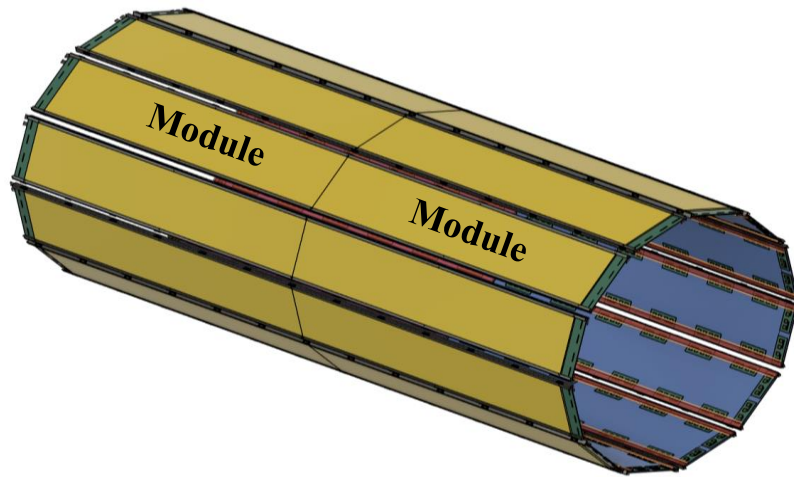


MPGD-DSC – General

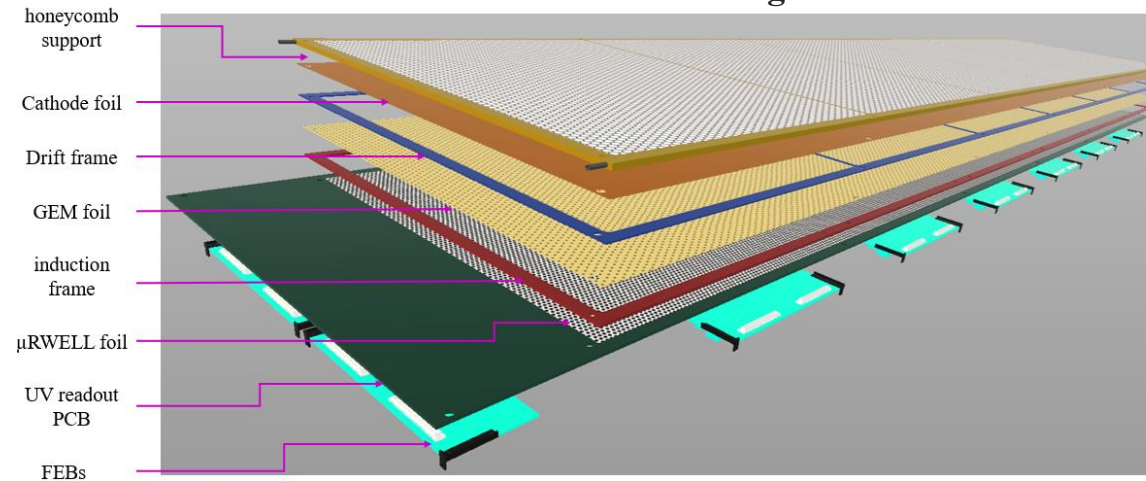
Update on PED Test Article design

Kondo Gnanvo – July 03, 2025

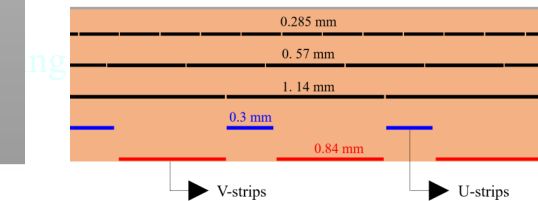
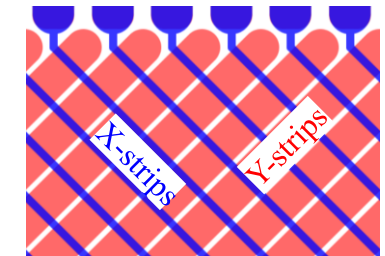
μ RWELL-BOT layout



Module design



capaSh X-Y strip readout



24 planar detector modules:

- ❖ 12 sectors in $r \times \phi$ \times 2 modules in z \rightarrow No overlaps
- ❖ $R_{\min} = 72.5$ cm; $R_{\max} = 75$ cm
- ❖ **Novel** Thin-gap GEM- μ RWELL hybrid technology
- ❖ ASIC: SALSA (under development @ Saclay): 64 chs
- ❖ ~ 86 k readout electronic channels

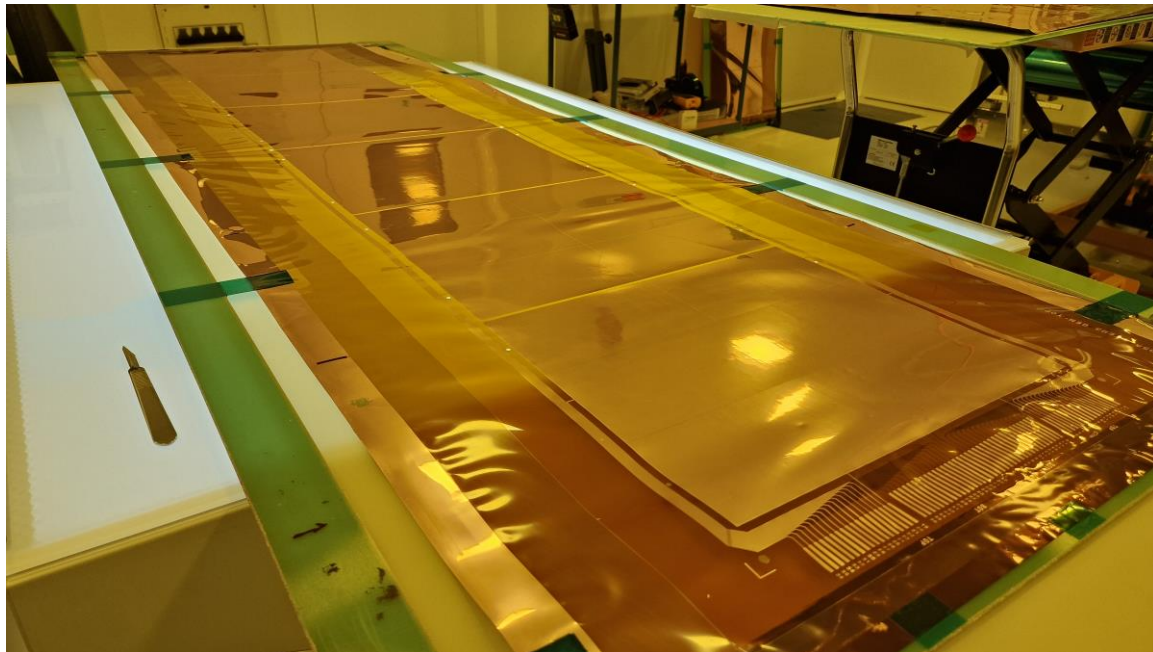
Module

- ❖ Overall dimension: 180 cm in z \times 36 cm in $r \times \phi$
- ❖ Active area: 170 cm in z \times 33 cm in $r \times \phi$
- ❖ Capacitive-sharing "X-Y" strips readout @ 45° w.r.t detector
- ❖ 14 FEBs / module Total: 3,584 chs / module
- ❖ Hirose connectors: 140 pins (128 signals + 12 grounds)

Expected performance

- ❖ Spatial resolution: < 100 μ m
in $r \times \phi$ & < 150 μ m in Z
- ❖ Time resolution ~ 10 ns
- ❖ Efficiency $\geq 95\%$
- ❖ Material budget $\sim 2\%$ X0

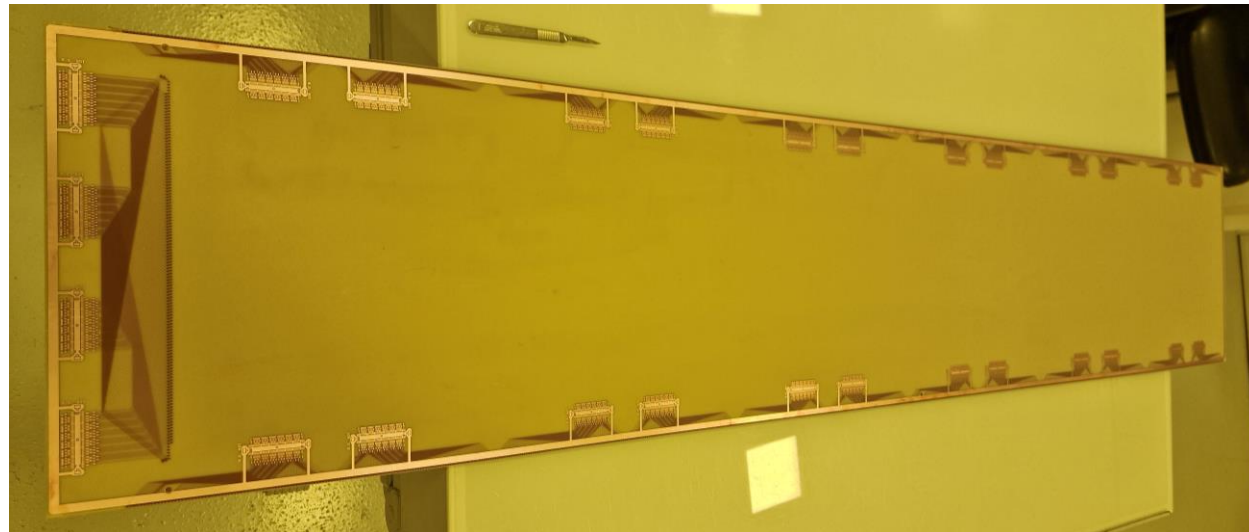
- ❖ GEM foil and μ RWELL / X-Y strip readout PCB completed @ CERN
- ❖ Cathode foil is already completed → but I have no picture
- ❖ Frames from RESARM were delivered more than two months ago
- ❖ Ordered from Rui 30 Hirose-to-Panasonic adapter
 - ❖ We could then test the test article with APV25 electronics while waiting for SALSA
- ❖ We have all detector parts in hand (almost) for the assembly in Sept.



GEM foil

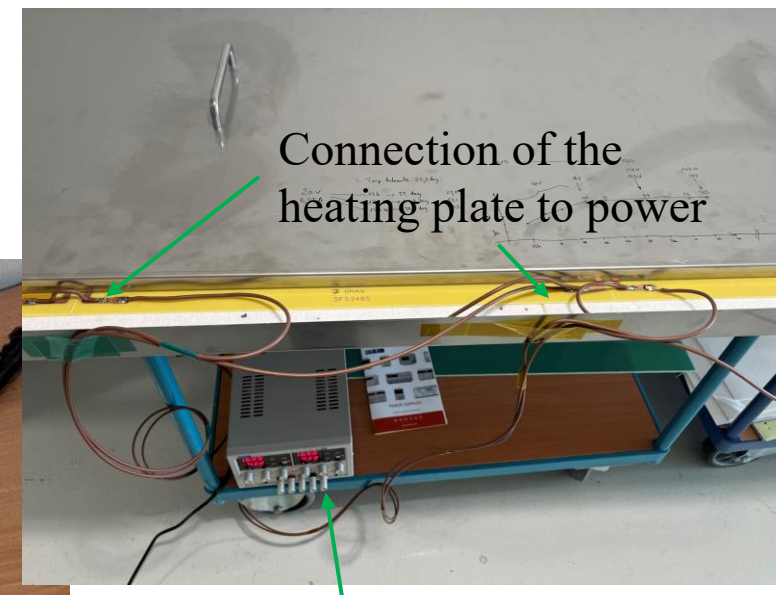


μ RWELL / CapaSh readout PCB: Front view



μ RWELL / CapaSh readout PCB: back view

- ❖ μ RWELL under test @ CERN □ 30 nA @ 690 V for 35 sectors connected
 - ❖ Already very good but Rui will perform one additional cleaning
 - ❖ One sector is drawing higher current → cleaning required
 - ❖ ~ nA @ 700 V is the validation and acceptance test criteria



