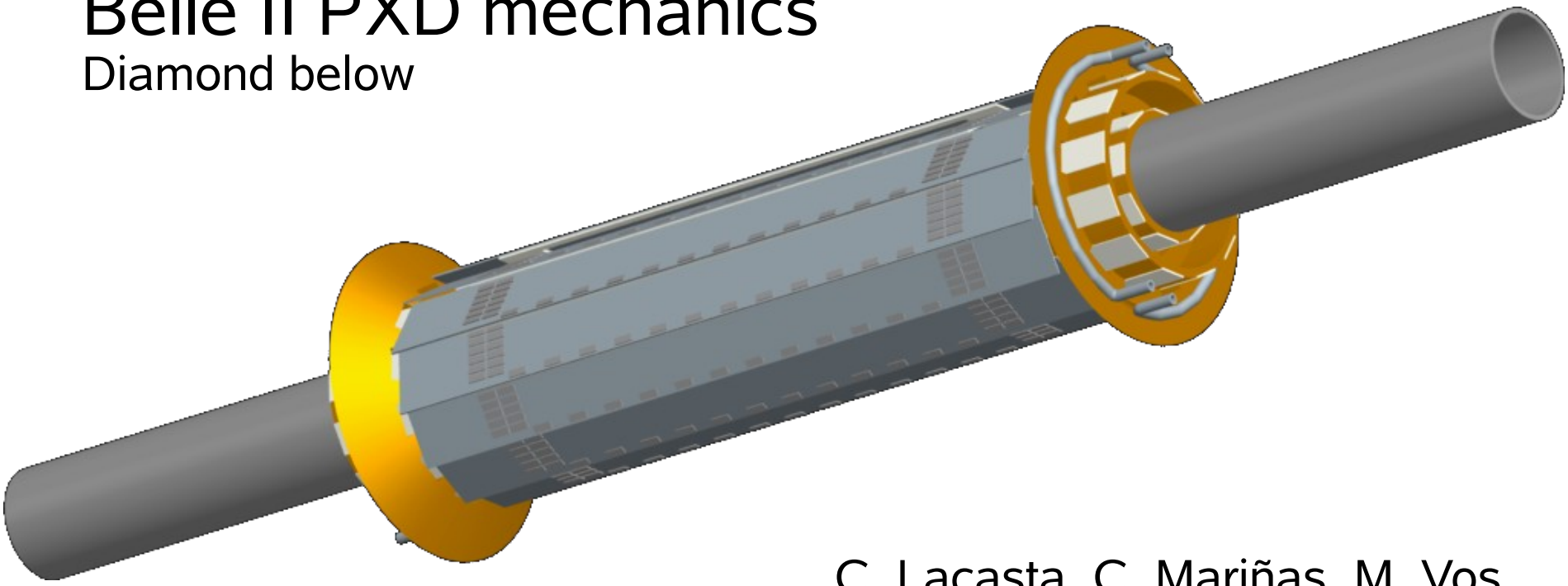
Belle II PXD mechanics

Diamond below



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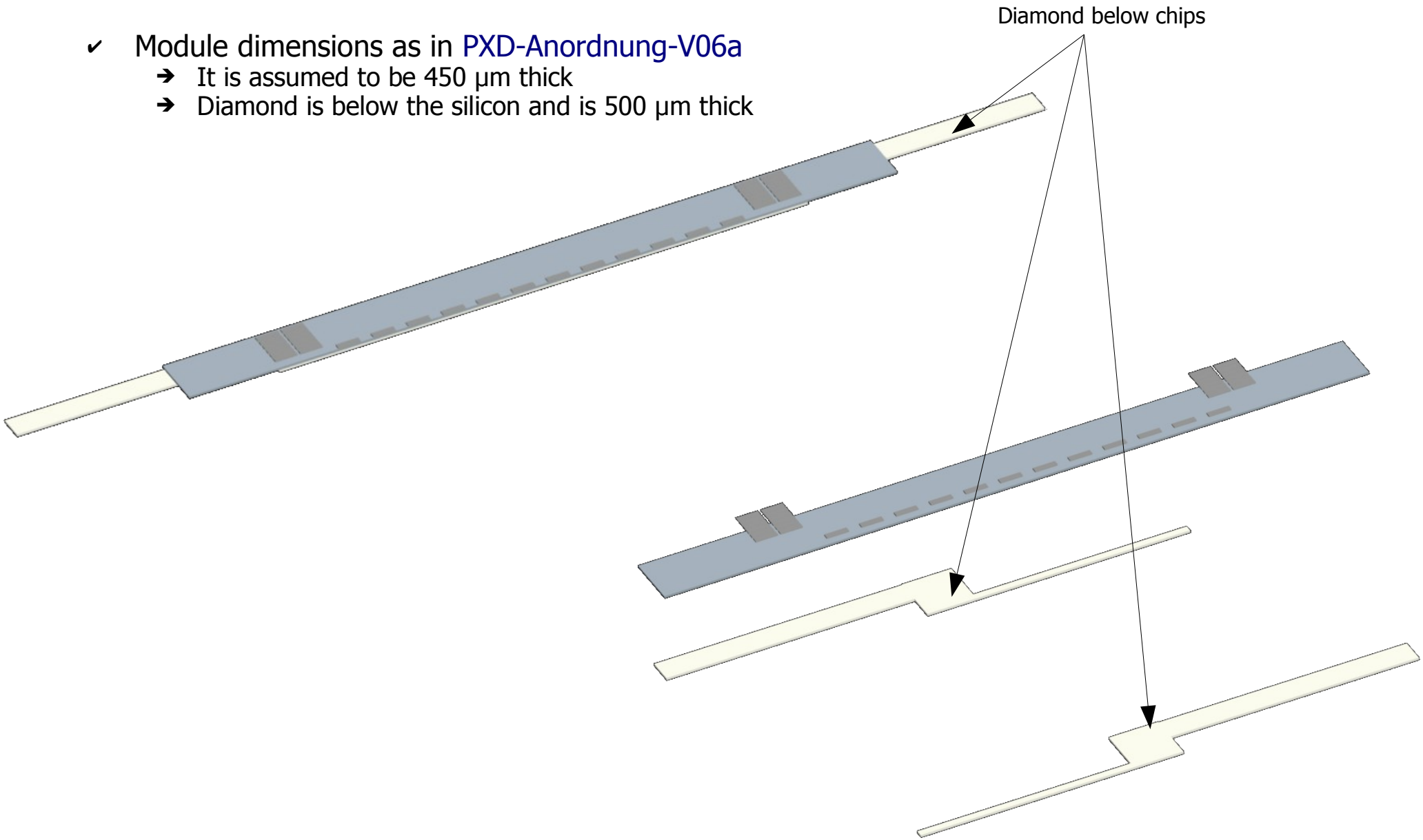
Introduction

- ✔ This is a collection of ideas that arose when trying to think on the PXD support needed when the diamond is glued under the sensor.
- ✔ There are some unknowns that may affect these ideas like
  - ➔ Beam pipe envelope
  - ➔ How far back, along the the beam pipe, we can go with the services
  - ➔ SVD envelope
  - ➔ ...

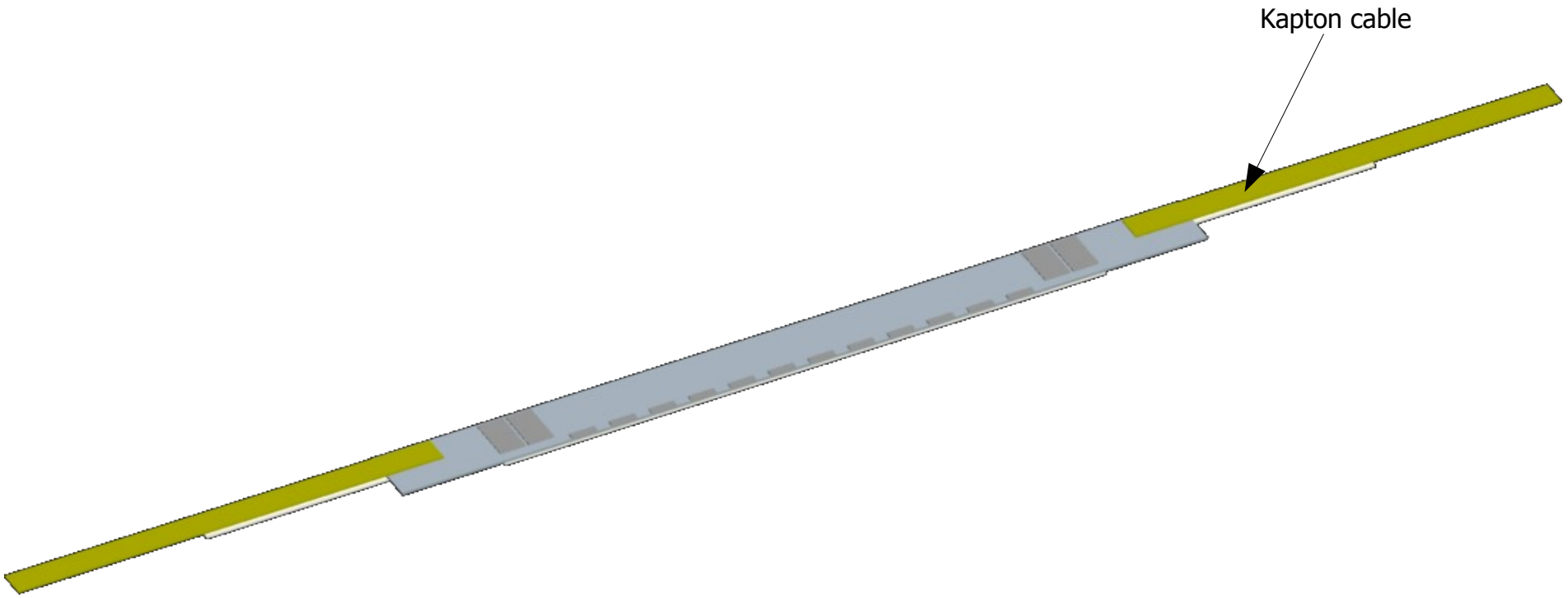
Modules

- ✔ Module dimensions as in PXD-Anordnung-V06a
  - ➔ It is assumed to be 450 µm thick
  - ➔ Diamond is below the silicon and is 500 µm thick



