ECAL-P mechanical frame
PCB support

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ECAL frame: design assumptions

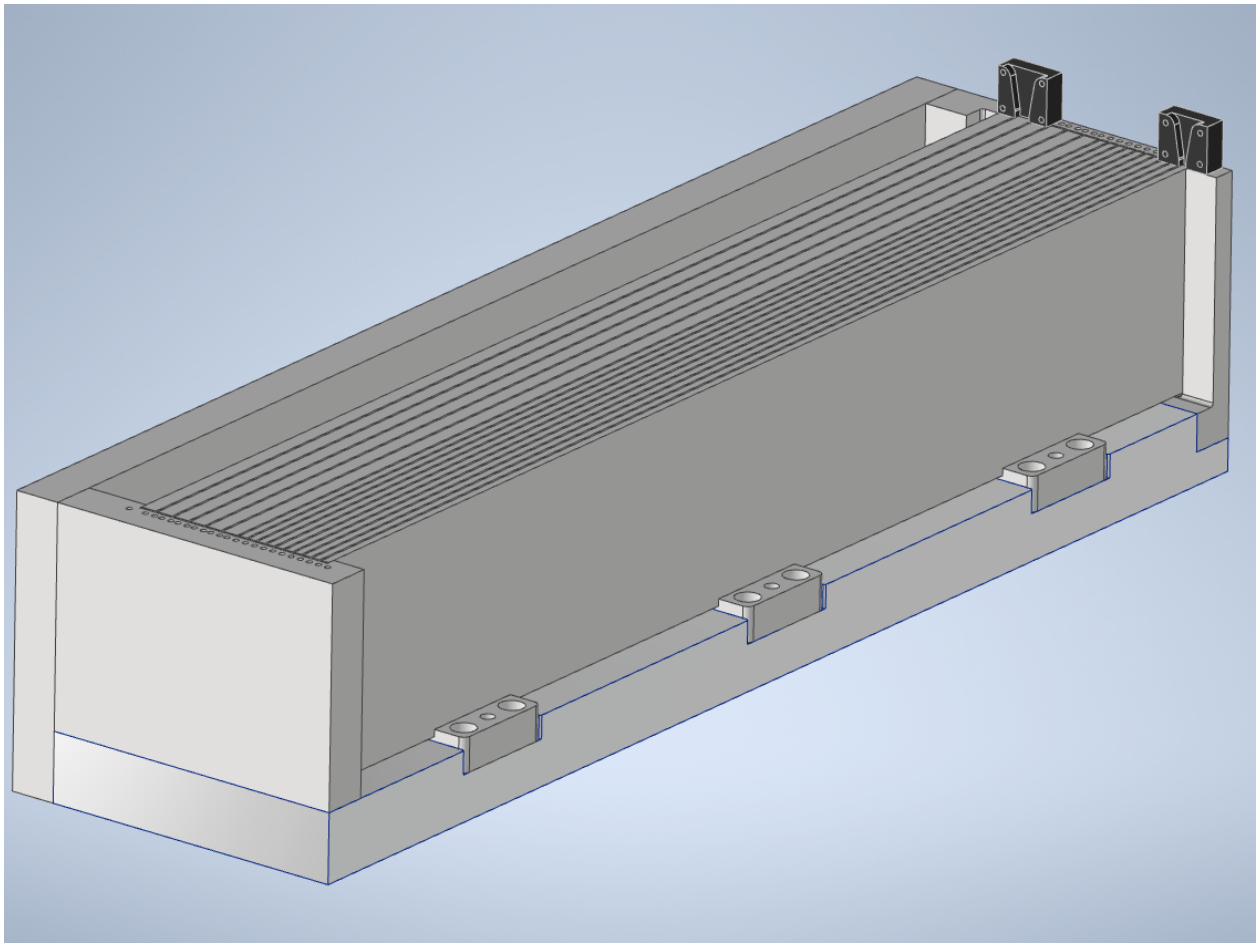
Plates:

- number of planes ($15 \div 20$)
- tungsten thickness (1 X_0 = 3.5 mm, some of them 2 X_0 = 7.0 mm ?)
- transverse size of single plane: 90×540 mm^2
  6 CALICE (320 μm) silicon sensors per plane

Frame design:

