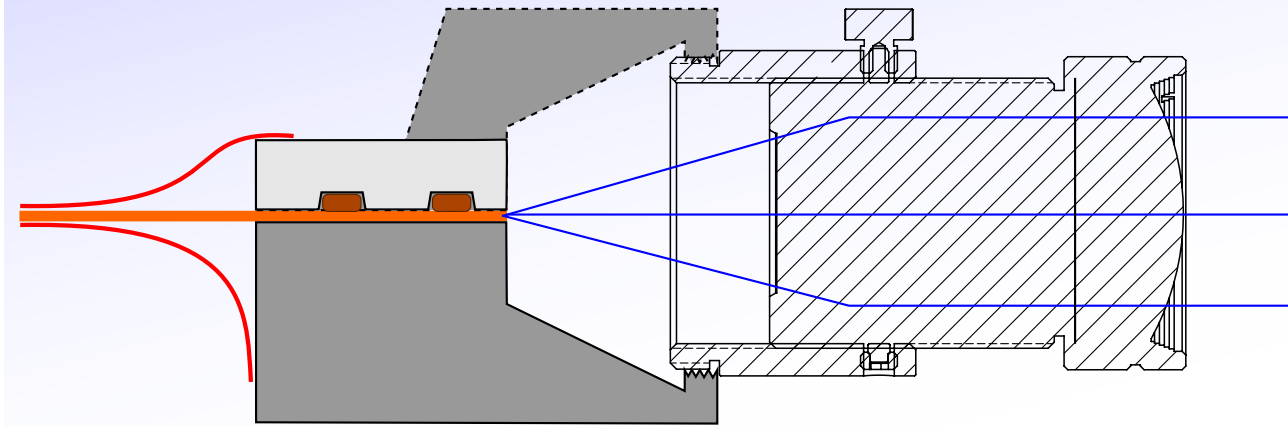


- 3) Strip cladding, lay side by side with glass spacers.
 + Simple construction.
 - Not very precisely aligned
 - ECRH stray radiation safe (no plastic)
 - Hard to adjust individual focus.



AET20/T21 Fibre/objective mount

Block to mount lens precisely to fibres.



- Precise alignment of fibres to best vignetting of objective.
- Precise alignment of acceptance cone to exit pupil of objective.
- Adjust positioning by rotation of whole combination (horizontal + vertical)
- Rubber(?) fibre clamps enclosed in metal - no heating by ECRH stray radiation.

Need to know exit pupil location:

