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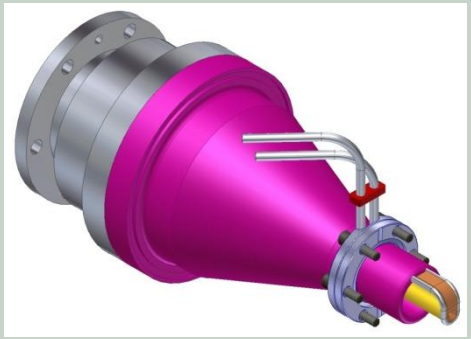
FETS Mechanical Engineering Update

by Peter Savage

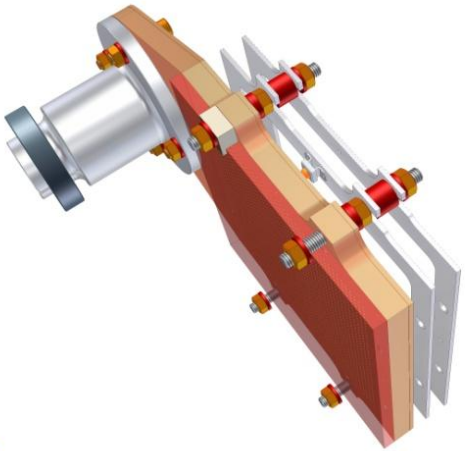
28th July 2010

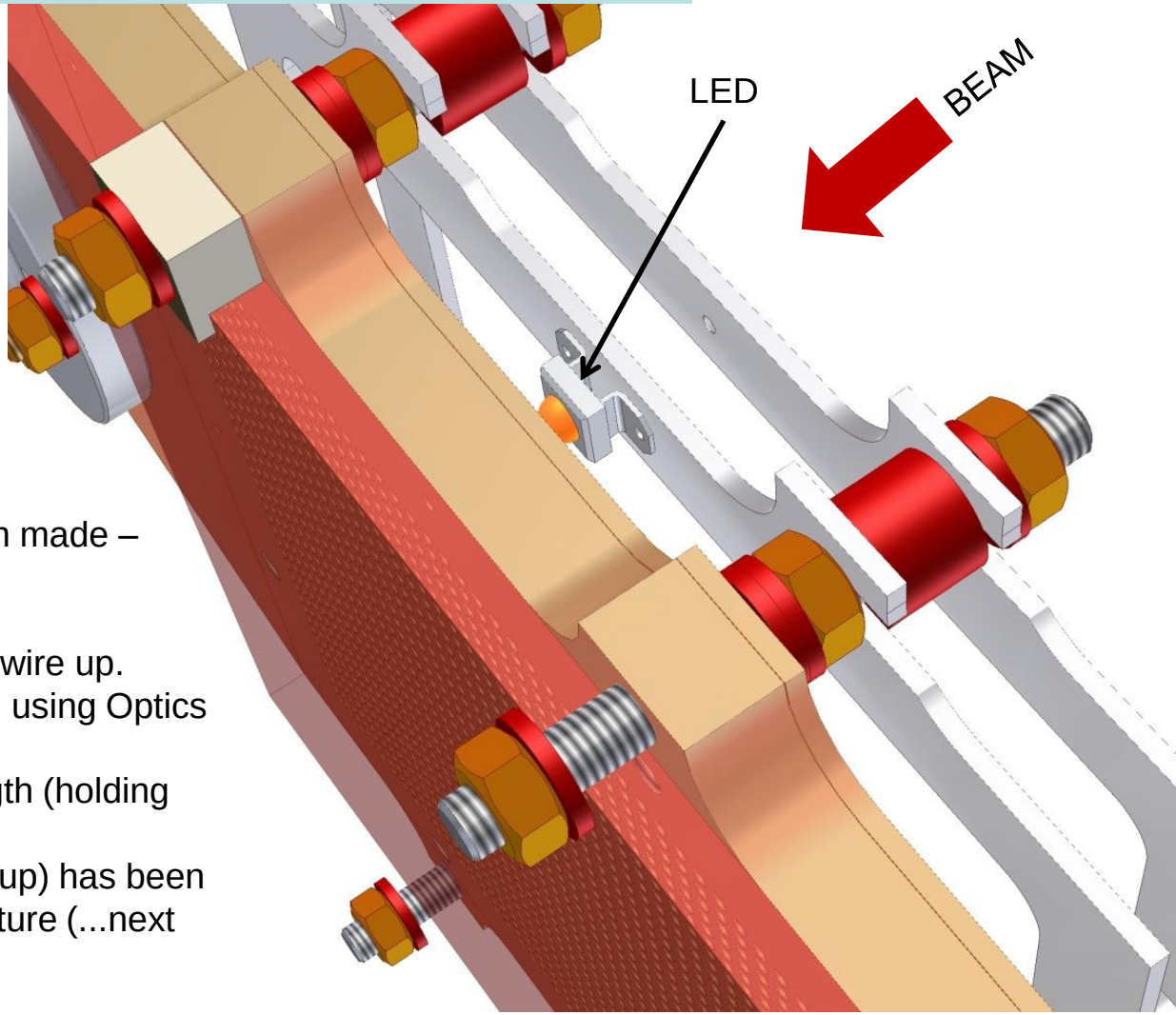


I have been working on several items in parallel. This is an overview of those items.

Pepperpot Calibration System

Pepperpot Calibration System

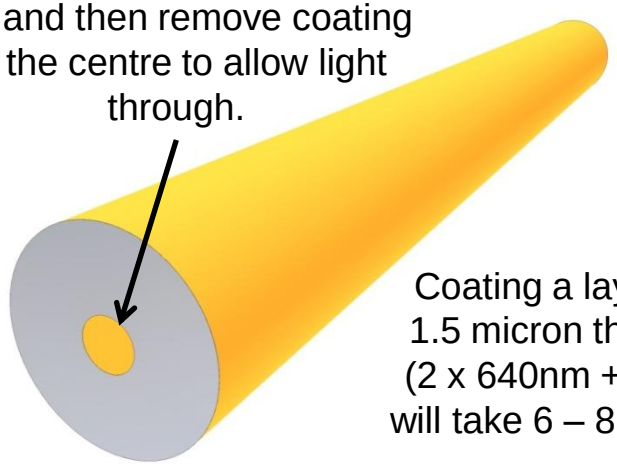




- 4 x LED mounting frames have been made –
  - 2 x copper and 2 x aluminium.