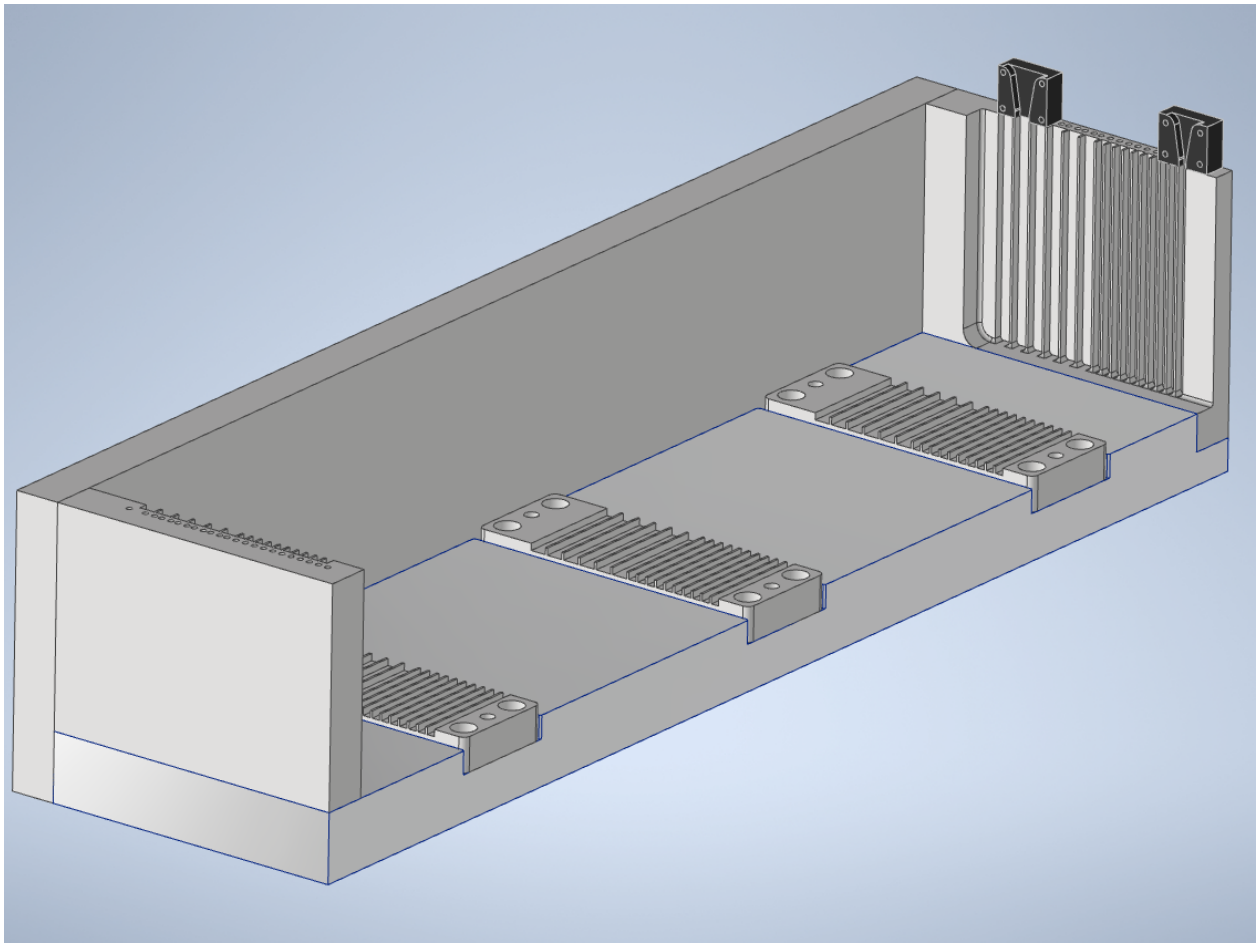
- air gap for silicon sensors: 1 mm
- **10 mm distance between Si sensors and the shielding (beam-pipe side)**
- "open architecture" 15 layers with more empty slots,
  (option next five layers)
- "double slots" to house also 2 X_0 layers
- **access to (inserting/removing) individual silicon+PCB planes**
- **mounting of the frame on the experimental table:**
  intermediate plate for ECAL-P
  (used also for transportation, crane hooks etc...)

