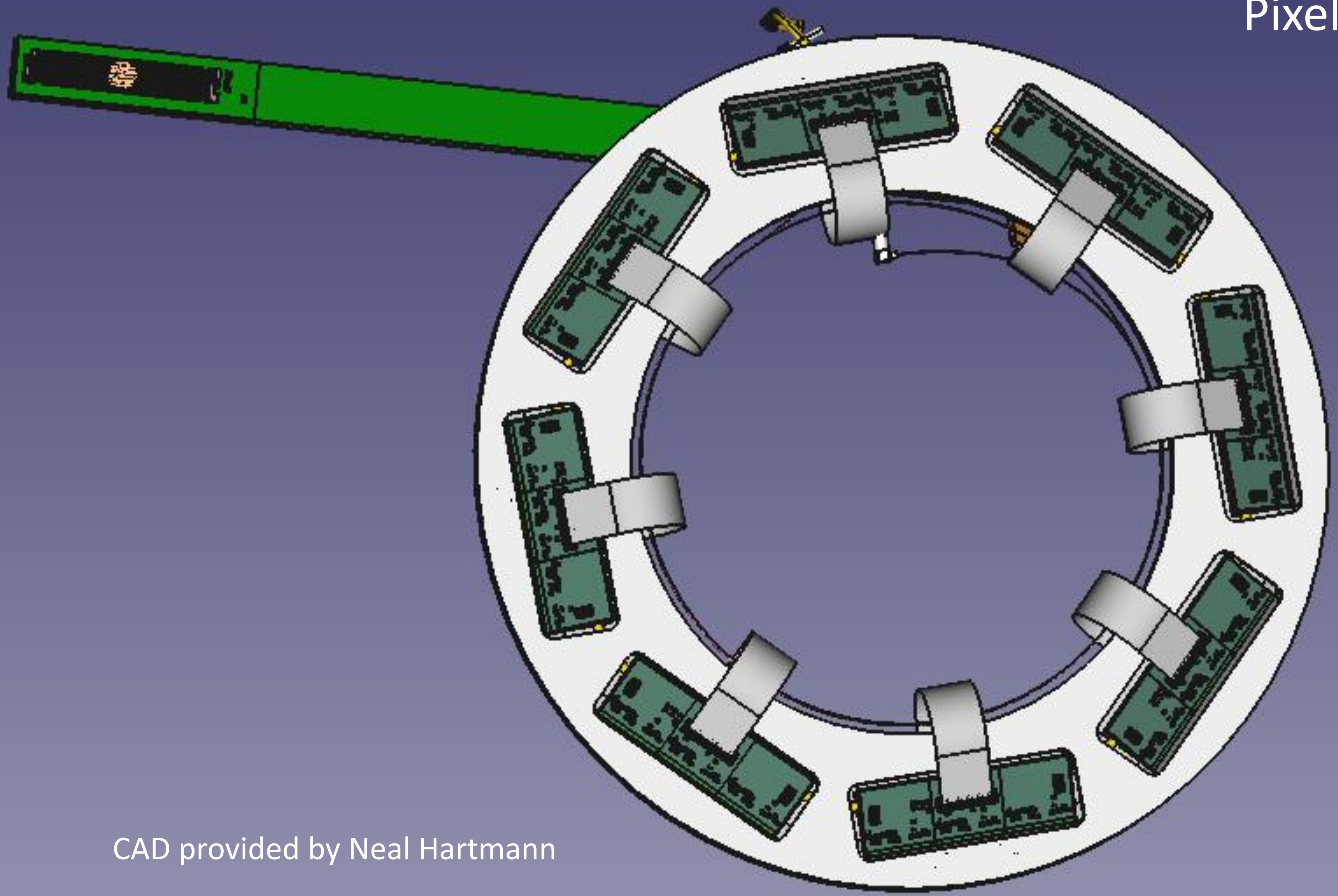
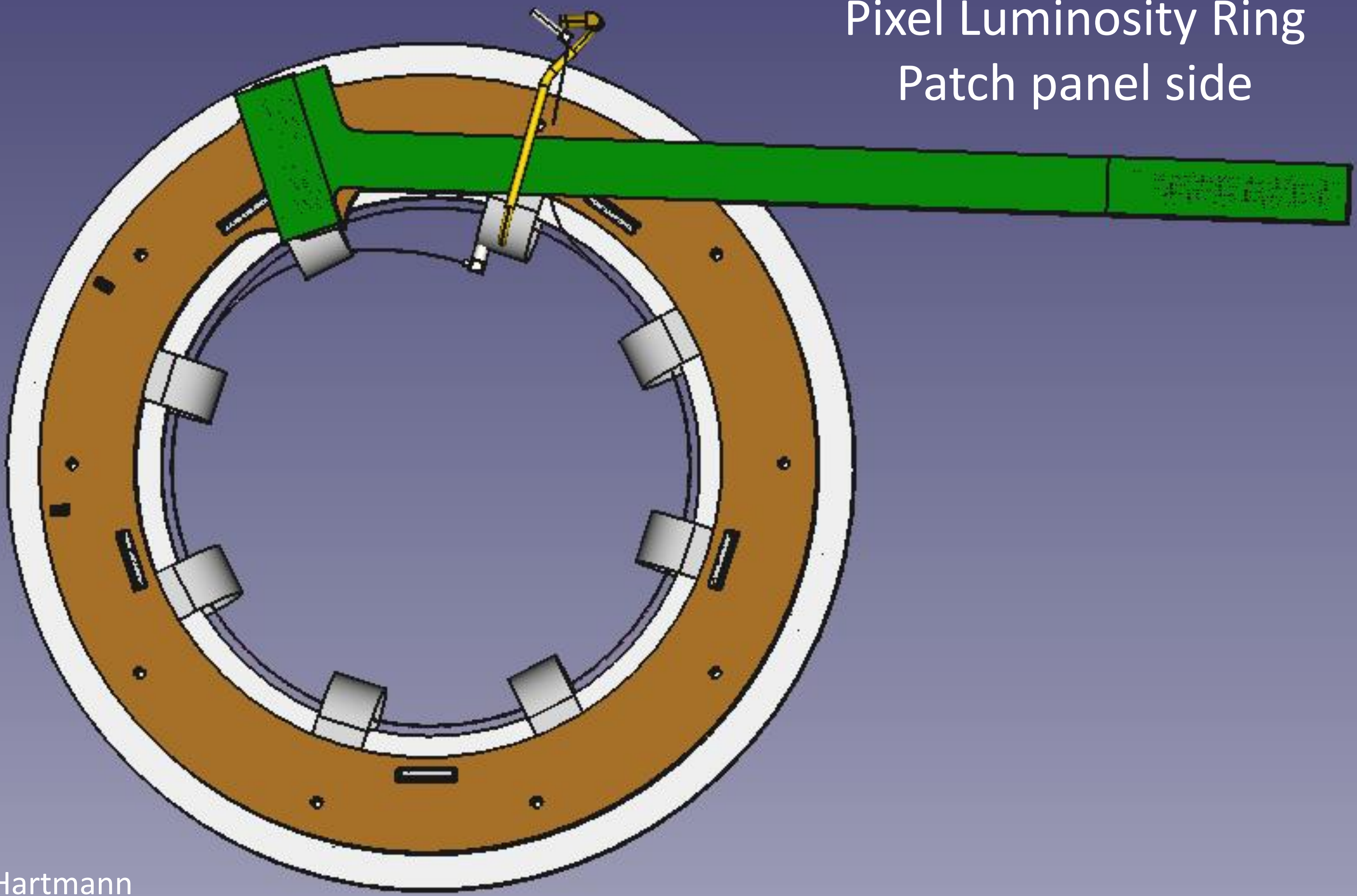
# Pixel Luminosity Ring
## Module side