Power to the heating plate



PED Test Article Module – μ RWELL layer design

Normal segmentation

Random segmentation

Active area 1700 mm divided into 36 HV sectors

330 mm

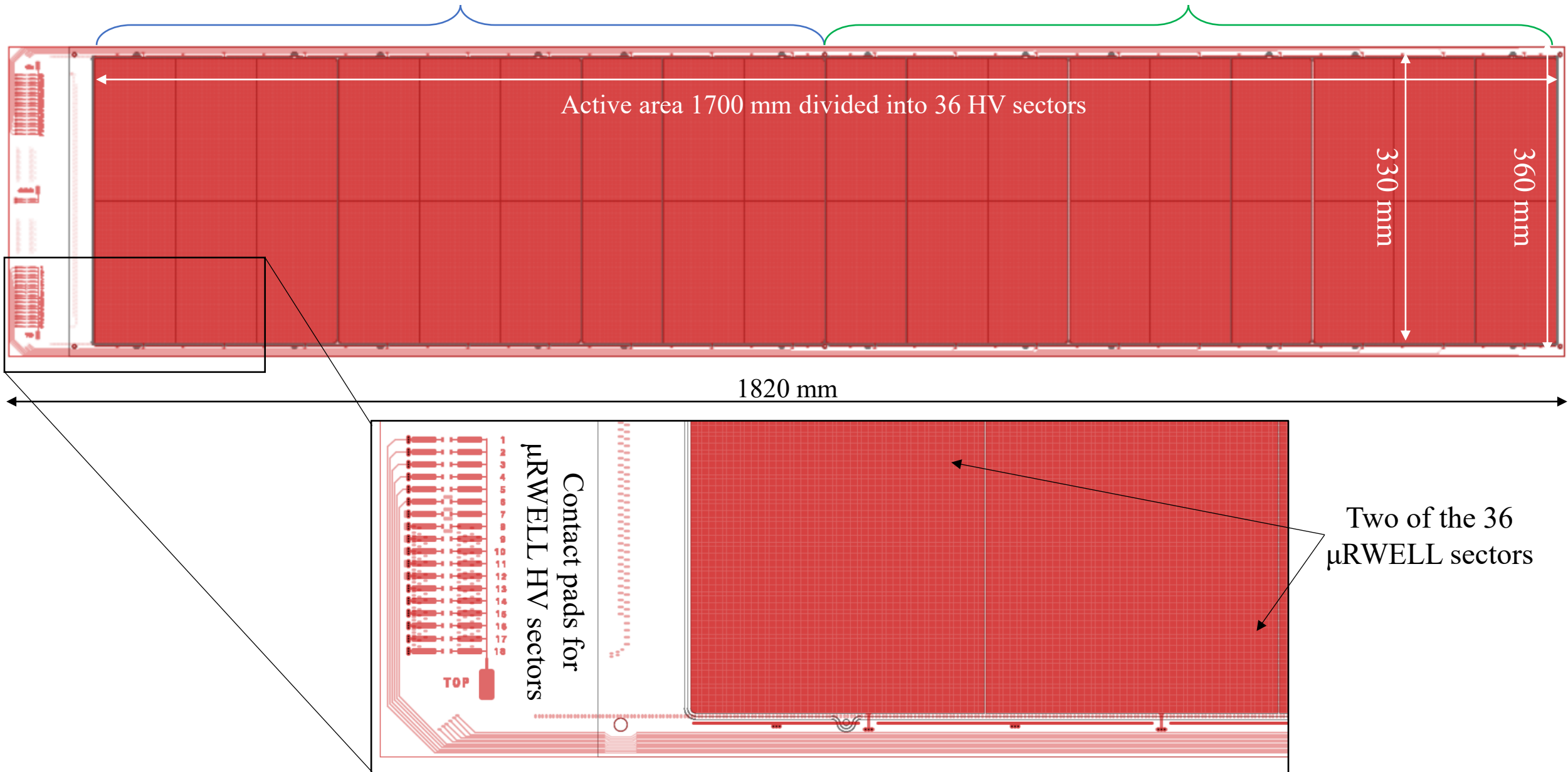
360 mm

1820 mm

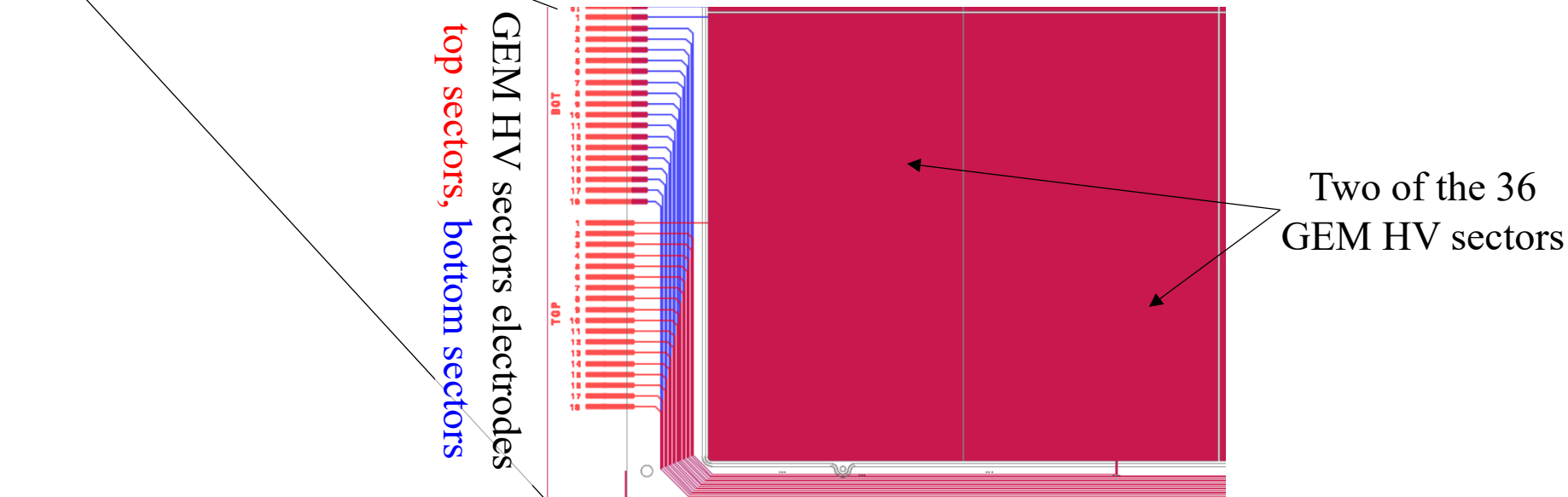
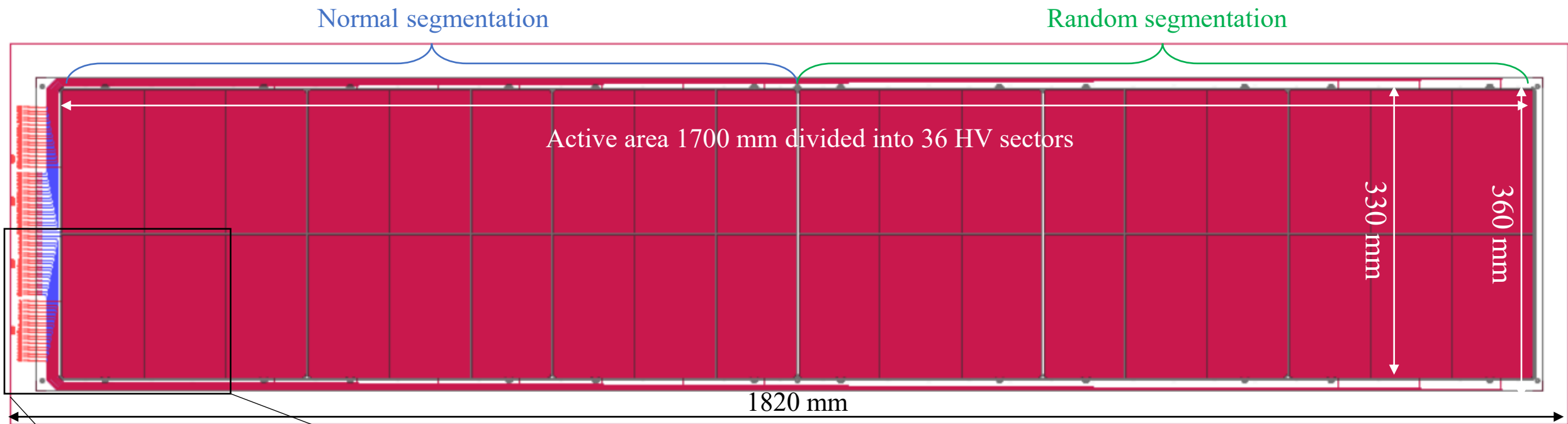
Two of the 36
 μ RWELL sectors