Main frame



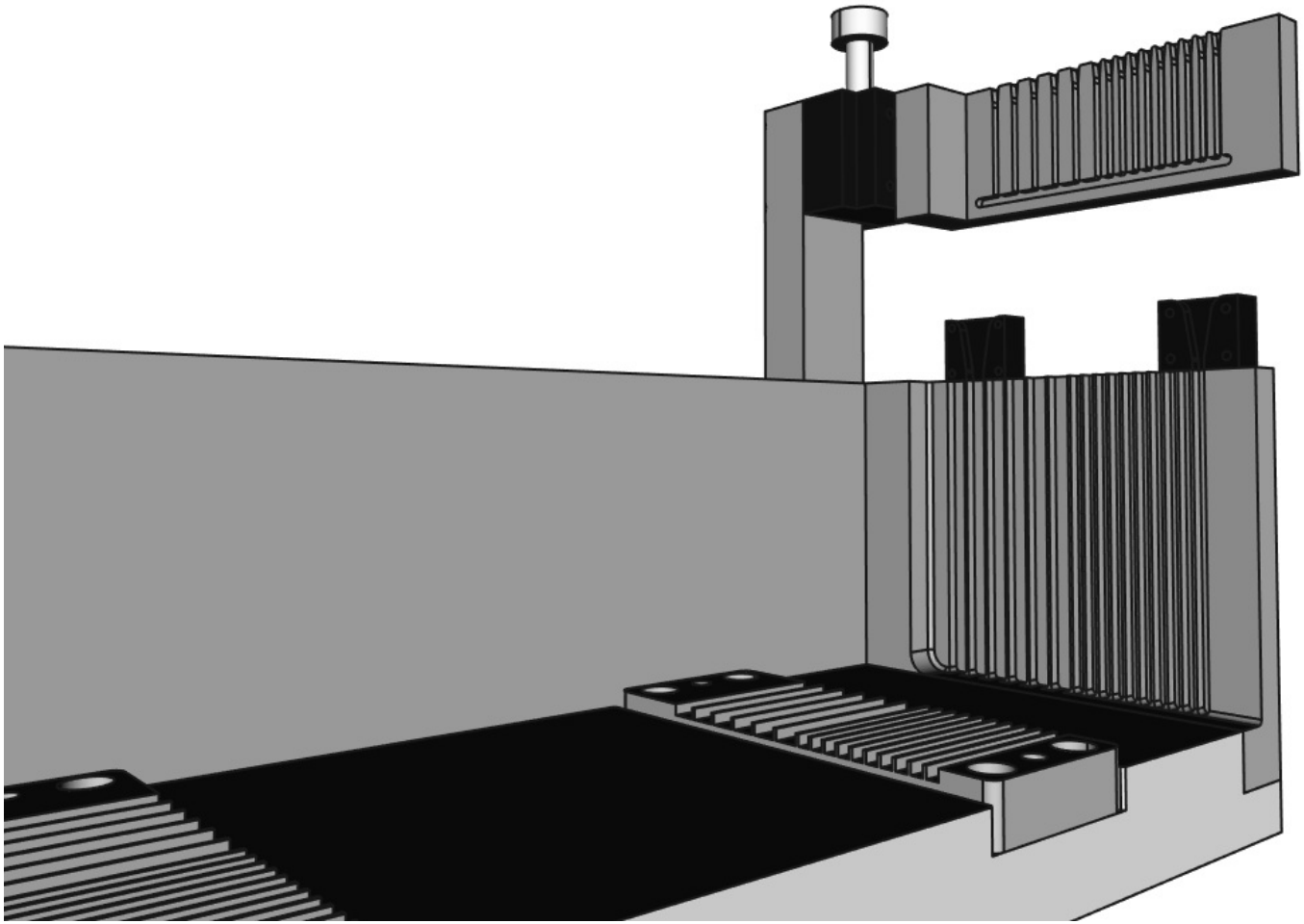
- main body of ECAL-P: tungsten plates and silicon sensors
- “funnels” to facilitate the insertion of tungsten plates