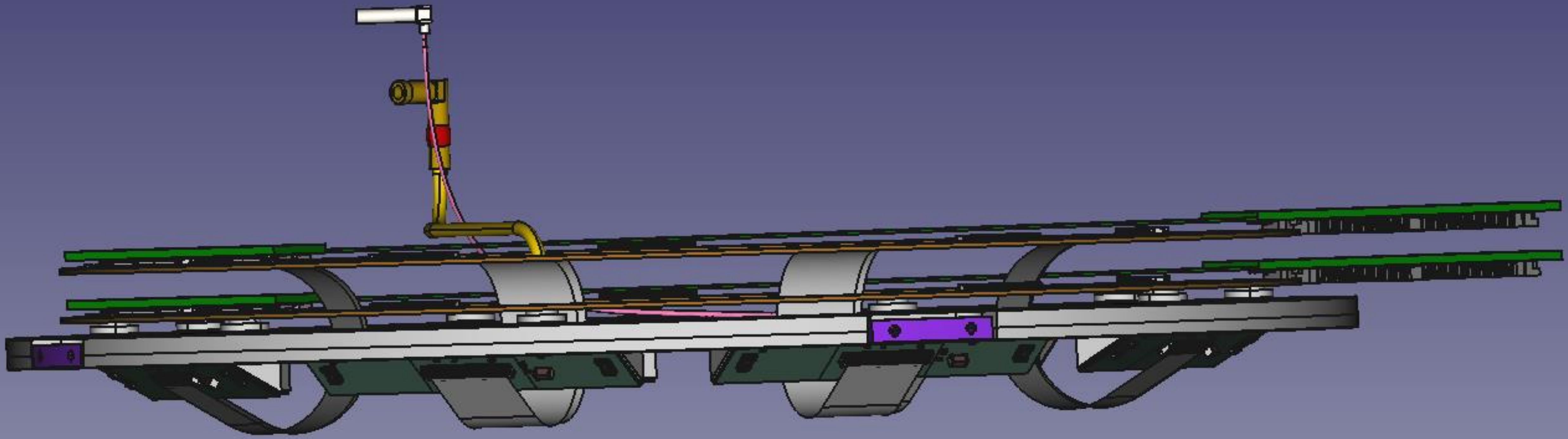
CAD provided by Neal Hartmann

# Pixel Luminosity Ring
# Patch panel side



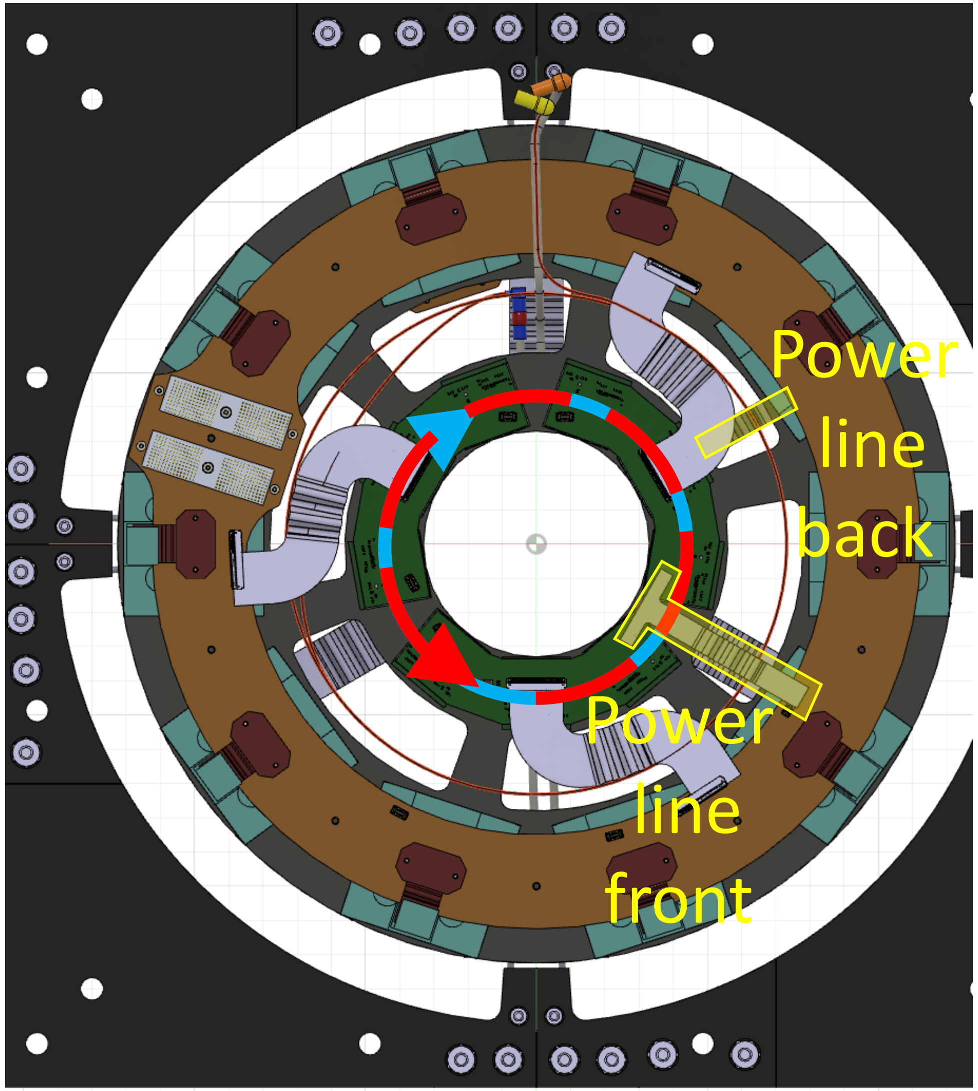
CAD provided by Neal Hartmann

# Pixel Luminosity Ring
# Side view : 2 patch panels



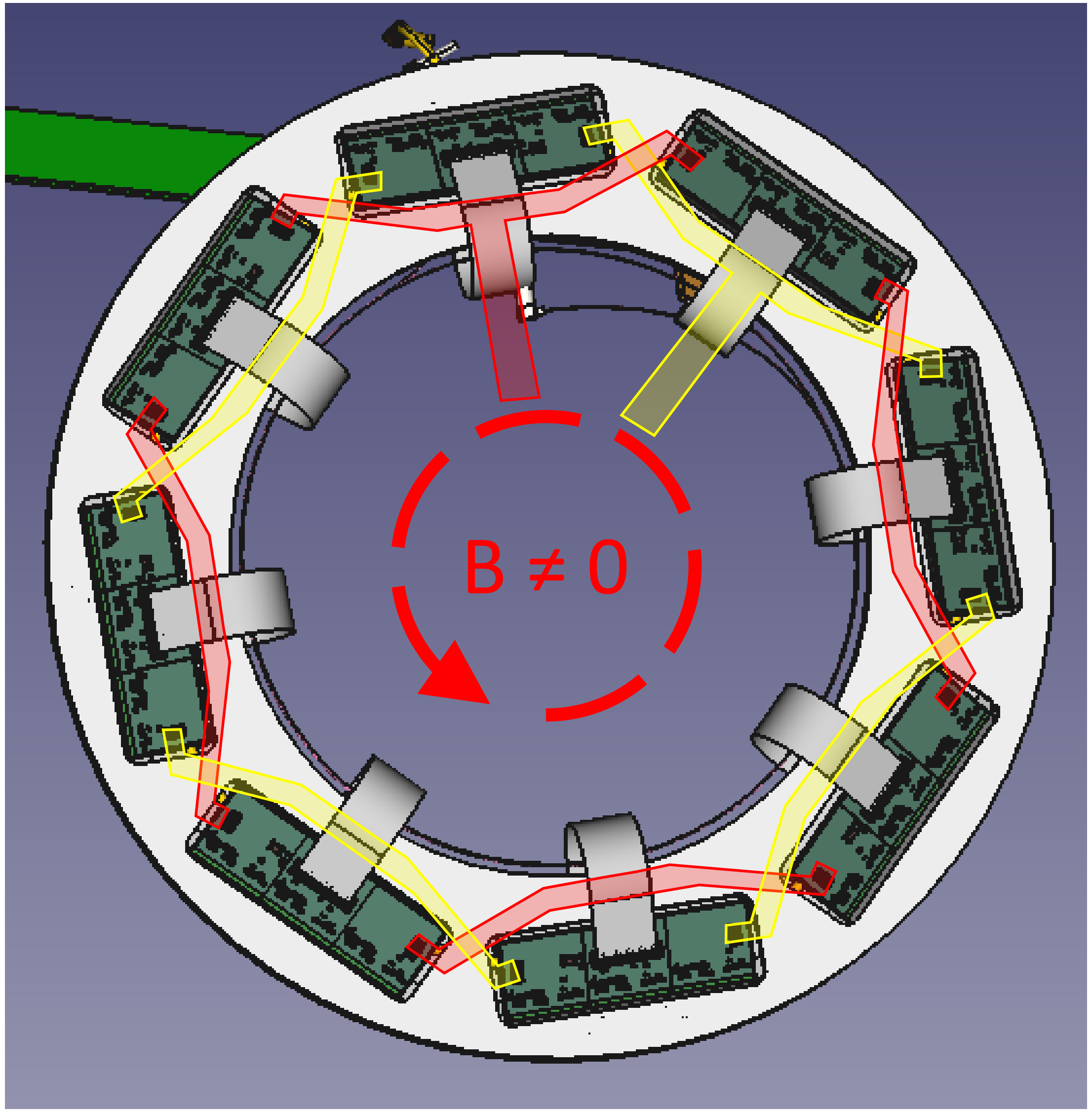
CAD provided by Neal Hartmann

# Power line design
# B field cancellation

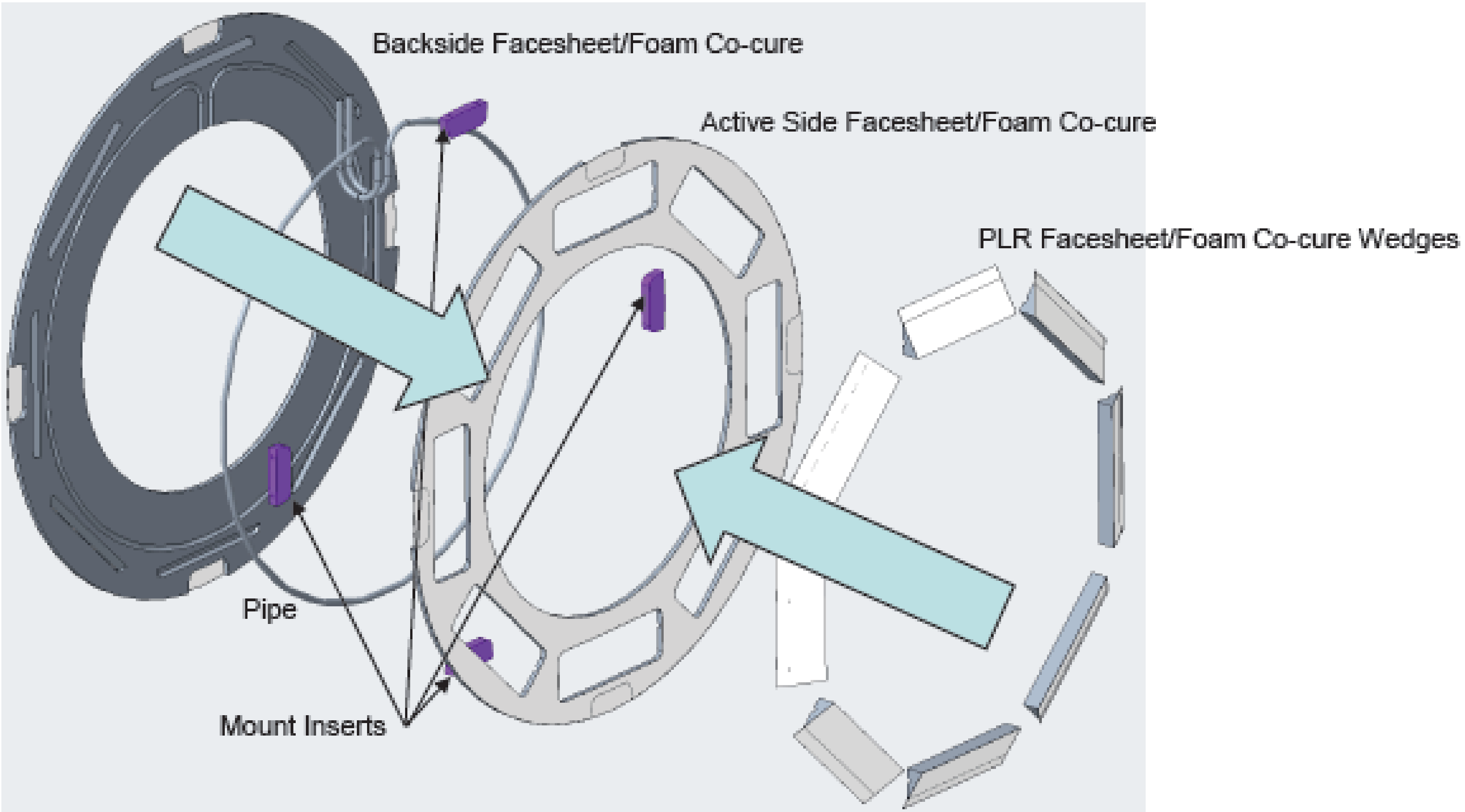


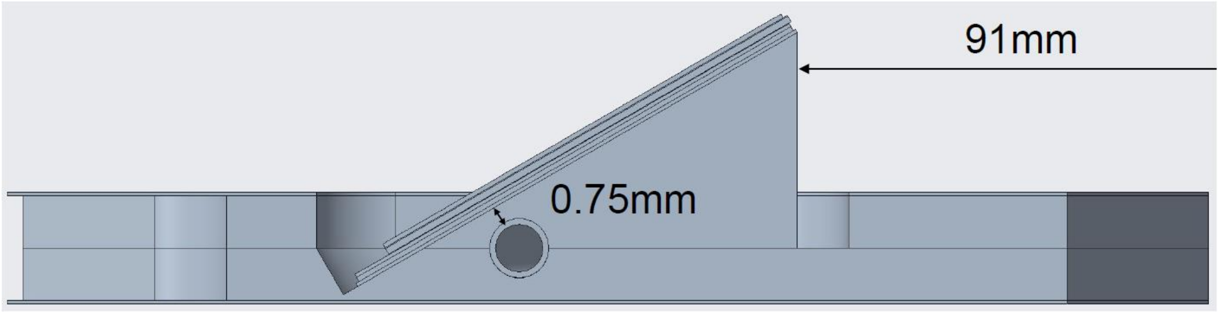

The power line has to be designed to cancel the B field.

**Question**: is it possible to power 8 modules with a single power line

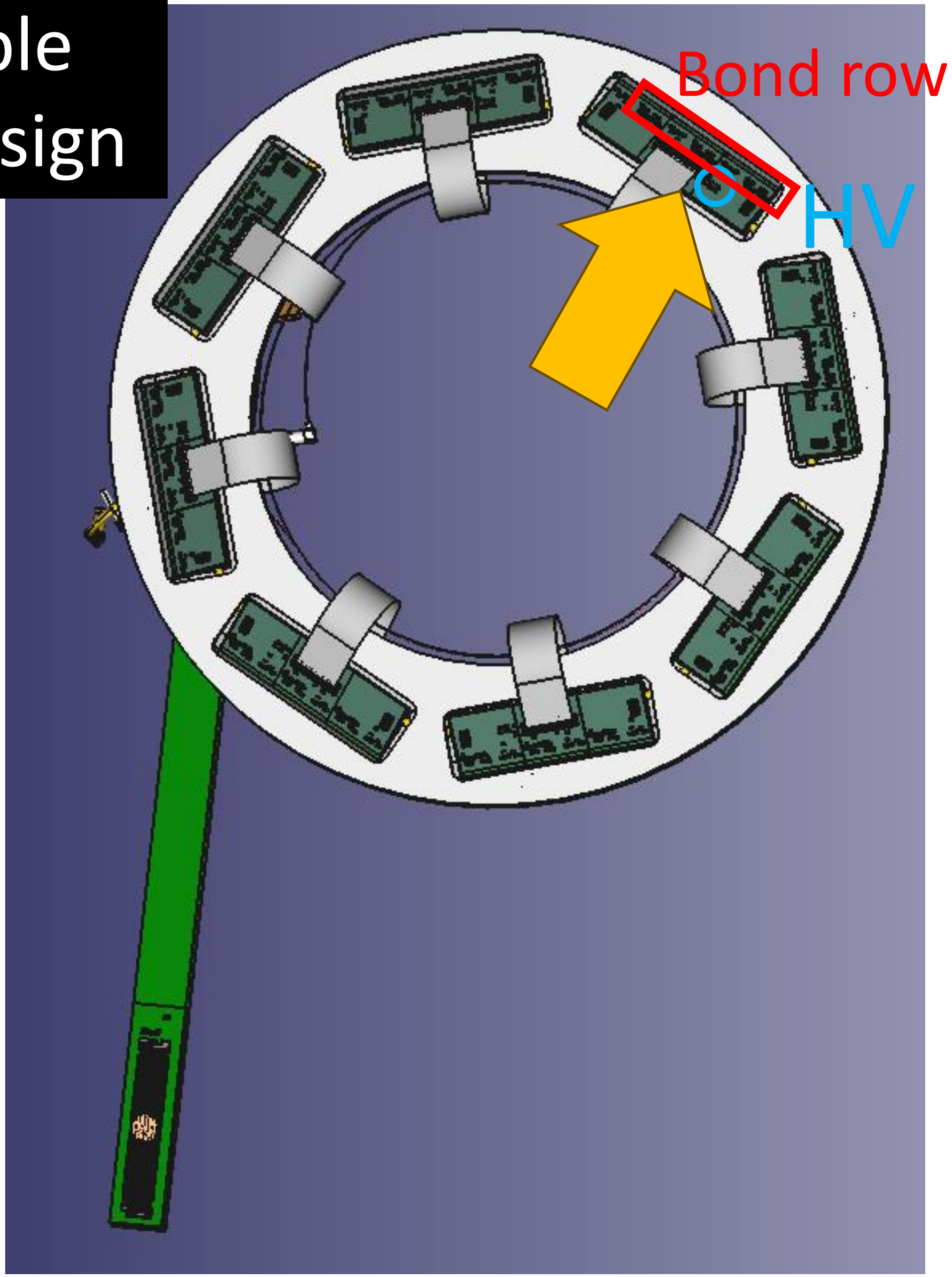


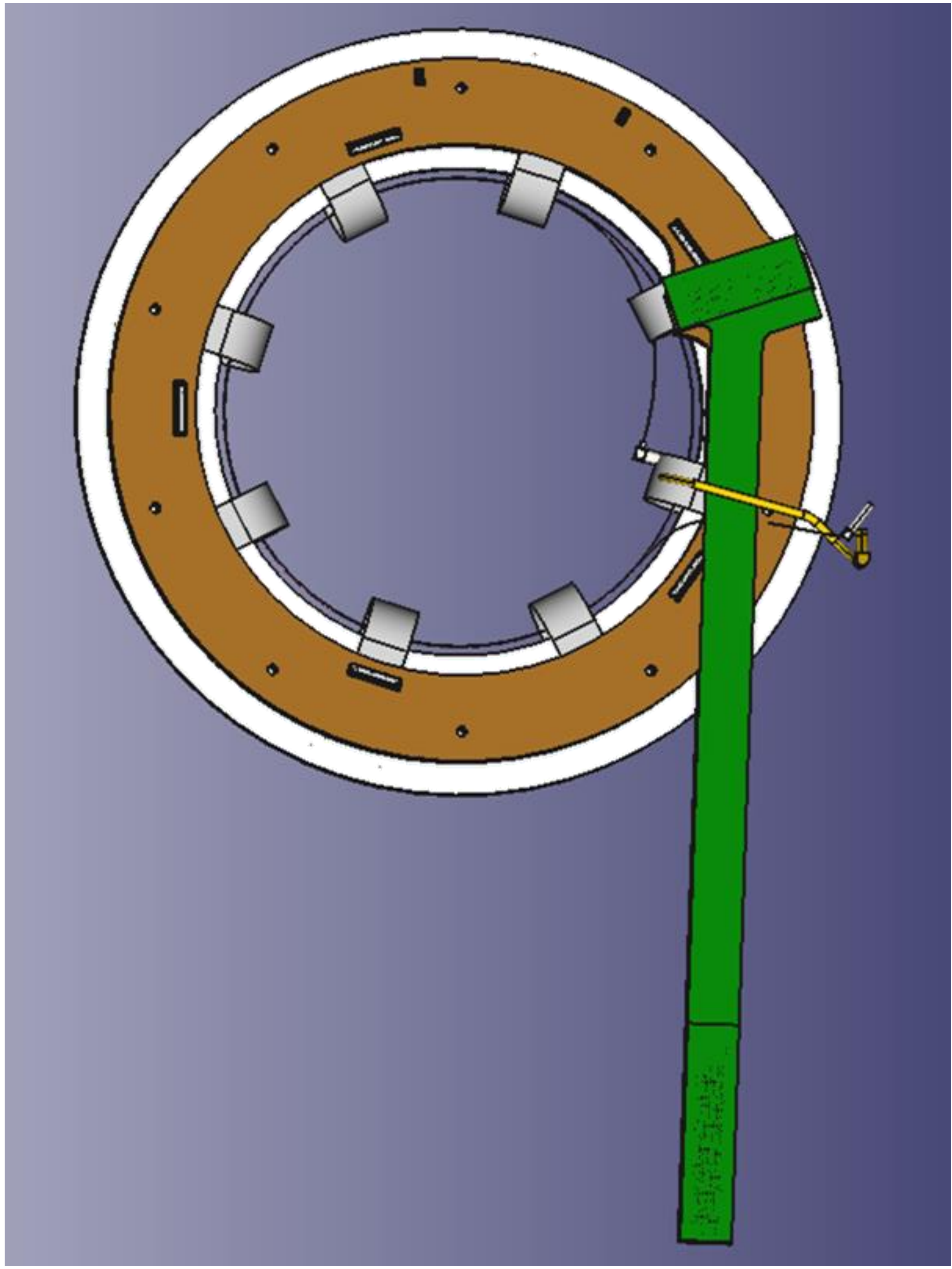
Reproduced from
**Pixel Luminosity Ring**
Project Description