- LEDs have arrived: RS 616-3652
- Need to mount LEDs to frames and wire up.
- We can cut 2mm diameter glass rod using Optics group facilities.
- We can lap them square and to length (holding block has been made).
- Holder for sputter coater (QOLS group) has been designed and submitted for manufacture (...next slide).

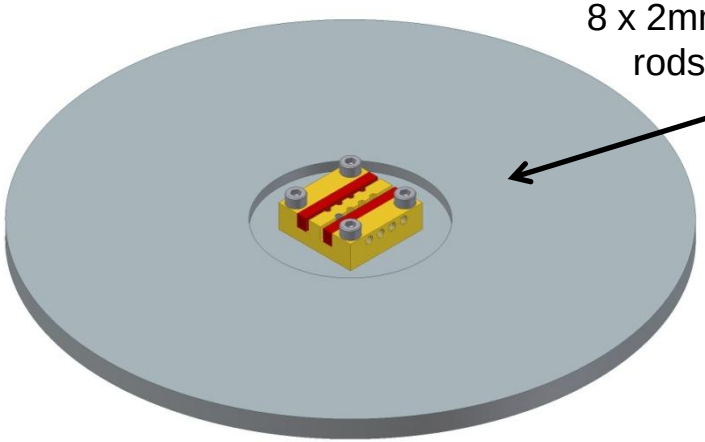
Pepperpot Calibration System

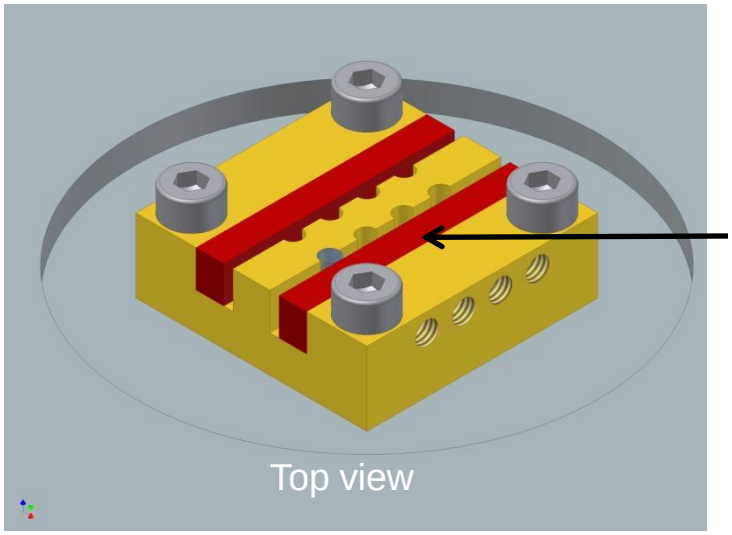
Goal is to coat end of glass rod and then remove coating at the centre to allow light through.