Main frame



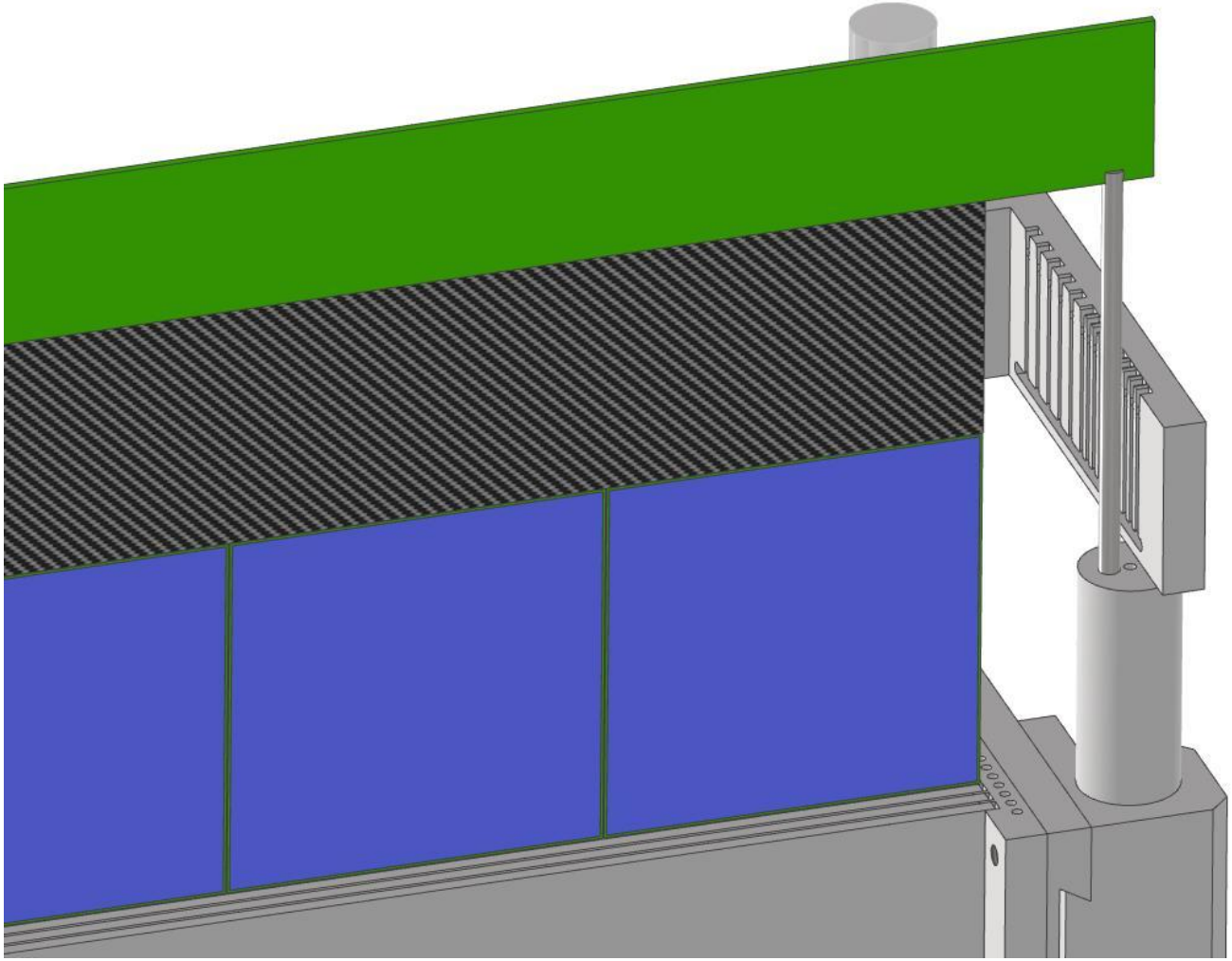
- interior with combs/ribs to hold the plates

PCB support



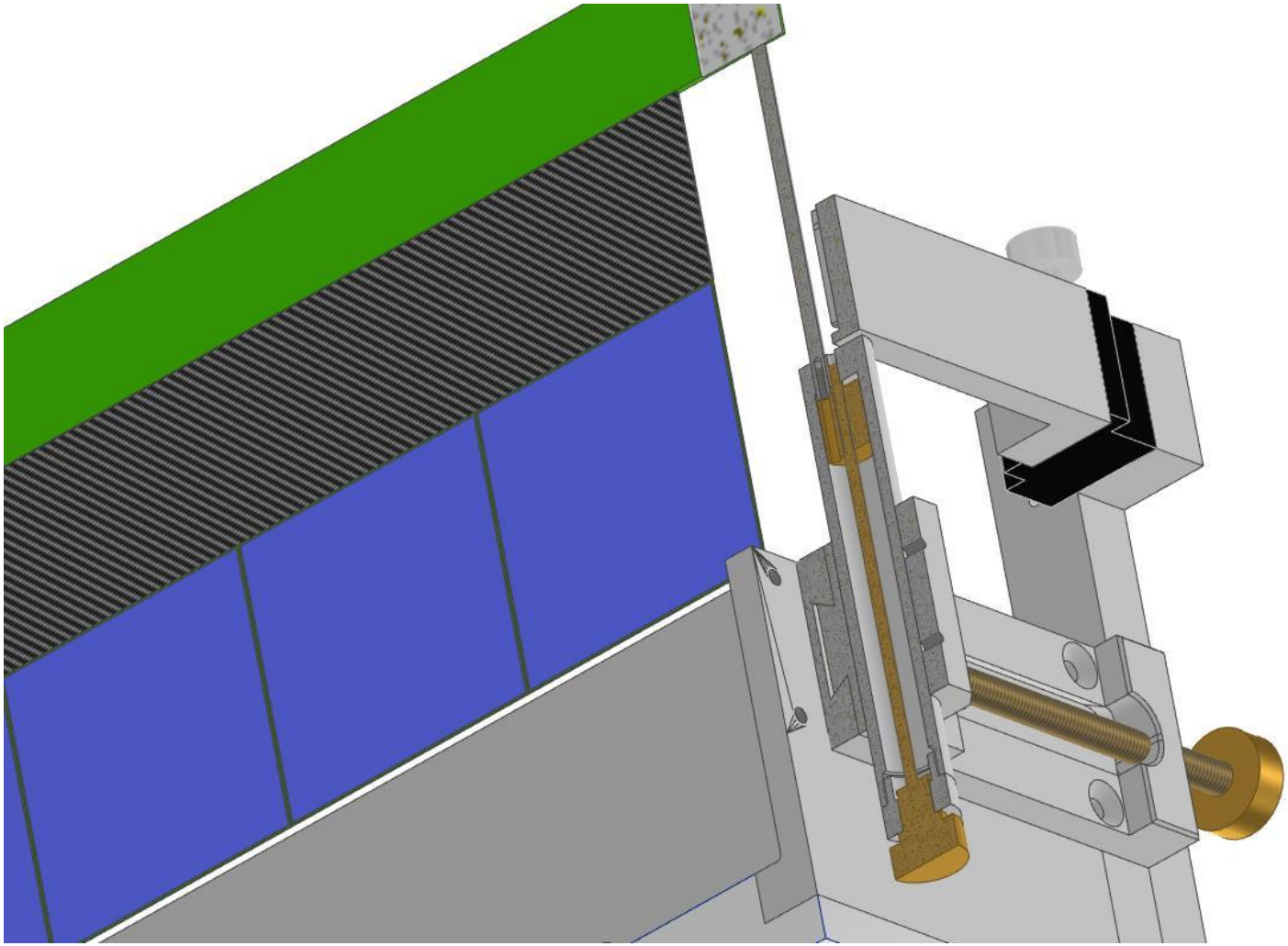
- upper combs to position the PCB structure