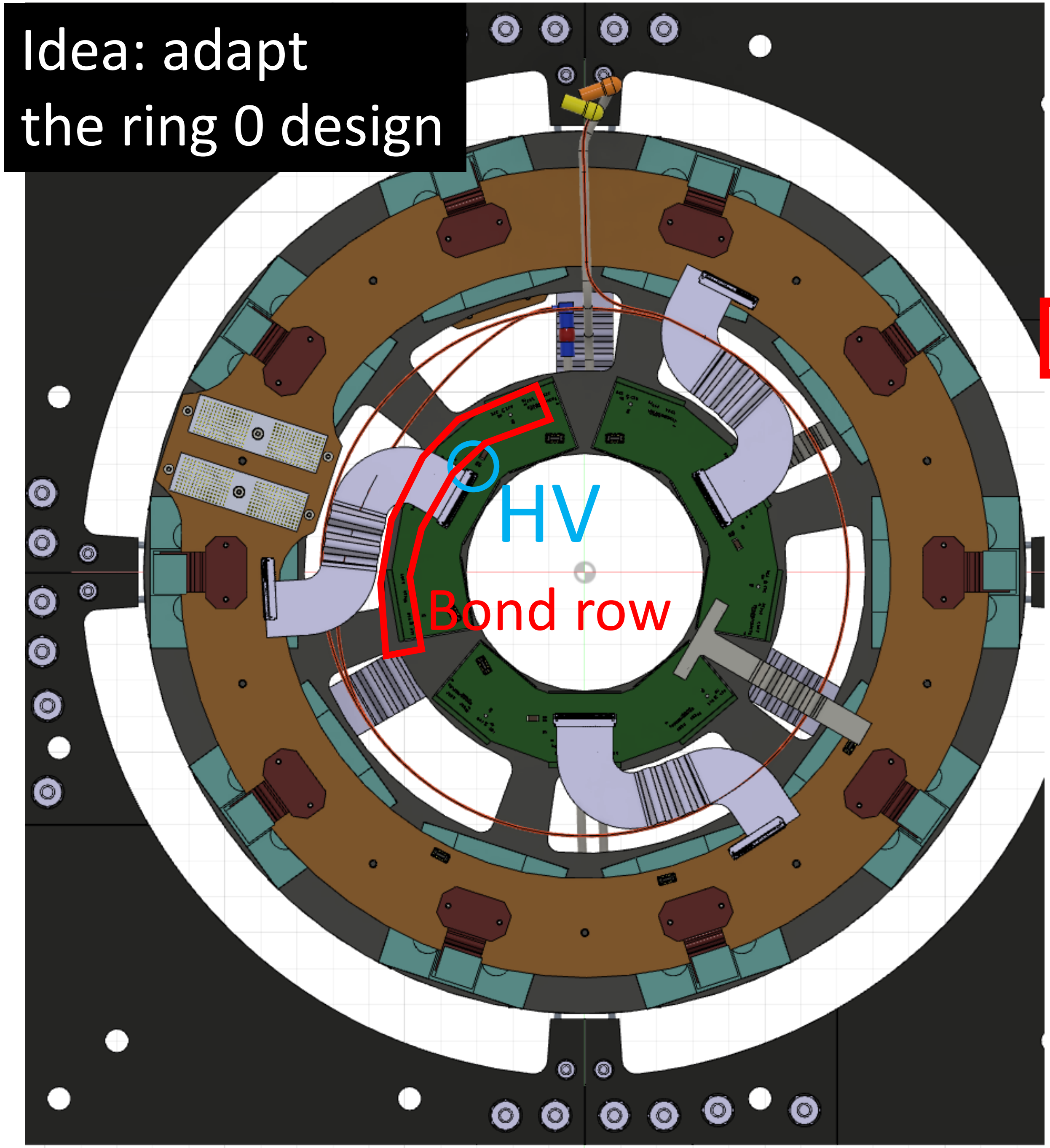



# Incompatible flex cable design

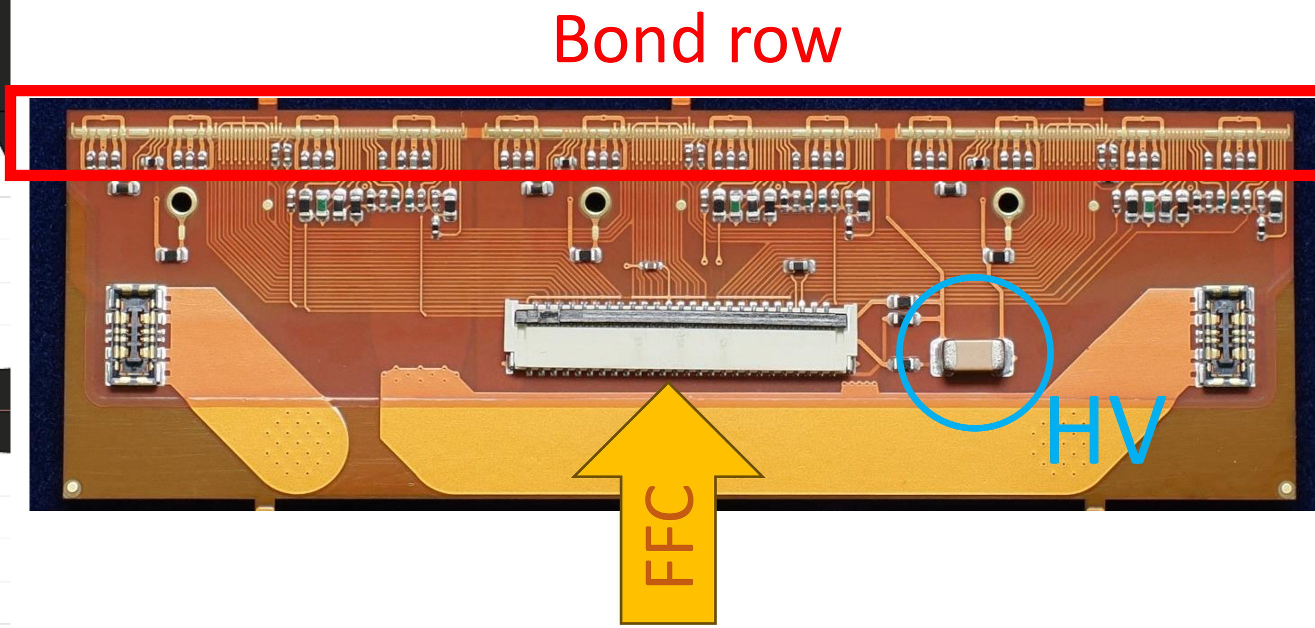


Idea: adapt the ring 0 design

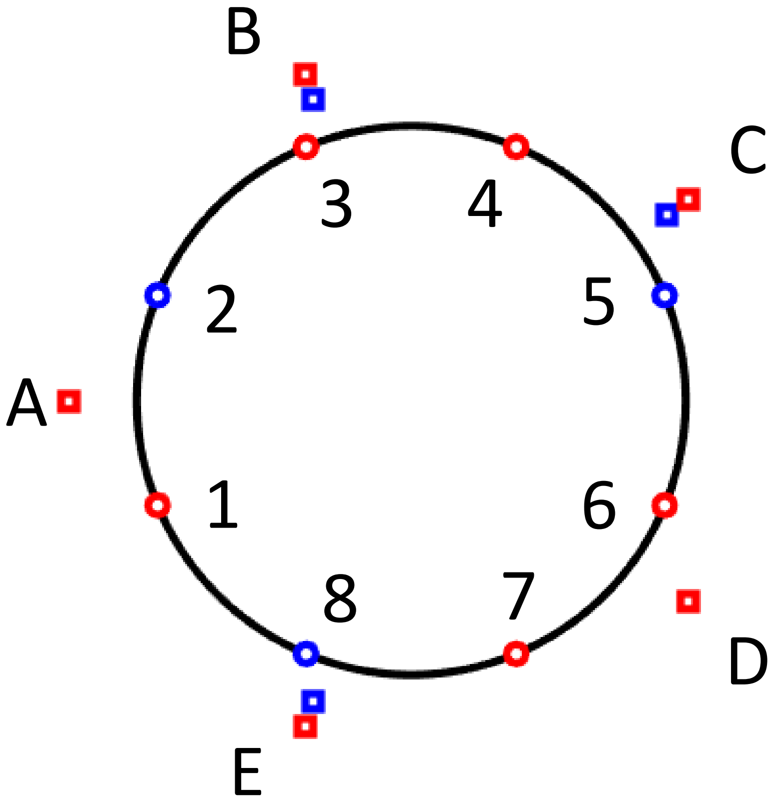


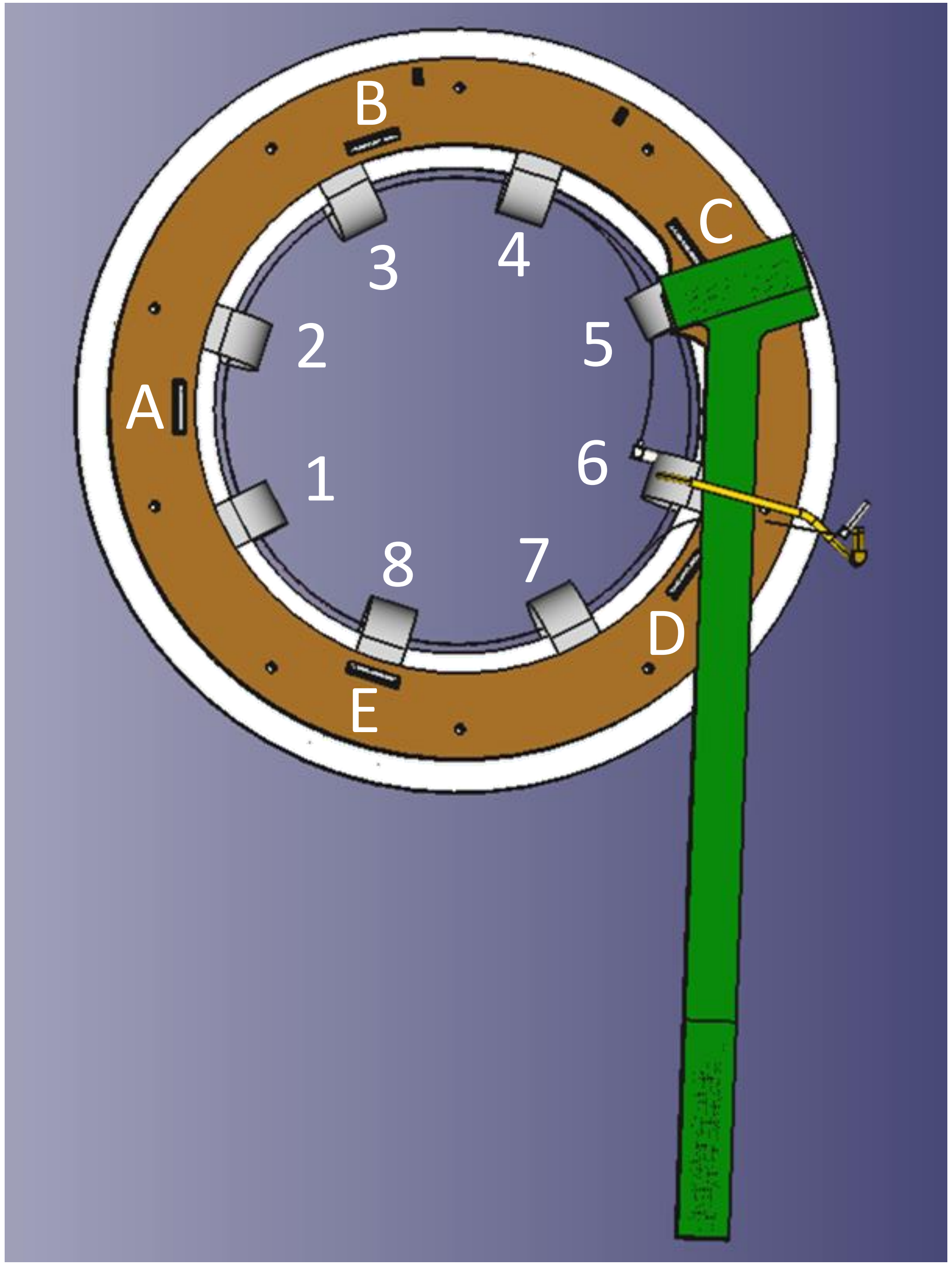

With a linear triplet




Incompatible topology/geometry!

# flex cable connection to patch panel




| Module | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Connector | A - l | B - u | B - l | C - l | C - u | D - l | E - l | E - u |

Probably 7 to E2 and 8 to E1 is a more practical option.
Connecting two flex cables on top of each other could be challenging.