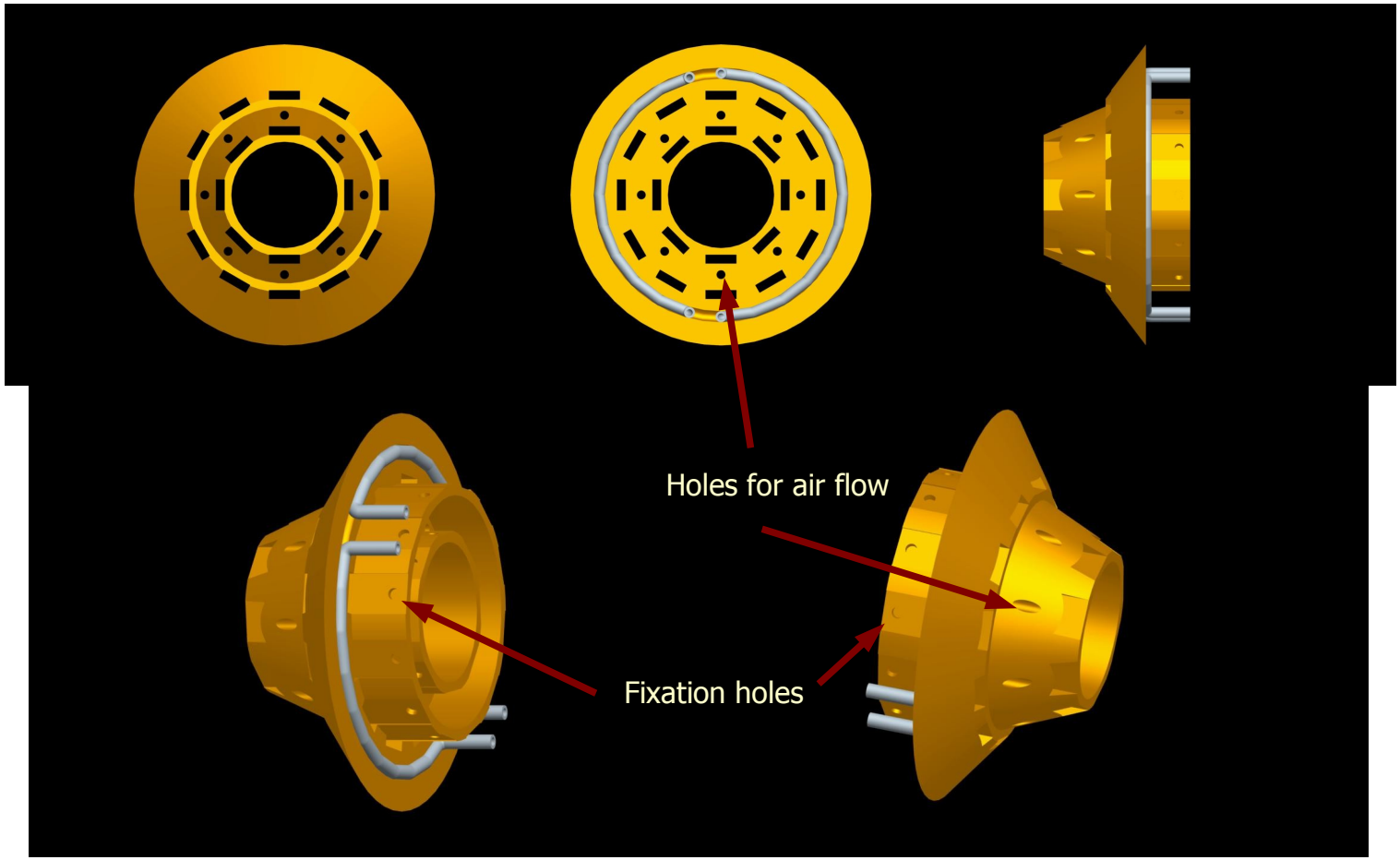
Modules

- ✔ Avoid connectors
  - ➔ Kapton cable with as many layers as needed
  - ➔ Bonded and glued (to avoid strain forces) to the module



Support block

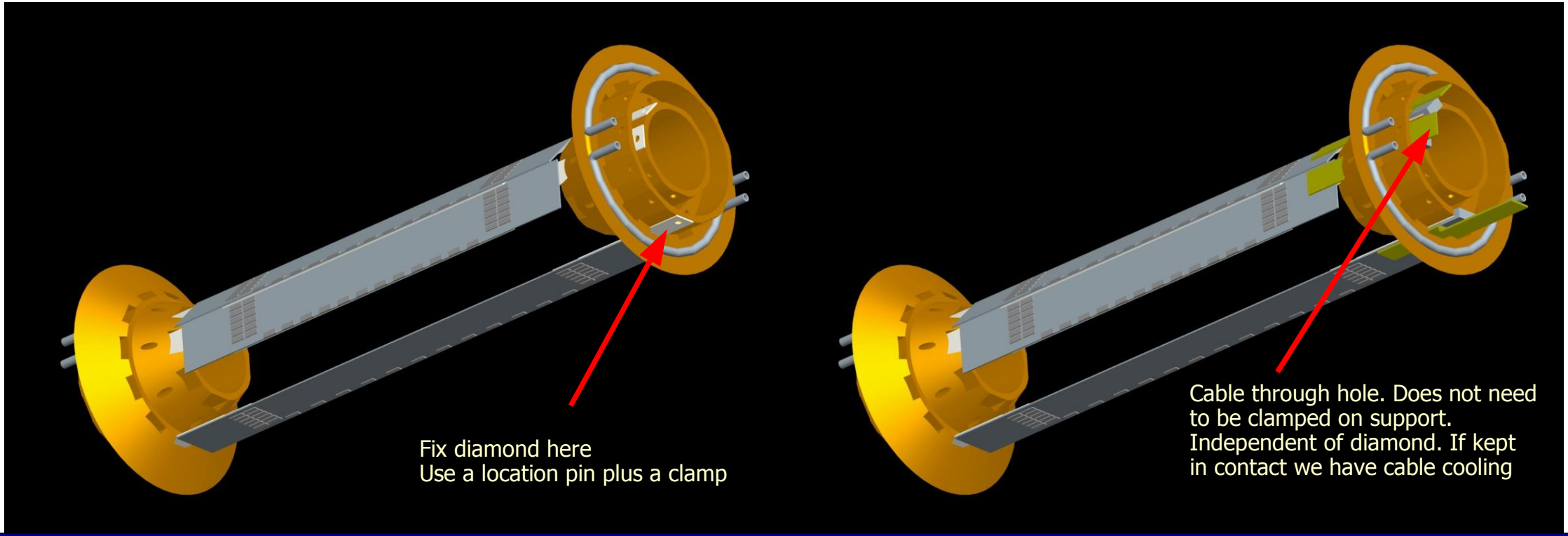
- A "conical" structure split in two shells
  - Holes (rectangular shape) to pass diamond and cables through
  - Holes (circular shape) for air flow (we could make the slots bigger and remove the holes (Marc's suggestion)
  - Diamond-support contact lowered 500 µm so that modules are at nominal radius (14 and 22 mm, according to PXD-Anordung-V06a)
  - Cooling: 2 circuits (one per clam-shell) as a pipe half buried and welded to the structure
    - Caveat: max. pipe OD is ~6 mm
  - Max. radius is 34 mm (Does the SVT start at 35mm ?)
    - Can be smaller depending on the required pipe OD