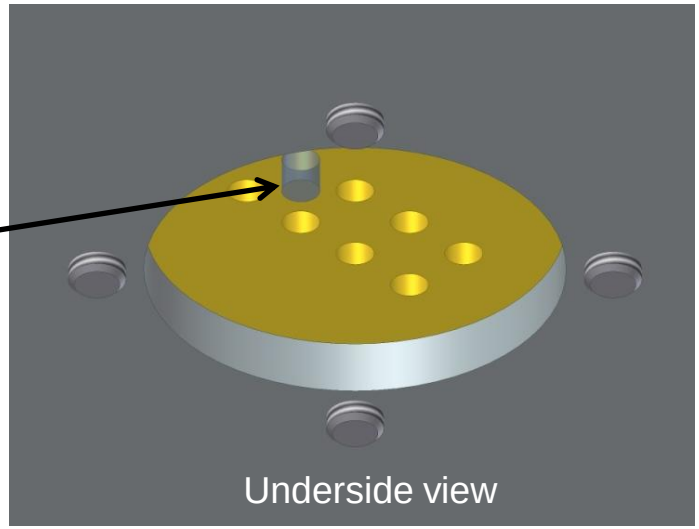
Coating a layer of 1.5 micron thick Al (2 x 640nm + a bit) will take 6 – 8 hours.

Sputter coater jig to hold 8 x 2mm diameter glass rods (temp 120^0C)