# Cooling simulations

Reproduced from
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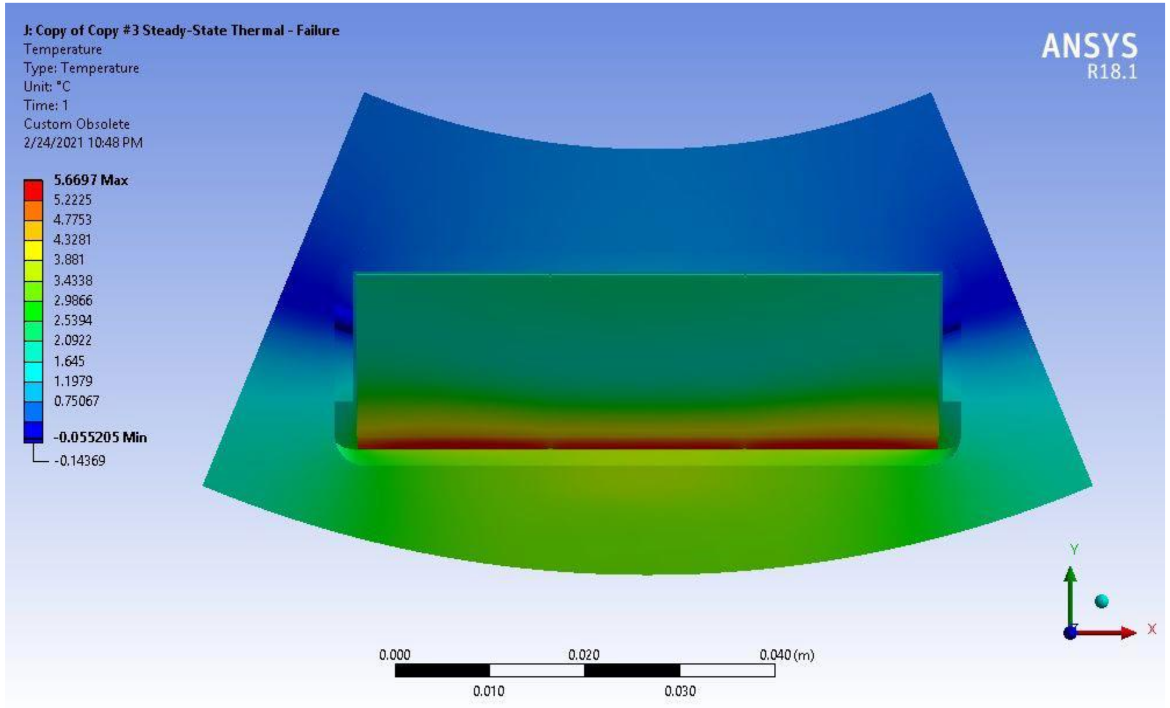
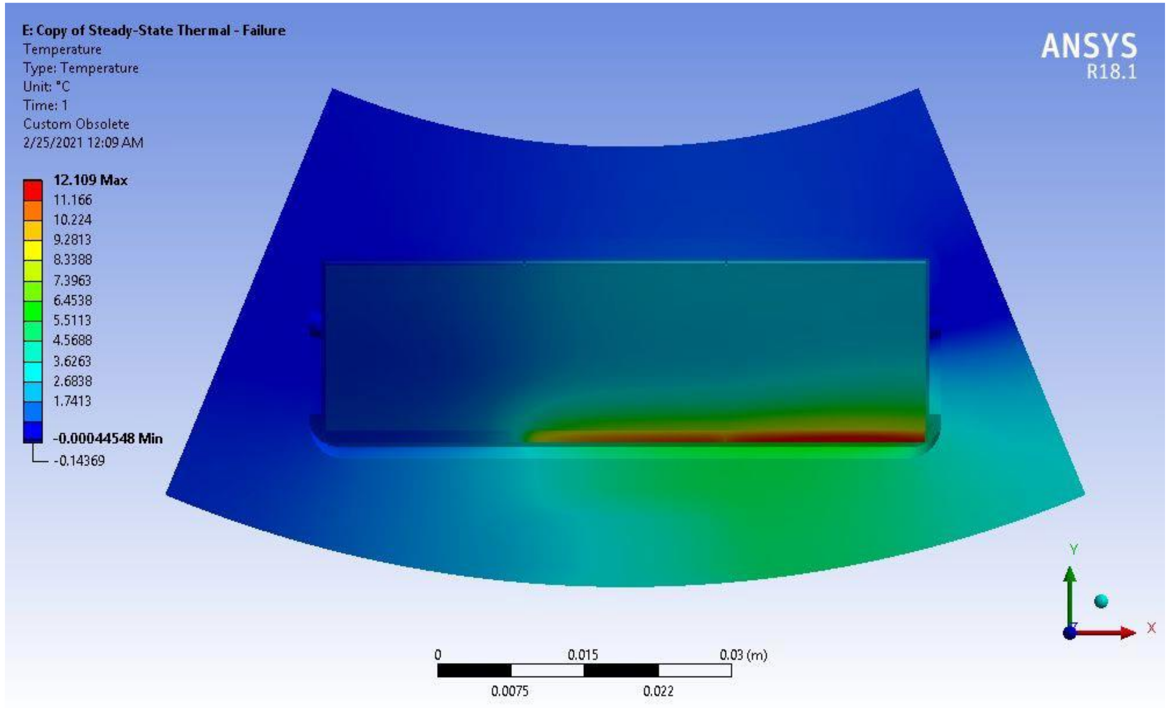



Initial FEA thermal simulation of the PLR ring with a linear triplet module - the mechanical structure used in the calculation is the same as shown in the previous two figures. The geometry and heat-flow impedances should be fairly accurately modelled. This figure is for a ”normal operation” scenario for the Shunt-LDOs. The ΔT≈5° is well within requirements




Initial FEA thermal simulation of the PLR ring with a linear triplet module - the mechanical structure used in the calculation is the same as shown in the previous two figures. The geometry and heat-flow impedances should be fairly accurately modelled. This figure is for a ”one-ASIC-open failure mode” scenario for the Shunt-LDOs, where the current that would normally power the leftmost ASIC is diverted through the other two ASICs, leading to additional heating. The ΔT≈12° is quite reasonable.

# PLR (Pixel Luminosity Ring)

- Task 1: prepare for the MoU and pre-production review (TDAQ or the number of data-links, mechanical stability, the module loading accuracy….)

- Task 2: complete the CAD design
  - Flex cable design
  - Power line design

- Task 3: organize for integration in to ITk.

# PLR (Pixel Luminosity Ring)

WP 1: production of 230 sensors by Genoa. (2x8x3x4x1.2)

WP 2: hybridization of 230 sensors. (ATLAS ?) extension of inner tracker upgrade.

WP 3: 16 straight ring triplets production. Norway.

- WP 3.1.1: production of 16 (20?) printed circuits
- WP 3.1.2: SMD loading
- WP 3.1.3: Visual inspection
- WP 3.2.1: assemble flex with modules
- WP 3.2.2: Extended test package
- WP 3.2.3: mounting of modules on wedges?

WP 4: production of 4 “ring 0 – type” patch panels. (US ?).

- WP 4.1: design of local support (check compatibility with patch panels: 2 patch panels per local support )
- WP 4.2: production of local support including wedges

WP 5: production of 2 local support rings with embedded cooling pipes and 16 wedges (US ?)

WP 6: cooling. Thermal budget estimate. Cooling test. Cooling lines at CERN (fit into the inner tracker). (Itk Danilo Giugni, Erik Vigeolas)

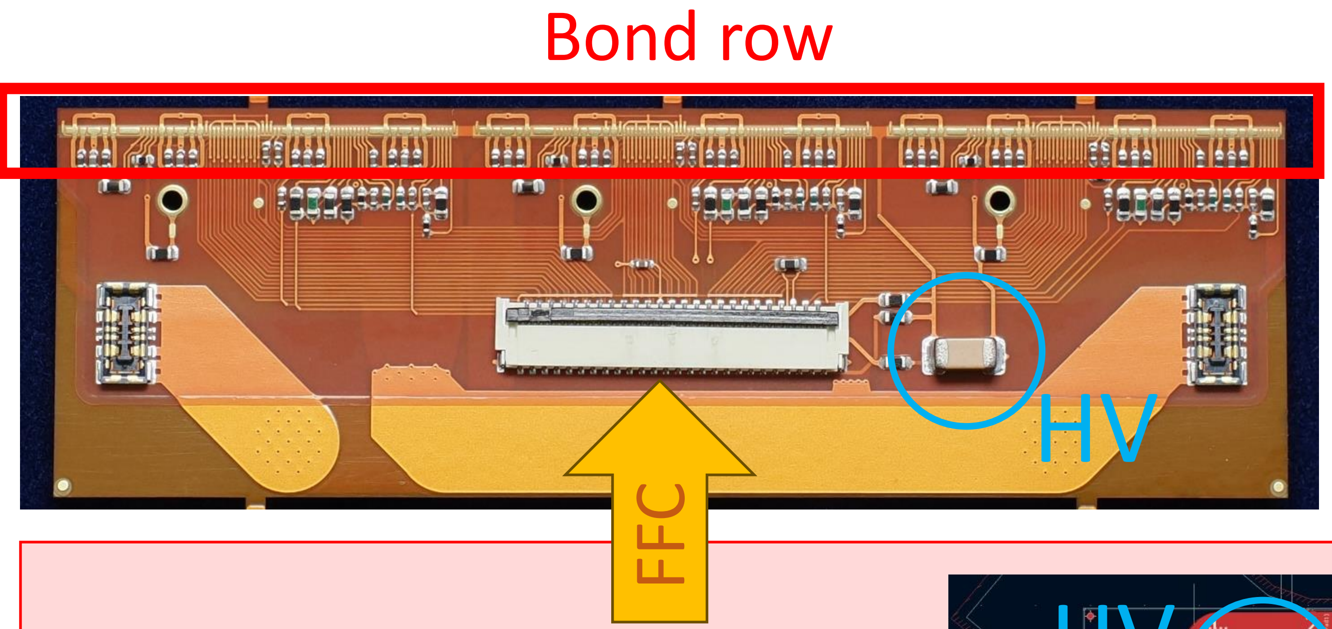
WP 7: loading on inner tracker (US ?).