Contact pads for
 μ RWELL HV sectors

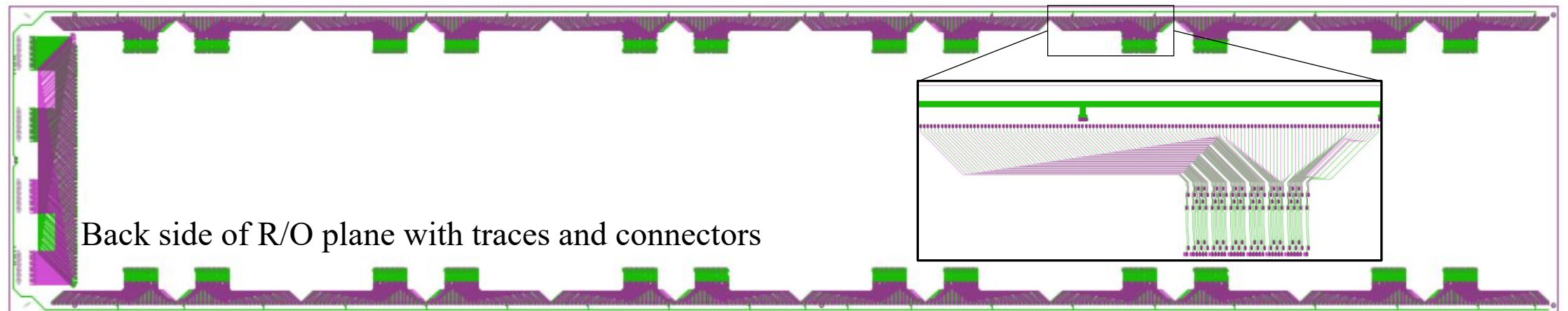
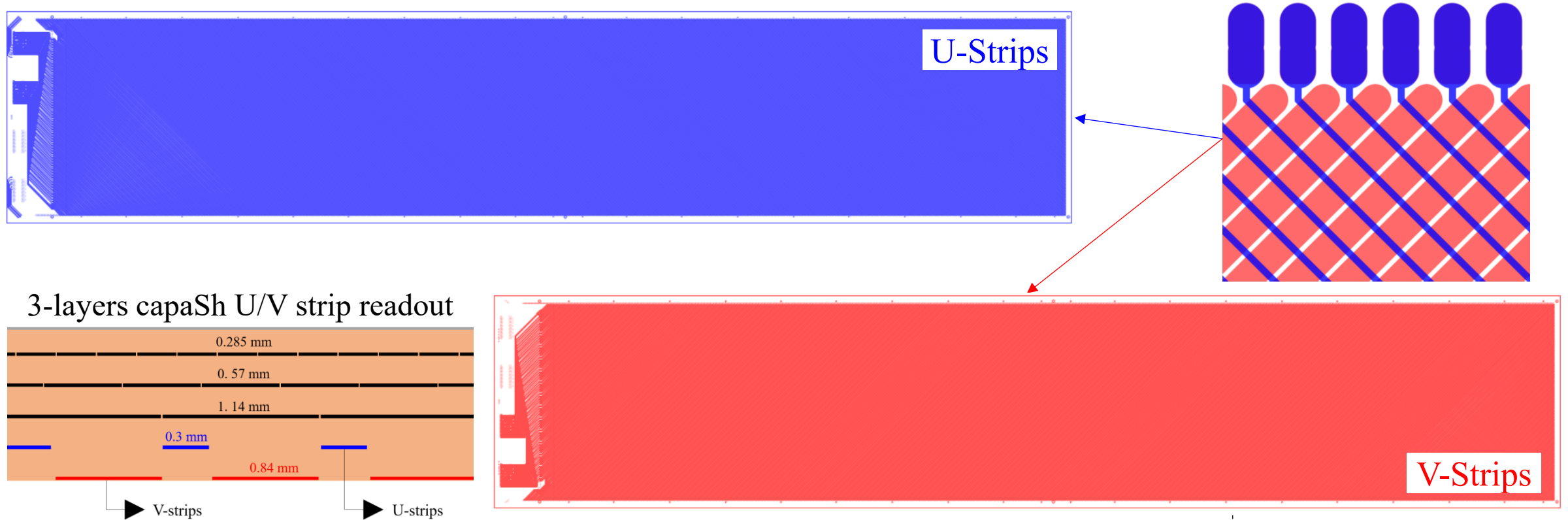
TOP