Cooling at the top allows to have air flow between the 2 layers

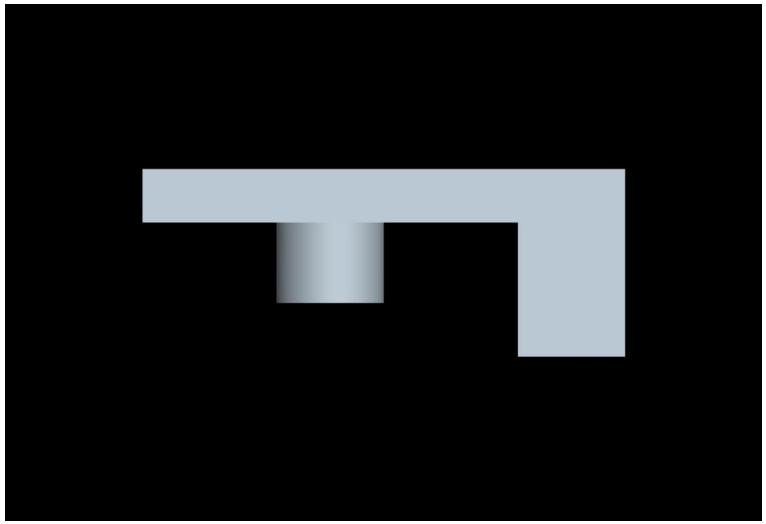
Inserting the modules

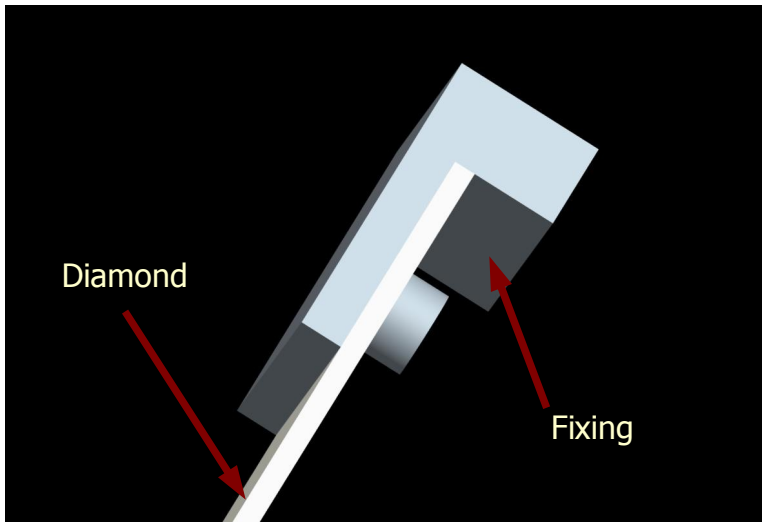
- ✔ Diamond passes through hole.
  - ➔ Large contact area: good
  - ➔ Contact diamond-support with thermal grease
  - ➔ Diamond clamped somehow to the support at the outer side
- ✔ Need to think on the assembly procedure
  - ➔ If we fix both sides of a ladder at a time, that fixes the separation of the support blocks and makes the assembly very difficult
  - ➔ Start on one side with both layers and then "insert" the other support block (see later)

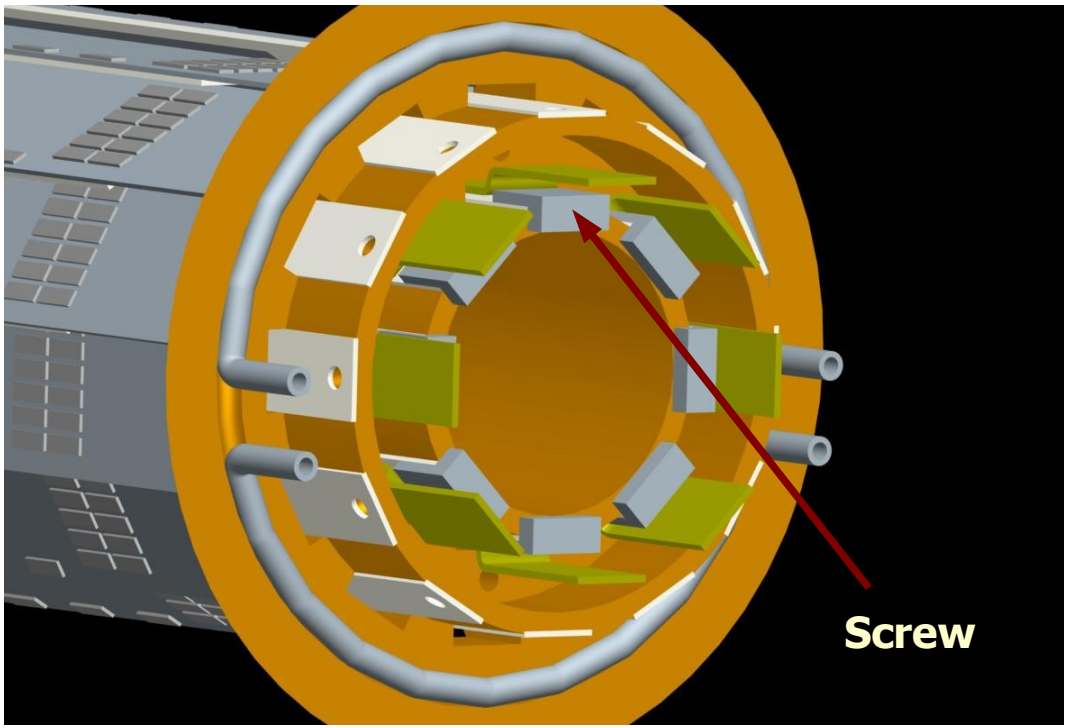


Module Fixation

- ✔ Use a small piece with a location pin inserted through a hole in the diamond and the support.
- ✔ The piece is screwed on the front where we have access.

