

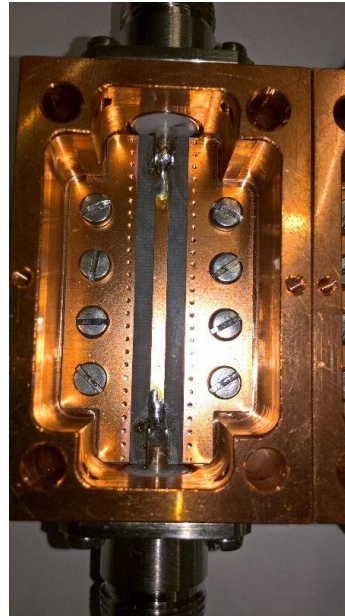
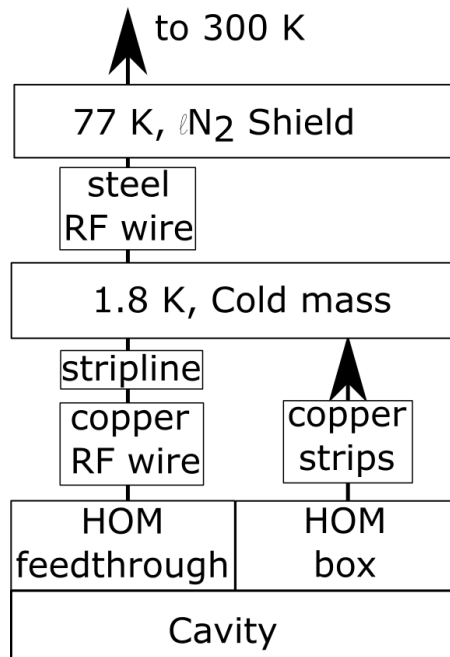
Superconducting Cavities for Accelerators and Axion Searches

- Test cavities of moderate quality factor in extreme magnetic fields (use of Nb₃Sn or HTS)
→ see following RADES talk by Jessica
- Test small Nb₃Sn systems for existing cavities here: Nb₃Sn HOM antennas for MESA cavities
- Studies on non-isochronous ERL beam dynamics



MESA Enhanced ELBE-type Cryomodules

1. Concern: Heating of the HOM-Antenna
2. Changes:
 - Sapphire windows at HOM feedthrough
 - Strip line in HOM cable for cooling



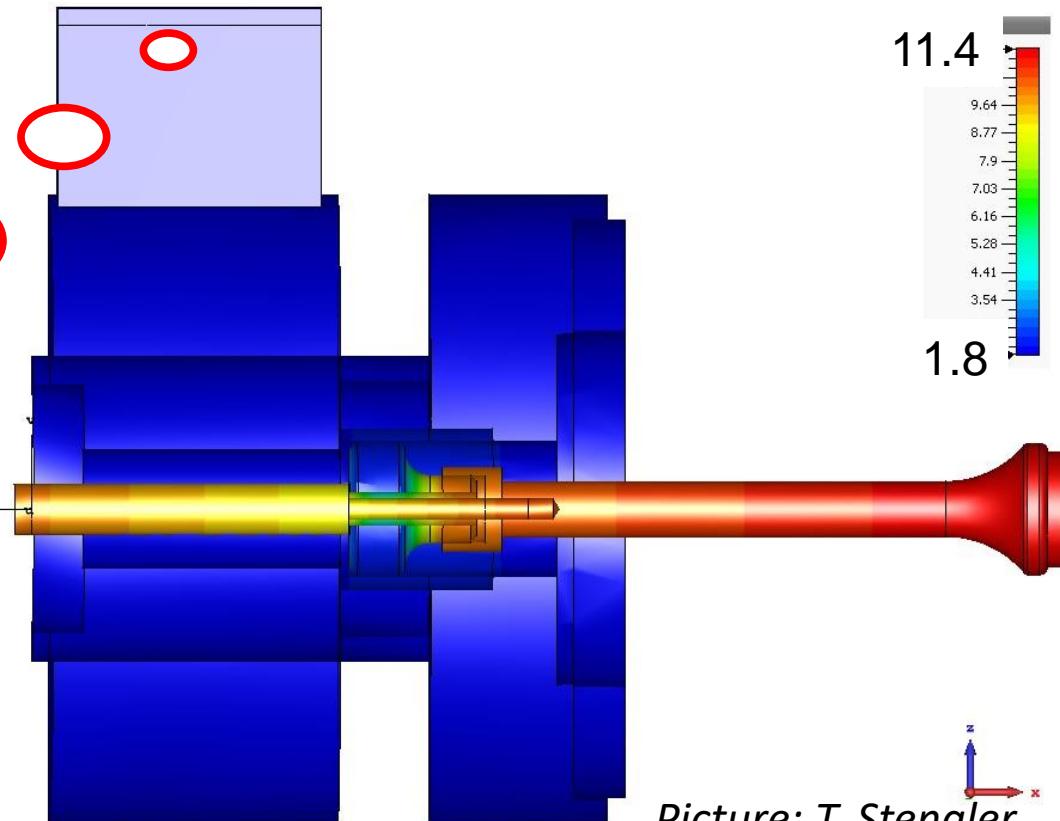
**Cryomodule (2 XFEL Cavities @
12.5 MV/m)**

MESA Enhanced ELBE-type Cryomodules

Thermal calculations at HOM antenna:

- Provide optimised thermal connection design to RI
- Limitation by heat input from cable, need for heat sink

Only 1.25 W
heat deposition in
1.8 K LHe bath
per HOM coupler
in cryo budget



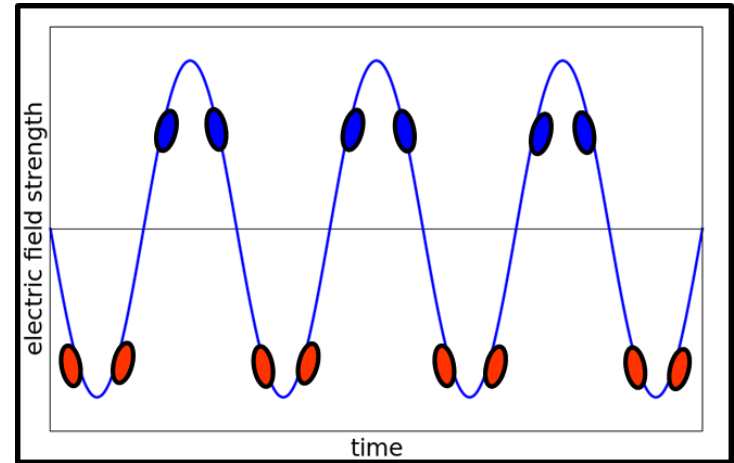
Picture: T. Stengler

ERL beam dynamics studies

Is a non-isochronous scheme in ERL operation possible?

- Ongoing studies using double sided design of MESA
- Acceleration on either crest phase space

First simulation results for MESA:



On crest, isochronous:

$$\Delta E_{\text{rms}}/E = 2 \cdot 10^{-4} \text{ (21 keV @ 105 MeV)}$$

Off crest, non-isochronous:

$$\Delta E_{\text{rms}}/E = 8.9 \cdot 10^{-5} \text{ (9.3 keV @ 105 MeV)}$$

F. Hug, Proc. IPAC '17 (2017) 873.

→ For this call:

how can this be useful for future ERLs?

Applications, benefits, draw-backs of separated recirculation beamlines for acceleration/deceleration (like presented by P. Williams on ERL 2019)