WP 8: loading of inner tracker at CERN.

# UiO flex design solution

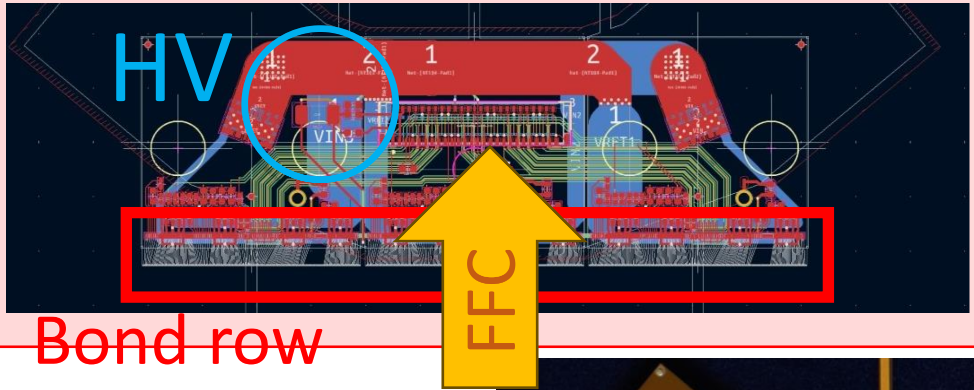
## Linear triplet (starting point):

connector in the “wrong” direction



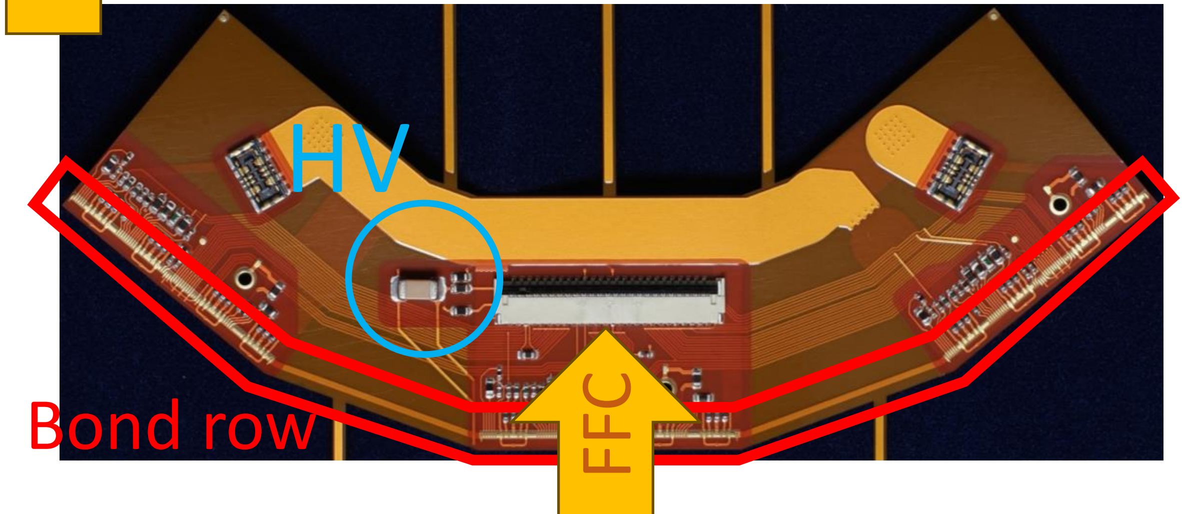

## Straight ring triplet

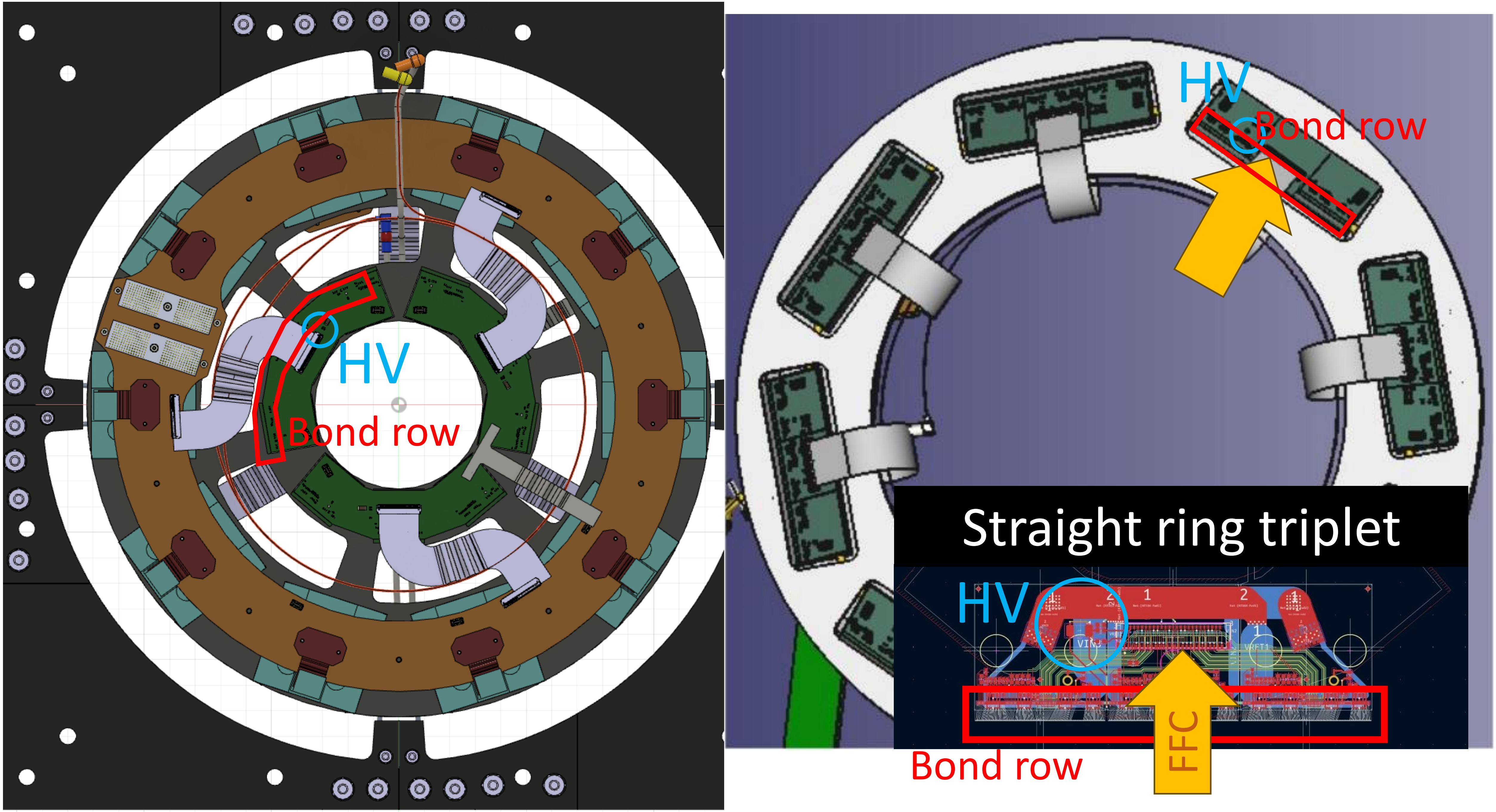
pin connector in the “right” direction




## Ring 0 triplet:

connector in the “right” direction




HV
Bond row
HV
Bond row
Straight ring triplet
HV
FFC
Bond row