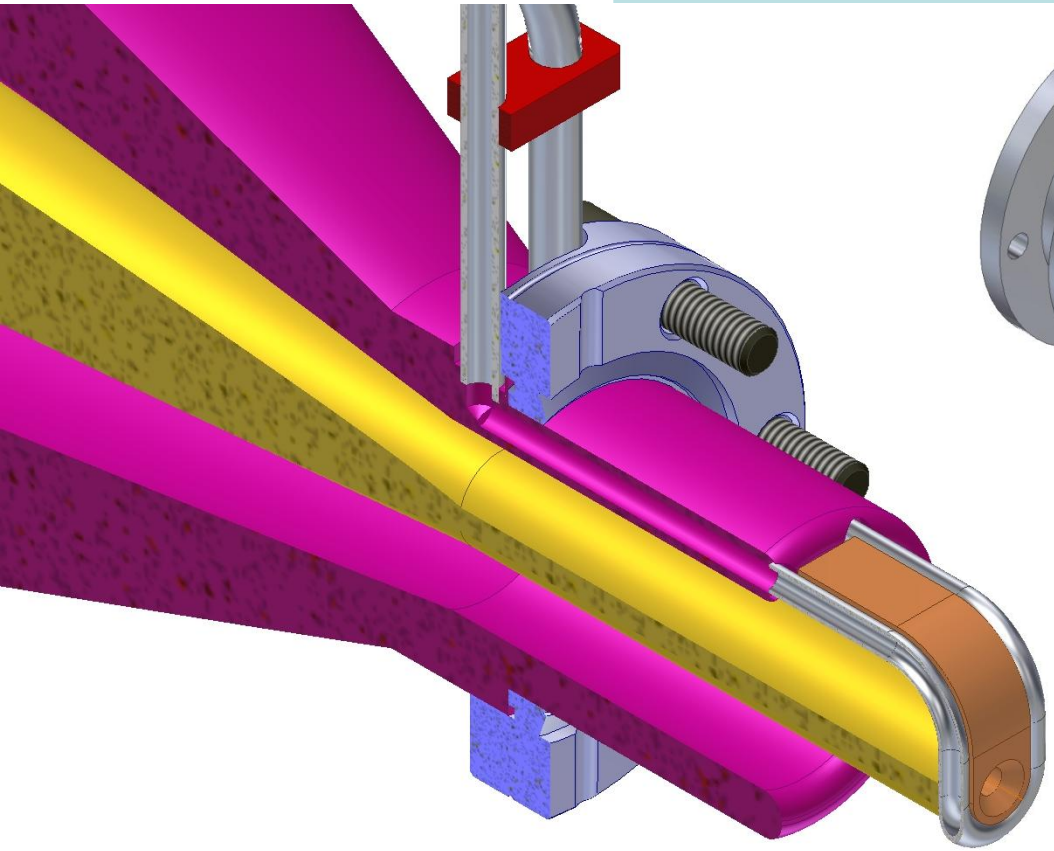


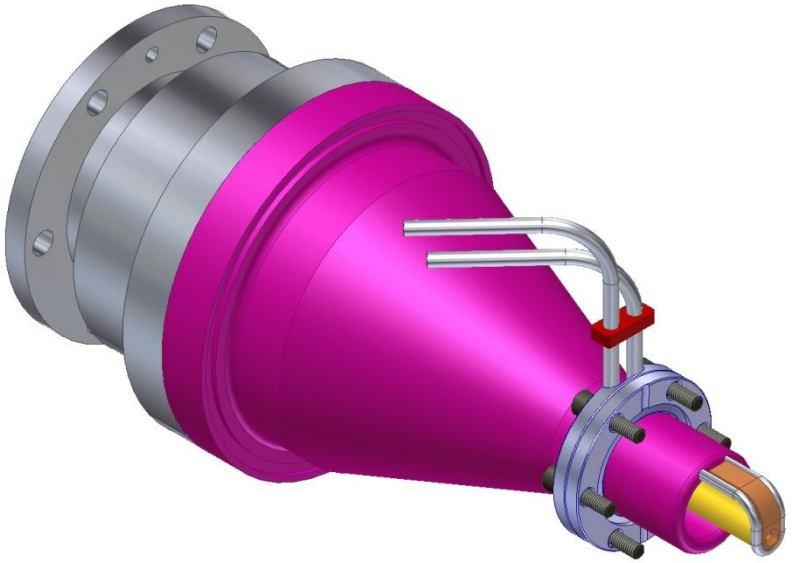
Glass rods poke through plate and are clamped in place.



RFQ Coupler

RFQ Coupler



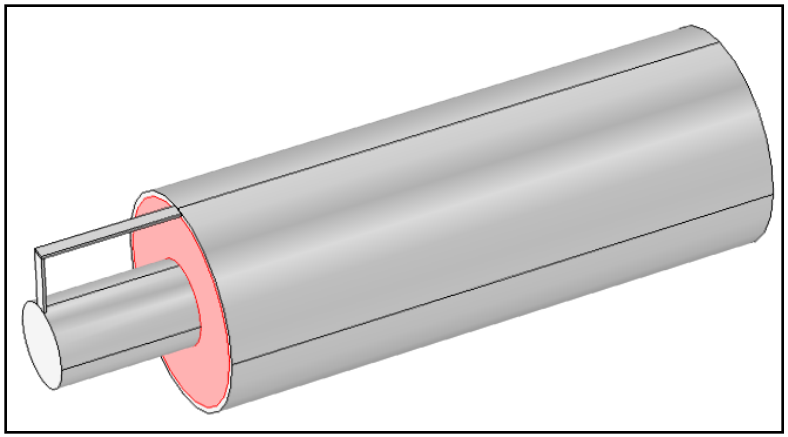


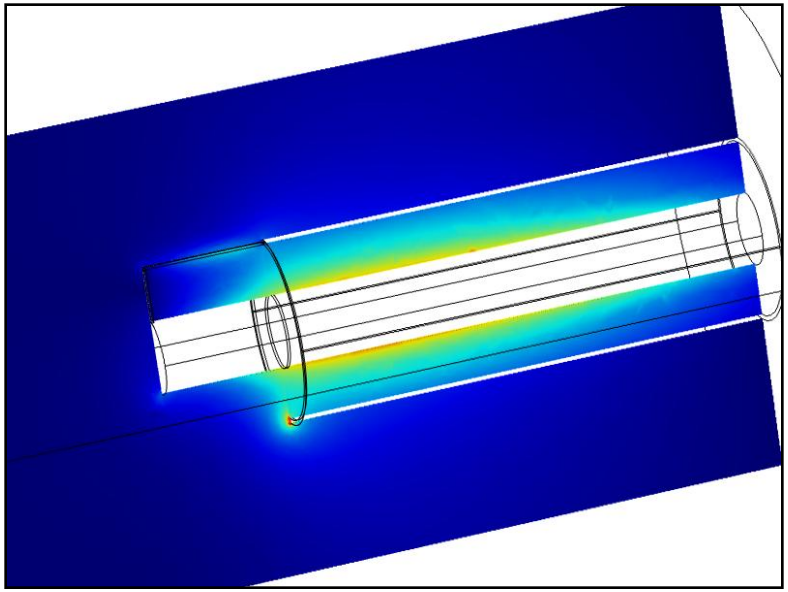
I have made a CAD model that is based upon the ISIS coupler design. The coax cable interface and ceramic window designs have been re-used. On the vacuum side the inner and outer conductors now taper to fit to the DN40CF tuner flange. The loop uses an SNS style carrier to allow it to be bolted to the inner coupler.