Fixture for lowering the sensors



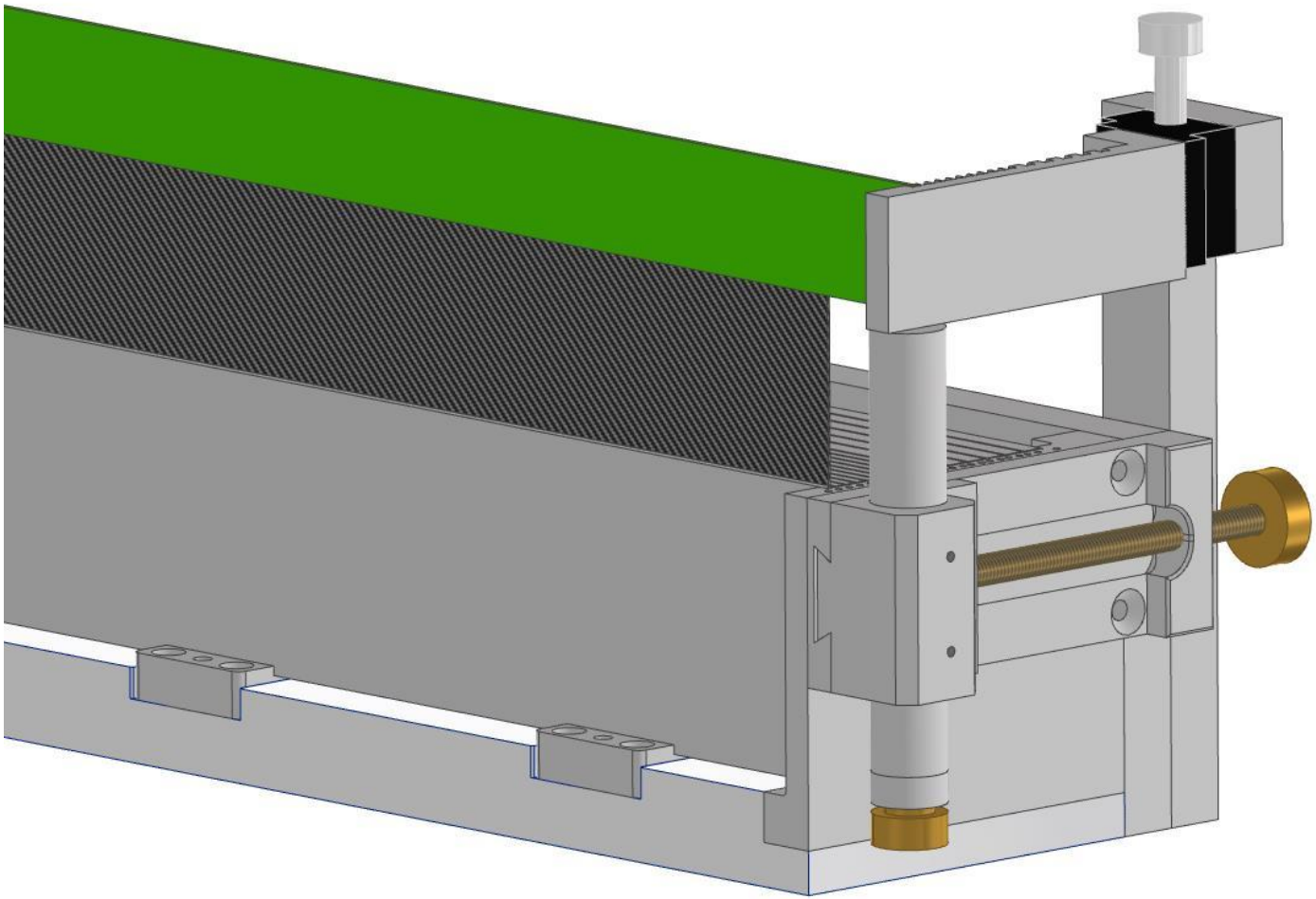
- Structure of PCBs (thickness: $1 \div 1.5$ mm), kapton foil and Silicon sensors
- Encapsulated in carbon fiber envelope
- the structure will be wobbly/flexible