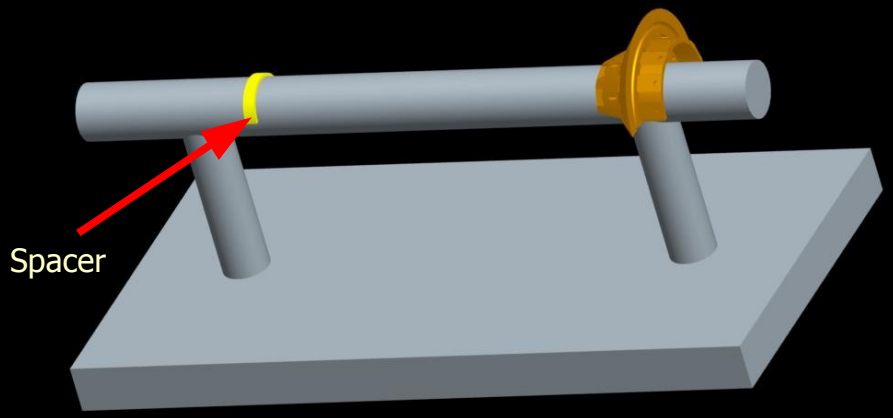






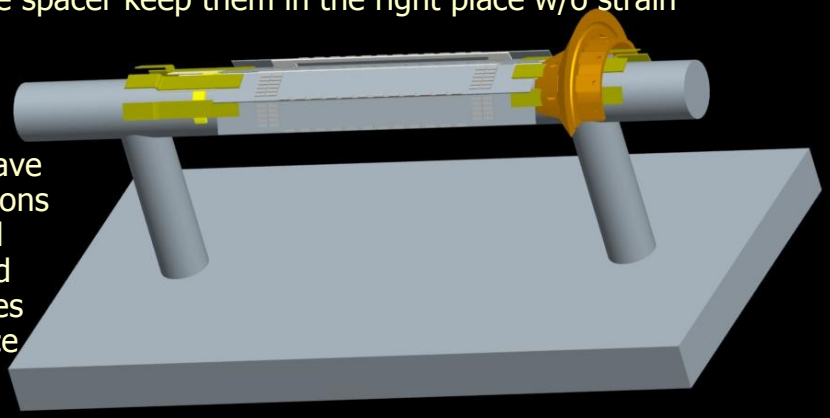
Assembly

Locate support and a spacer on assembly plate

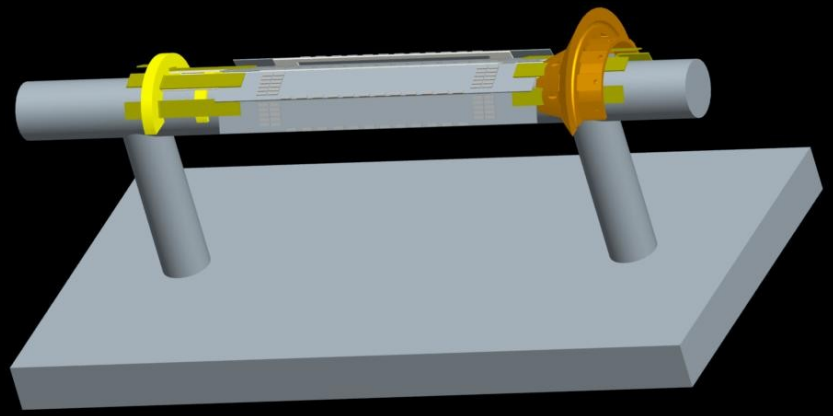


Insert Layer 0 modules.
The spacer keep them in the right place w/o strain

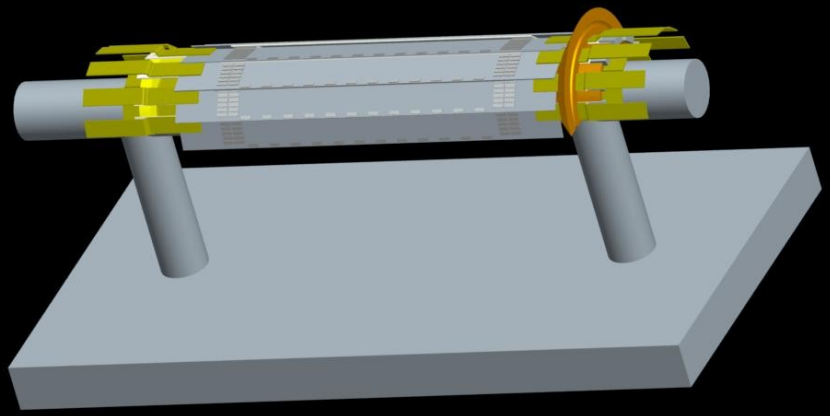
Spacer may have extrusions to hold inclined modules In place



