

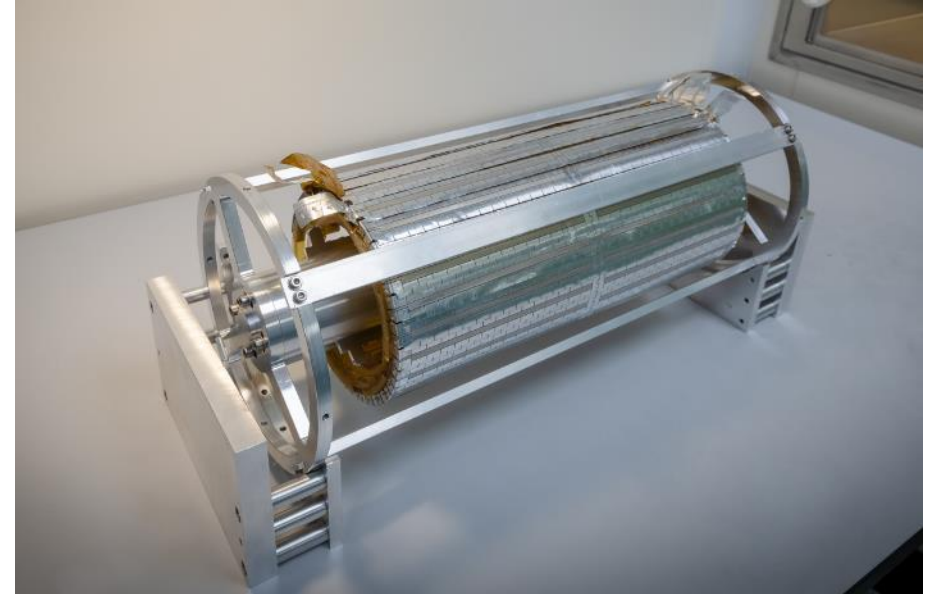
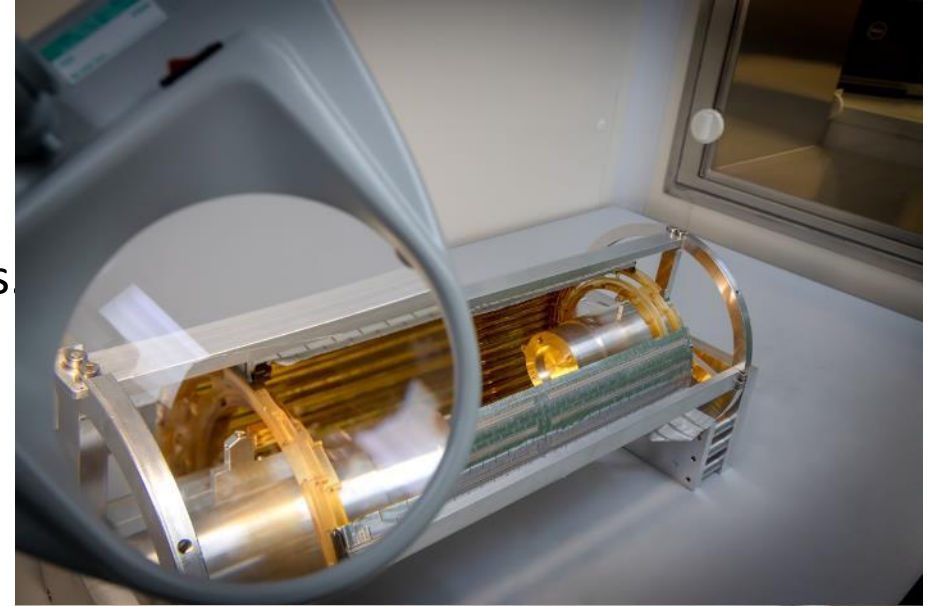
# Module mounting

# Module mounting studies

The spring-load on one of the endrings is set with three springs  
How do we define a suitable spring tension on the ring and what are the constraints place on module/ladder length.

## Mounting tooling

- Ensure no deformation occurs to modules when mounting
- Work out solution for load transfer



# Spring load / length tolerance (work done by Andrew Groves)

## Tolerable length differences:

Using L4 flex heater ladders with varying length we find that visible deformation occurs when  $\Delta L$  between neighbouring modules is  $\sim 500$  micron. We should aim for length differences well below this (<100-150 micron?)

## Do modules stretch or deform under springload?

- A single flex heater ladder stretches  $\sim 40$  micron per Newton load applied (representative of final object?)
- Visible deformation to a flex heater ladder occurs around 200 micron extension (5N)
- *This may be very different with ladder with 90deg bent interposer flex (if not glued)*

Hypothetically, if one ladder is shorter than the others it could take the bulk of the spring force on the ring. We can avoid this by:

- Keeping length difference ladders we within  $\sim 50$  microns (then above 1N loads gets shared)
- Overall spring-load should not exceed a few newtons

Option 1: length differences 50-200 micron need springload less than a few Newtons. Springload will apply to the shortest ladders.

Option 2: if lengths are within 50 micron could afford larger springload (not obvious this is desirable)

*To do (if we can): measure thermal expansion on a real module, to understand what  $\Delta T$  is tolerable in operation. I.e. could we tolerate if a single module were not powered.*

# Module mounting: pick-up tool

Modules must be on a rigid tool at all times.

Pick-up tool takes module from assembly tool to storage box and from storage box to detector.

Foresee to keep this tool in place until a full layer is assembled

Removing the frame will be very delicate operation (ideally we need a better solution to avoid torque on the mounting rings)

Some modifications needed

- To ensure low force when mounting and removal of tool
- To allow length adjustment and avoid and rotation in the pick-up points

Foreseen mounting sequence:

1. Mount (subset of?) “empty” mounting tools (= tool + endpieces) to L3 ring
2. Start mounting modules, leave tool attached to modules and remove “empties” as we go
3. Mount (subset of ) empties to L4 and remove tooling from L3
4. Mount L4 modules, leave tooling on modules and remove empties
5. Remove tooling from L4 modules

For dismounting follow opposite sequence

Tooling length needs to be set to ~100 micron?