- The steps taken to arrive at this first design are detailed in depth in a separate presentation called:

  “46) FETS RFQ Coupler First Design”

RFQ Coupler

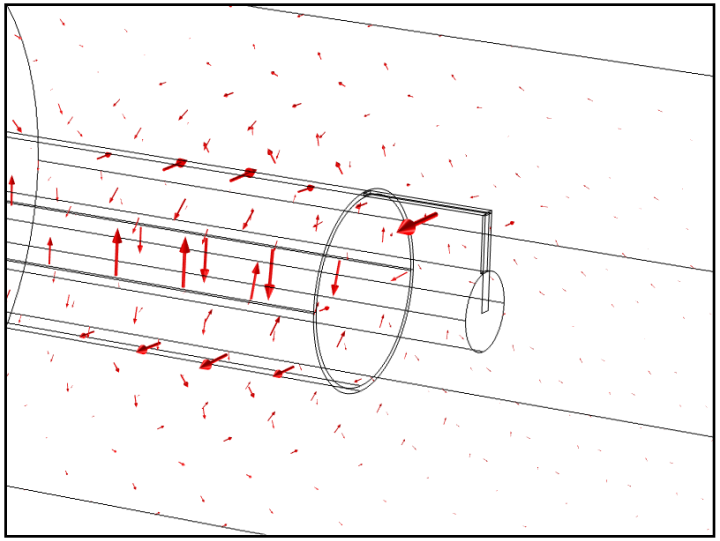




The RF Engineer Juan Luis Muñoz from Bilbao has started modelling some simple coupler designs.

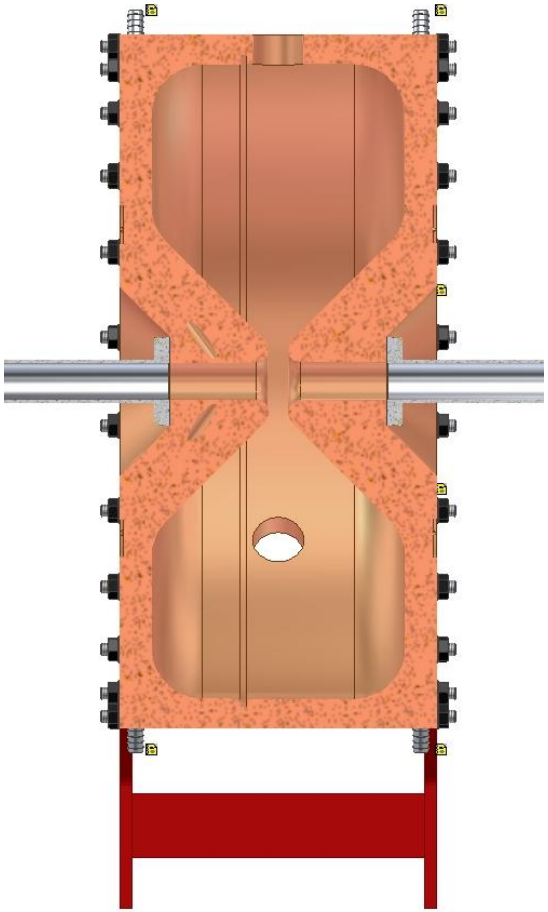
Should we do the same?