When layer 0 is ready insert spacer for Layer 1



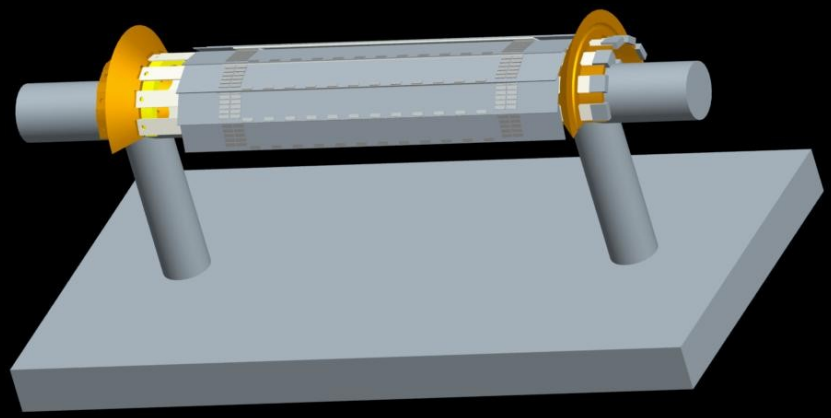
Mount Layer 1 modules



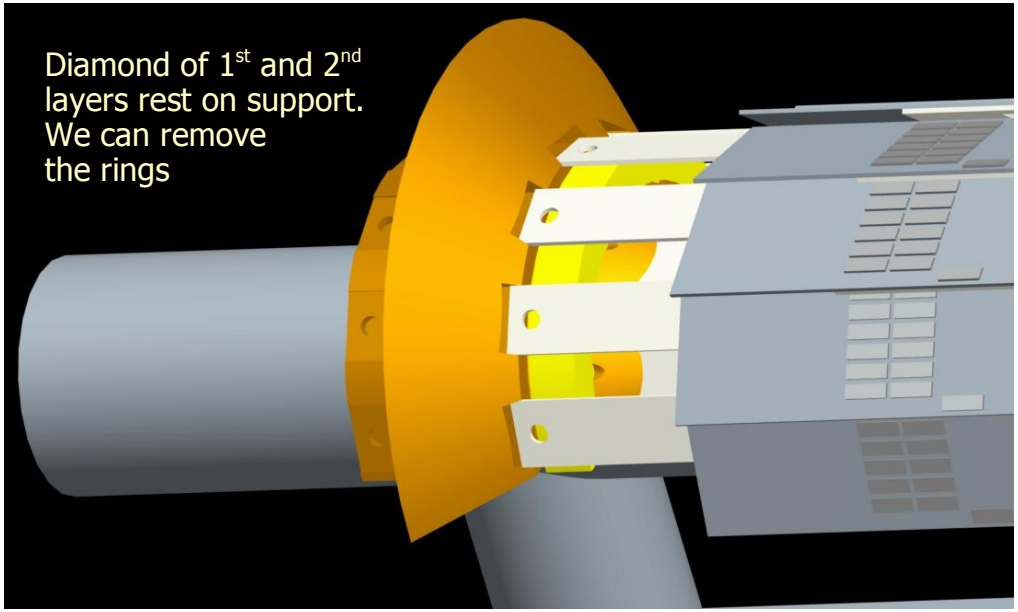
Assembly

Insert the support

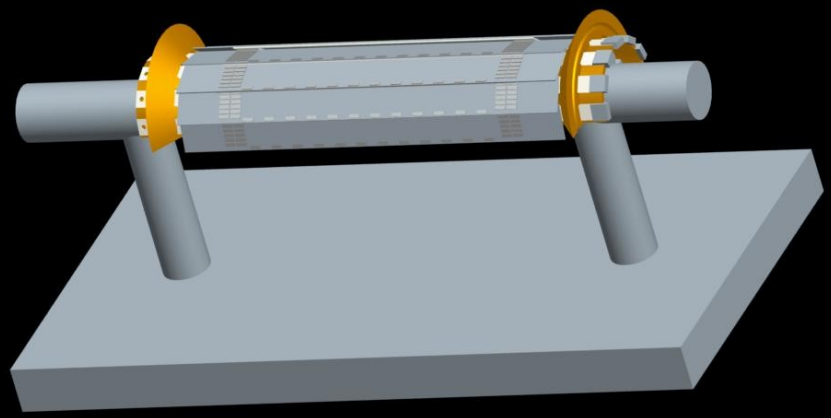
(Cables removed for clarity)



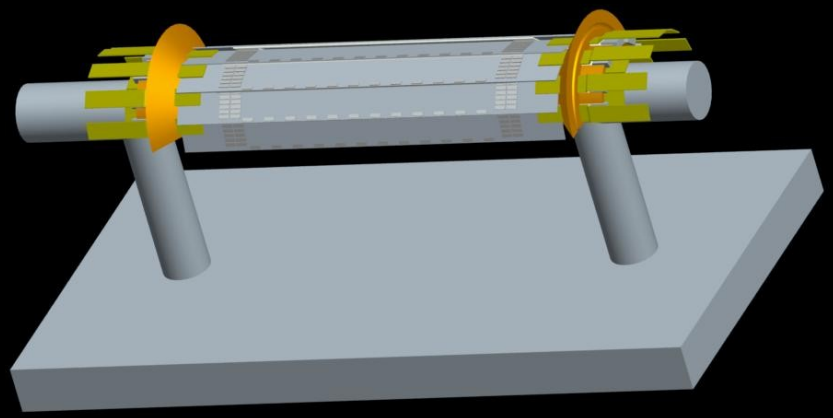
Diamond of 1st and 2nd layers rest on support. We can remove the rings