Fixture for lowering the sensors



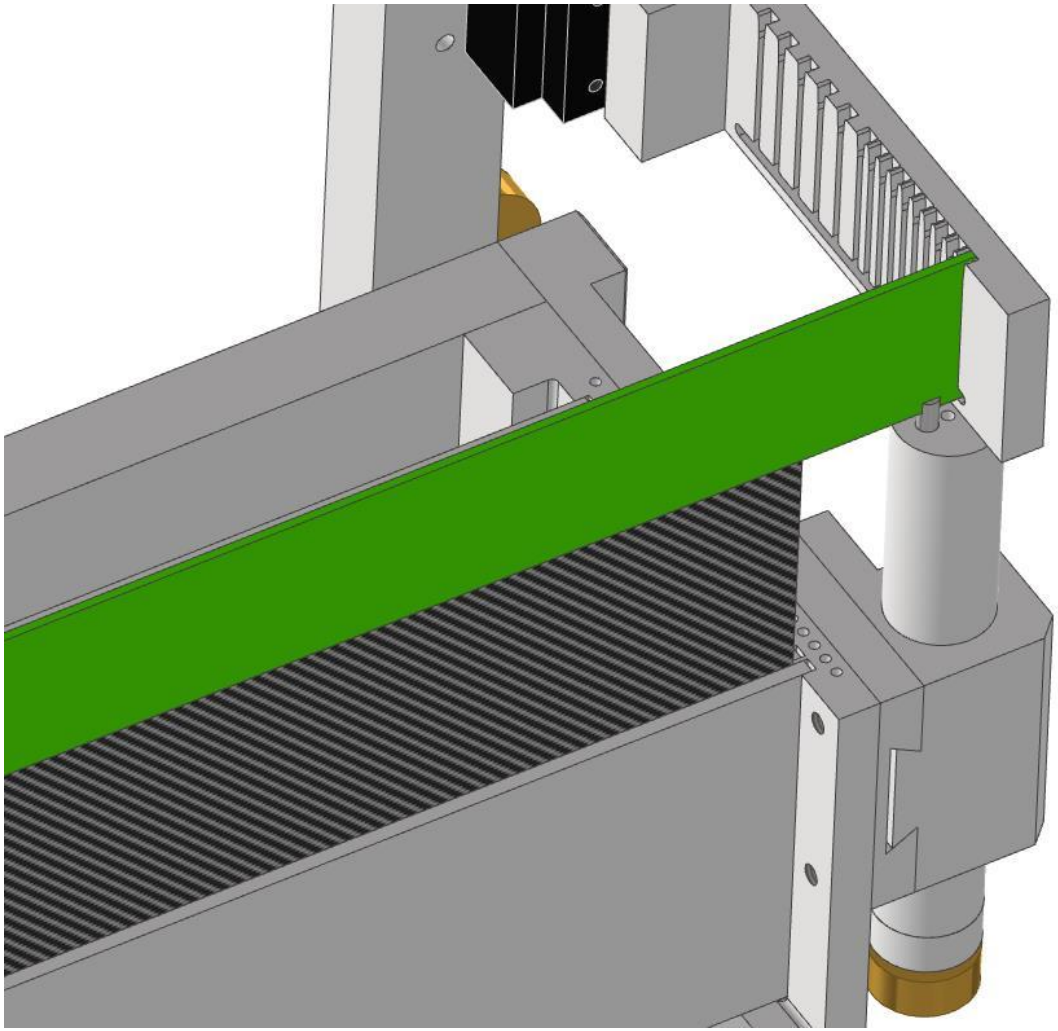
- Gentle lowering requires “slow motion”
- 2 degrees of freedom: up-down (Y) and forward-backward (Z)
- two perpendicular screws, “dove-tail” shifter