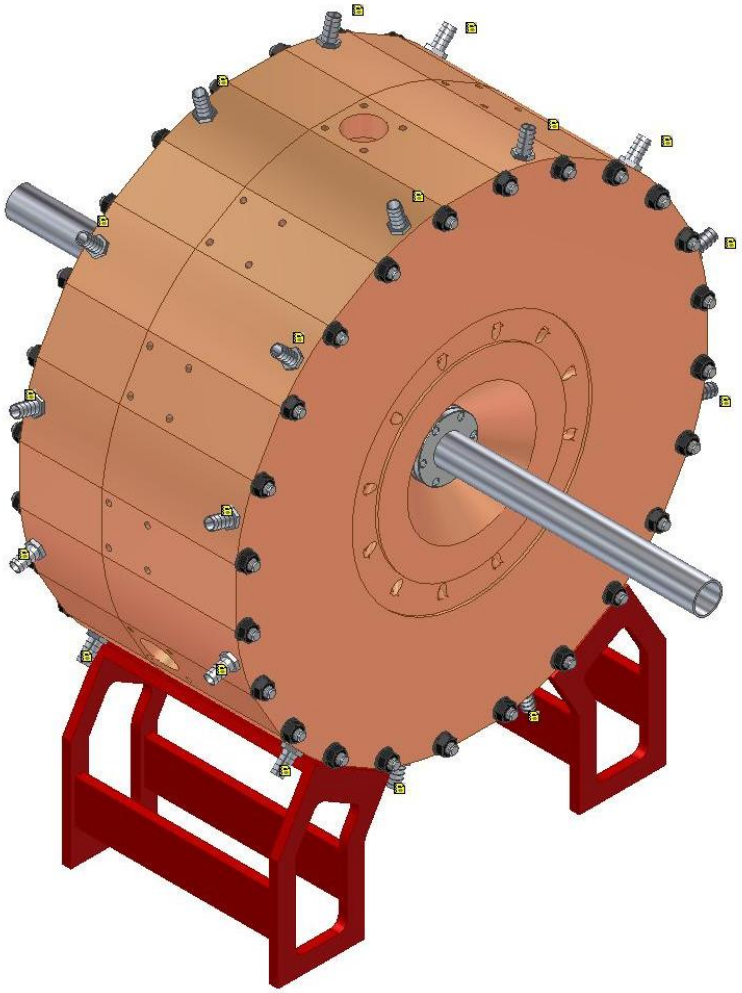
I could create a similar model that is parameterised through Excel (for simple modification) – or perhaps initially a simple model can be made directly in COMSOL allowing parameter sweeps directly within the software?