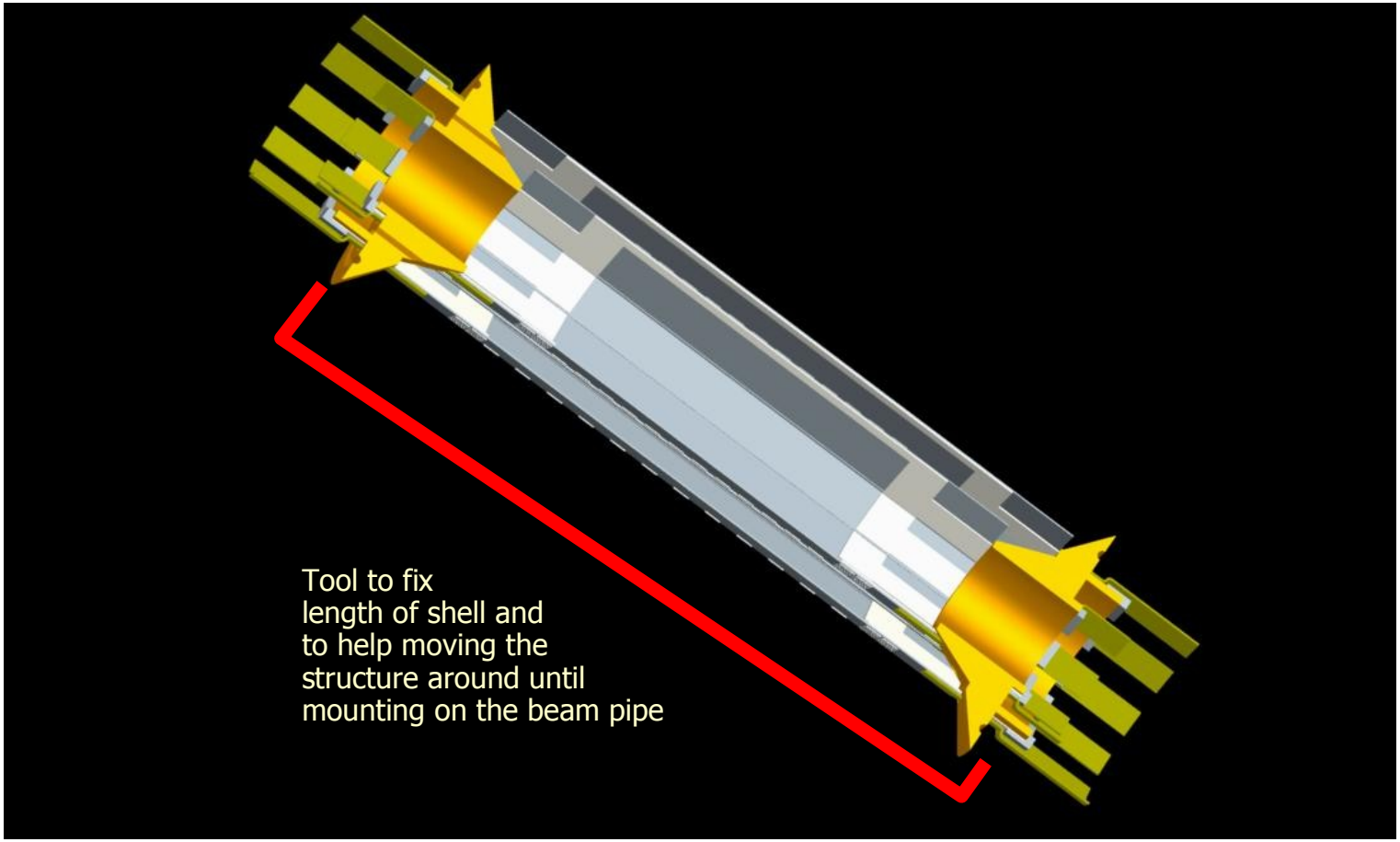
Move support to final position



Fix modules on that end. (Cables back in the drawing)