Fixture for lowering the sensors



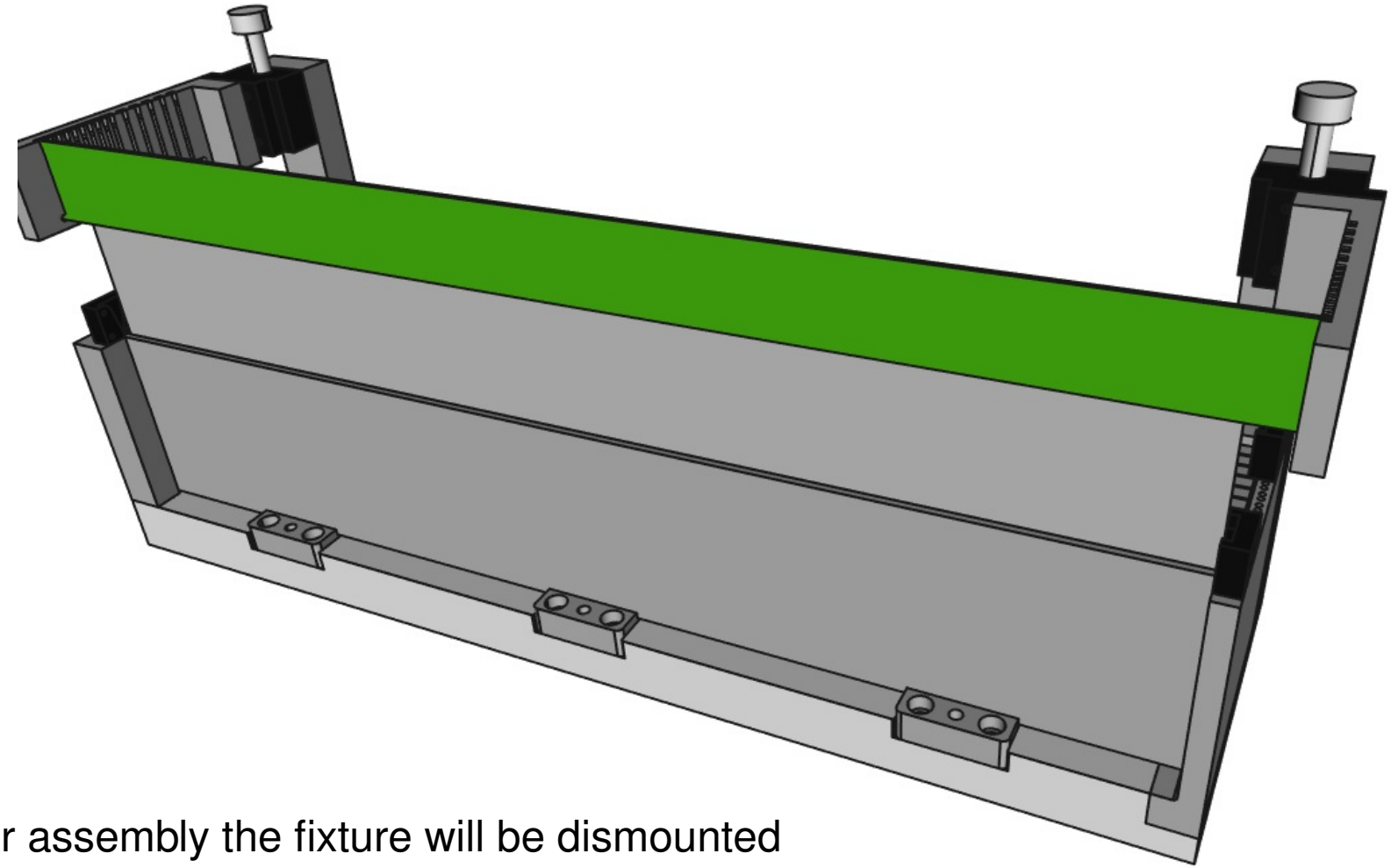
- view with nominal/working position of sensors

Fixture for lowering the sensors



- view with nominal/working position of sensors
- **combs for PCB should be deeper to better position/fix the boards**