PED Test Article Module – GEM foil design

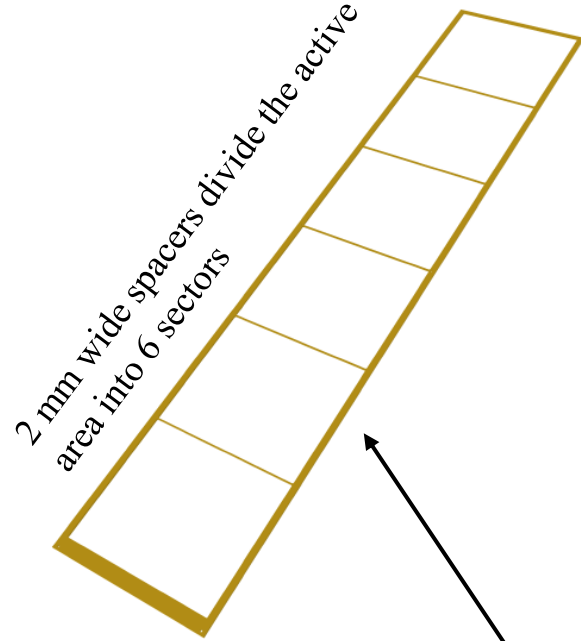


PED Test Article Module – Capacitive-sharing U-V strip design

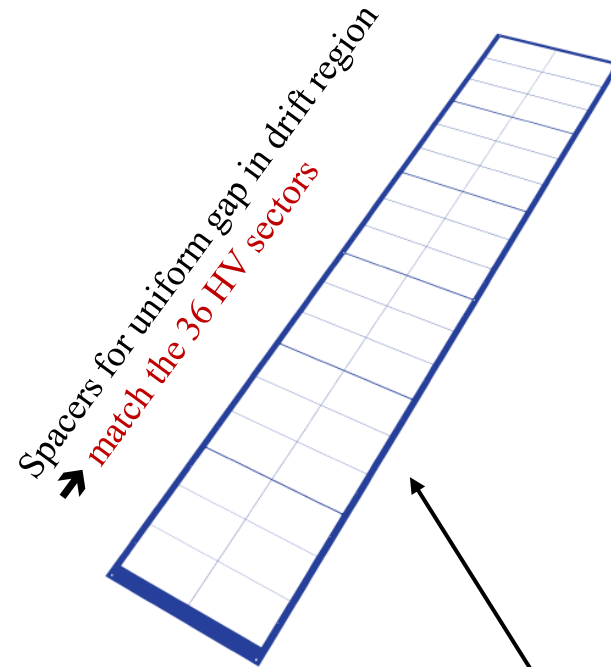


PED Test Article Module – Support frames

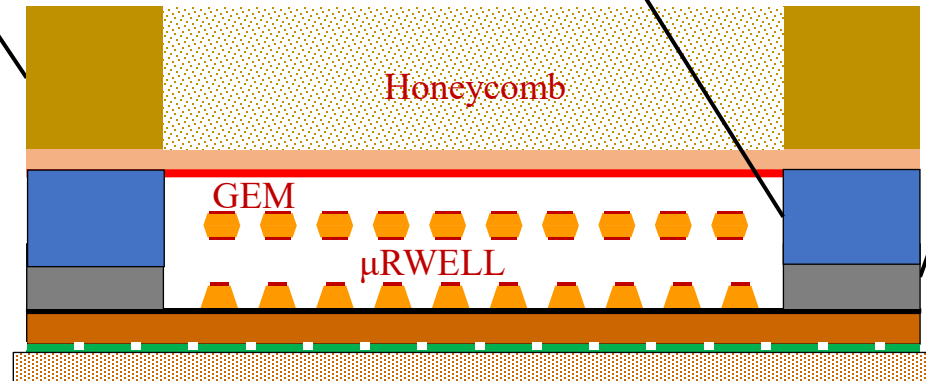
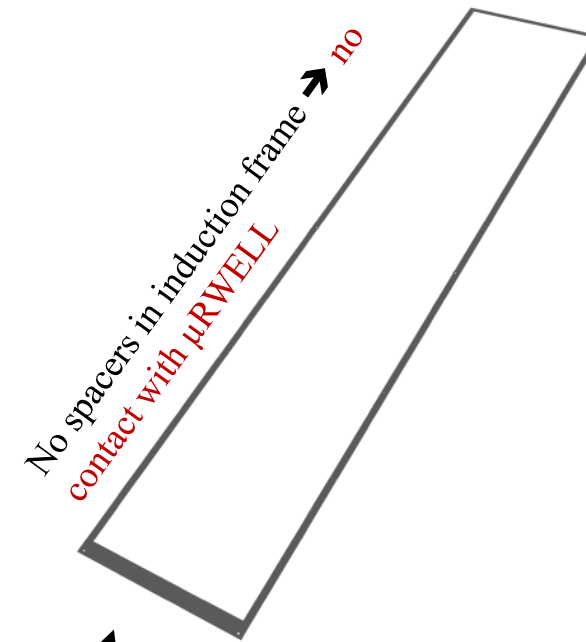
Honeycomb support: Top frame



GEM top support: Drift Frame



GEM bottom support: Induction Frame



Support frames set for μ RWELL-BOT test article module