MEBT Re-bunching Cavity

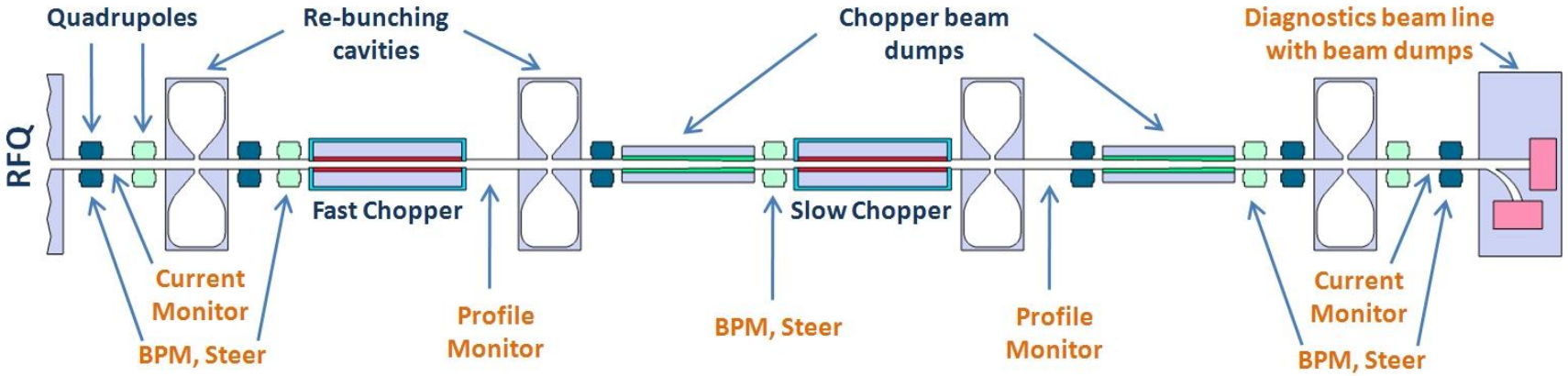
MEBT Re-bunching Cavity

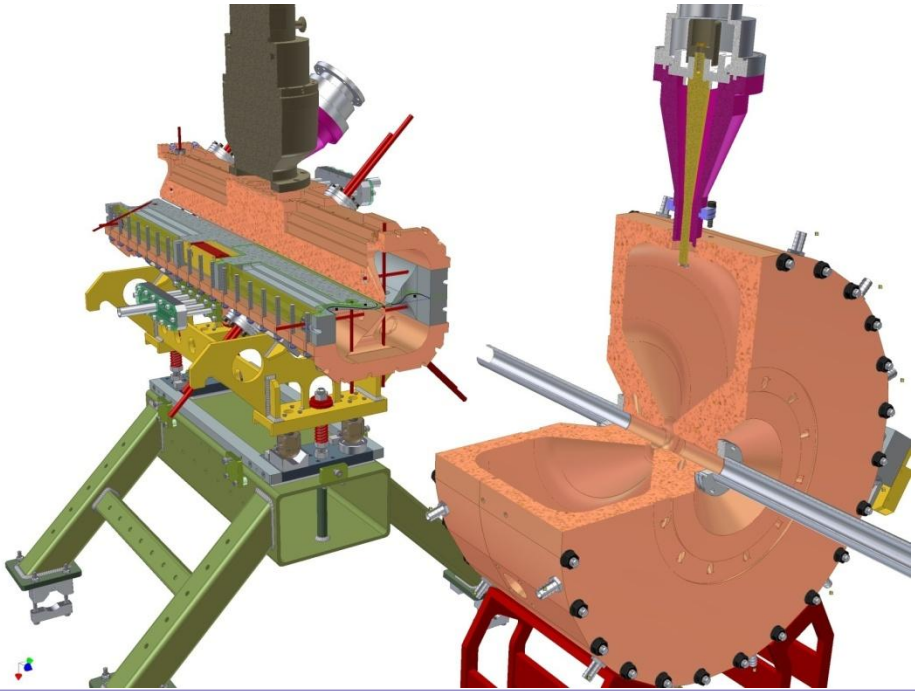




This design is based upon a CERN design. It is a thick walled structure made in two ‘halves’ that are bolted together. The RF seal is Helicoflex. Cooling channels run through the thick walls. The beam pipe shown here is a 30mm ID welded to a DN40CF flange. The total length (in Z) is 50mm + the inside length, in this case it is 250mm.

MEBT Re-bunching Cavity





The design has three ports for:

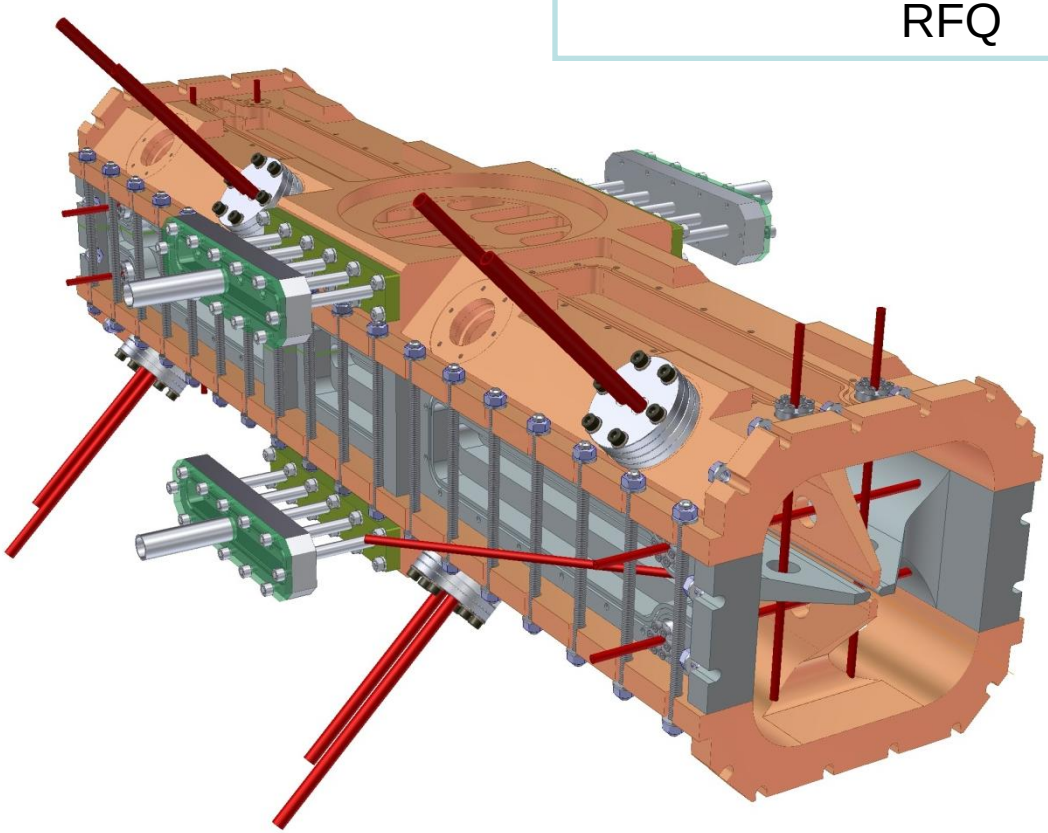
RF power
RF feedback control
Tuning

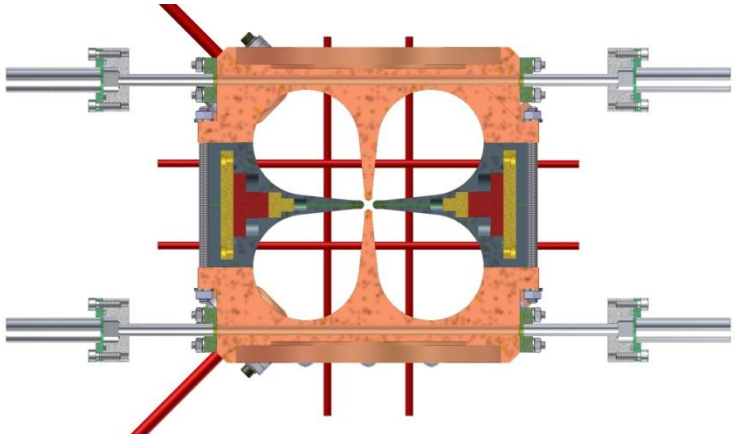
The cavity RF coupler could be identical to the RFQ coupler design.

Needs detailed design work.

RFQ

RFQ

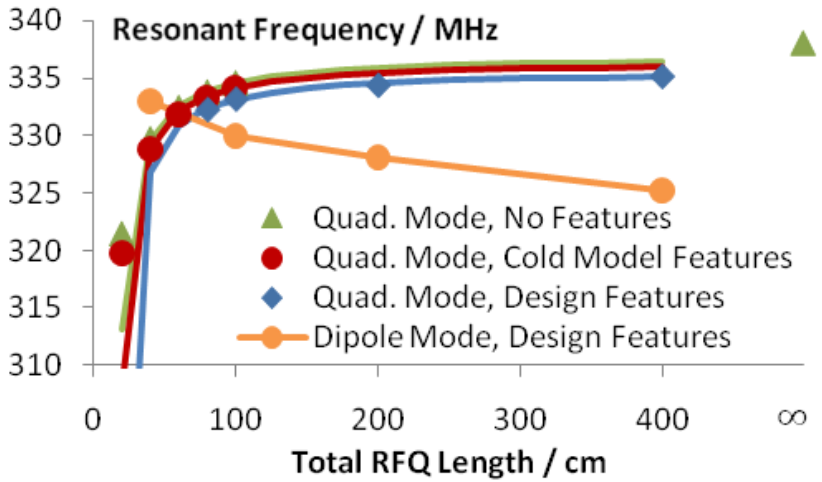




I have made provision for Pi mode stabilising rods in the RFQ. Early indications show that they should not be required. However, it is sensible to consider them in the design. Note that adding the rods has a slightly changed the cooling circuit.

It has been suggested that we may want extra ports for RF monitoring, vacuum monitoring and vacuum let-up. These details should be added sooner rather than later.

RFQ

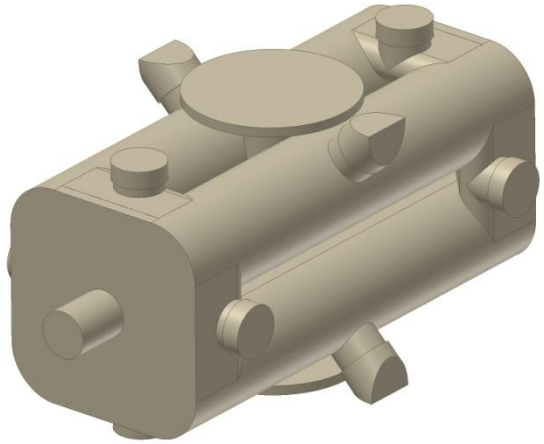


Scott's work showed the affect of RFQ length on the resonant frequency.

The latest RFQ CAD model now has the correct internal geometry to give 324MHz at 4m long.

Previously made simulation models must be updated to use the new geometry.

Length	r = 42.14 mm	r = 43.49 mm
400 mm	324 MHz	
1000 mm	333 MHz	
4000 mm	336 MHz	324 MHz
Asymptotes to...	338 MHz	326 MHz



Other stuff...

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•Drawings for flanges to blank off the RFQ cold model have been submitted to the HEP workshop.

•End flanges for both the Bilbao weld models and our Indium sealing test are at the vacuum brazing company.