PCB support

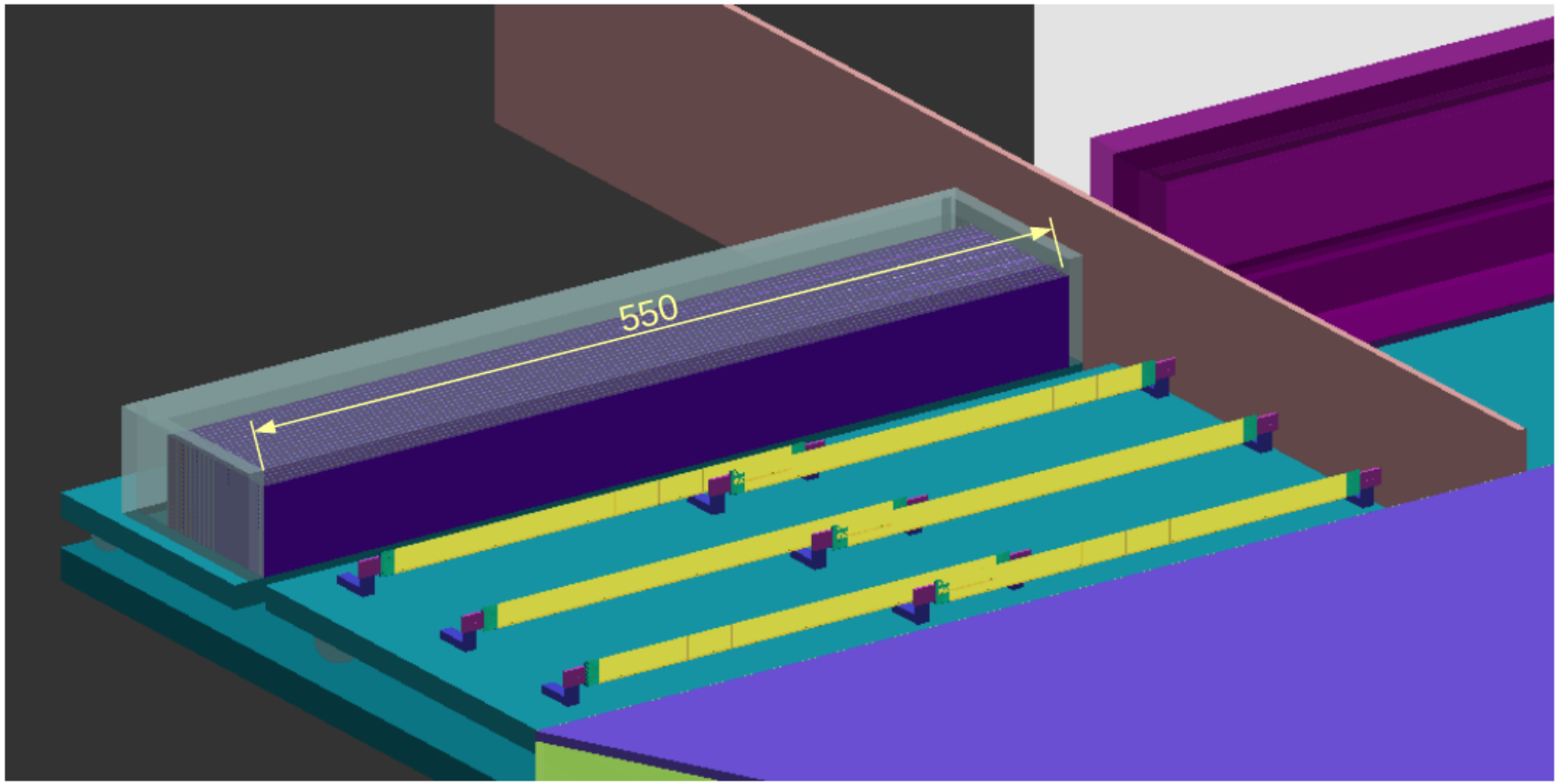


- after assembly the fixture will be dismounted
- **combs for tungsten and combs for PCBs are not aligned**
- otherwise not enough space to firmly fix the PCB structure
- possible clash with ECAL-P shielding

Summary

- **do we know the final dimensions of ECAL-P shielding ?**
- where/how it fill be mounted (to the beam-pipe ? to the table ?)
- are we going for two shieldings, on both sides of the beam-pipe ?
- (will be it used only in e-laser mode ?)
- shielding can be bigger/higher on “electron” side if necessary
- we are happy if on the “positron” side the shielding will remain as in current version of Geant MC ($1000 \times 144.78 \times 5$ mm^3)
- **BUT:**
  this means only about 3 cm shielding above the upper edge of Si sensors
- **higher shielding means longer kapton cables/foils**
  (optimal is $2 \div 3$ cm $\rightarrow$ signal transmission/noises !)

Geant implementation of the shielding



- NOTE: now we opt for bigger (9×9 cm^2) CALICE sensors
- NOTE2: there is no floor of ECAL-P in Geant simulation...