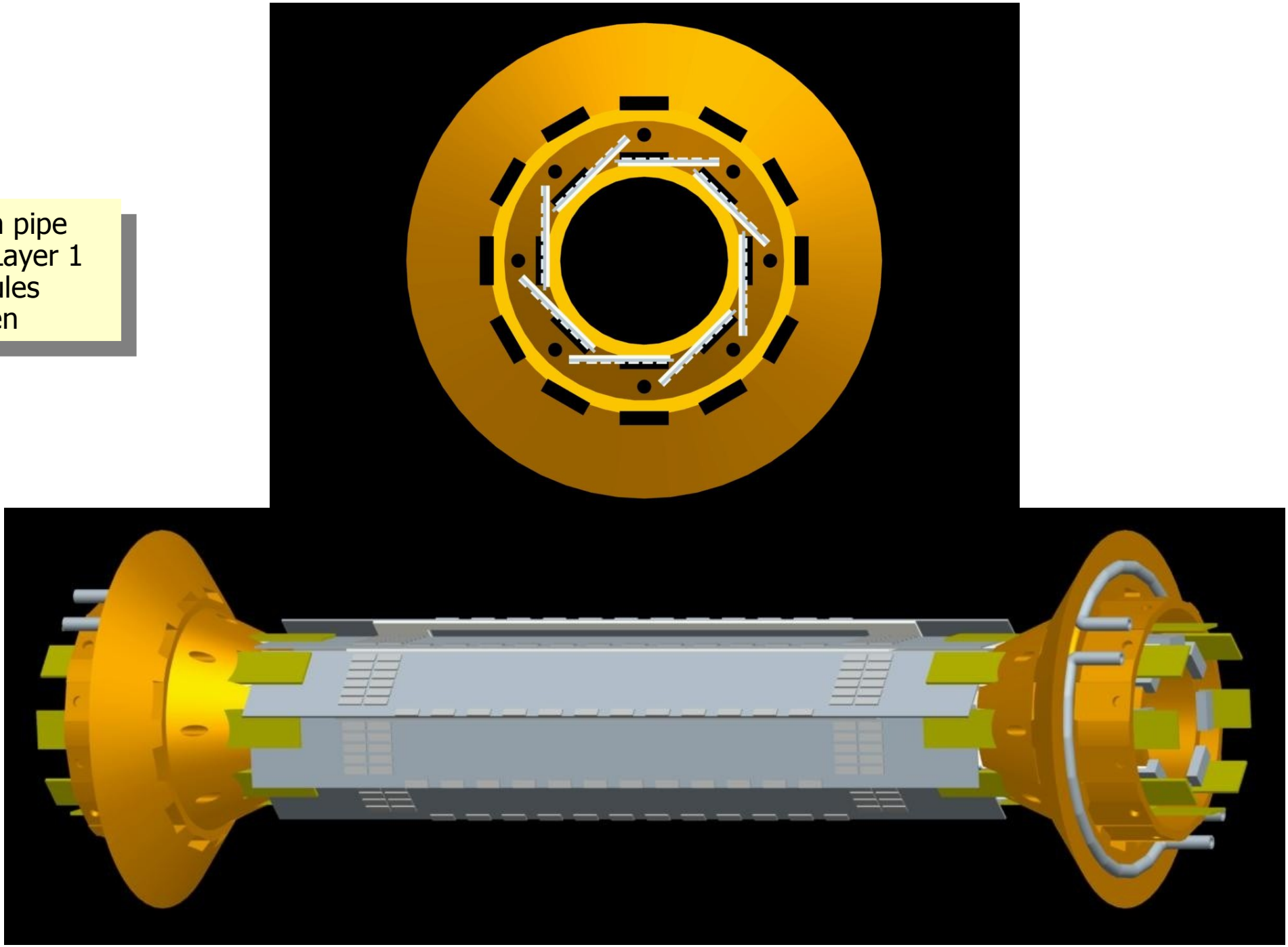


Assembly

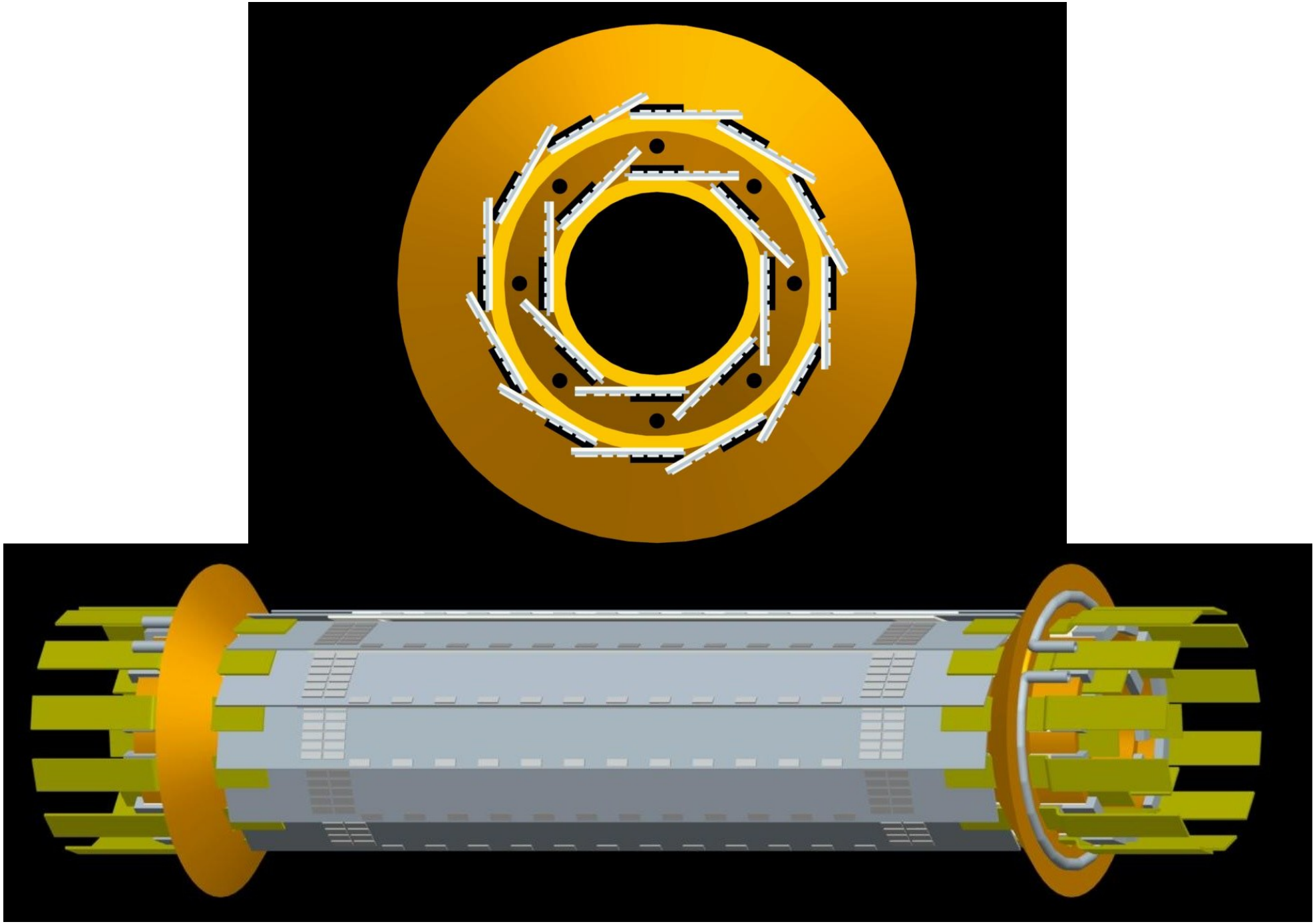

Tool to fix
length of shell and
to help moving the
structure around until
mounting on the beam pipe

Layer 0

Beam pipe and Layer 1 modules hidden



Adding Layer 1



The Belle II PXD + Beam pipe