Current ND280 $B = 0.2\,T$ Possible upgraded ND280
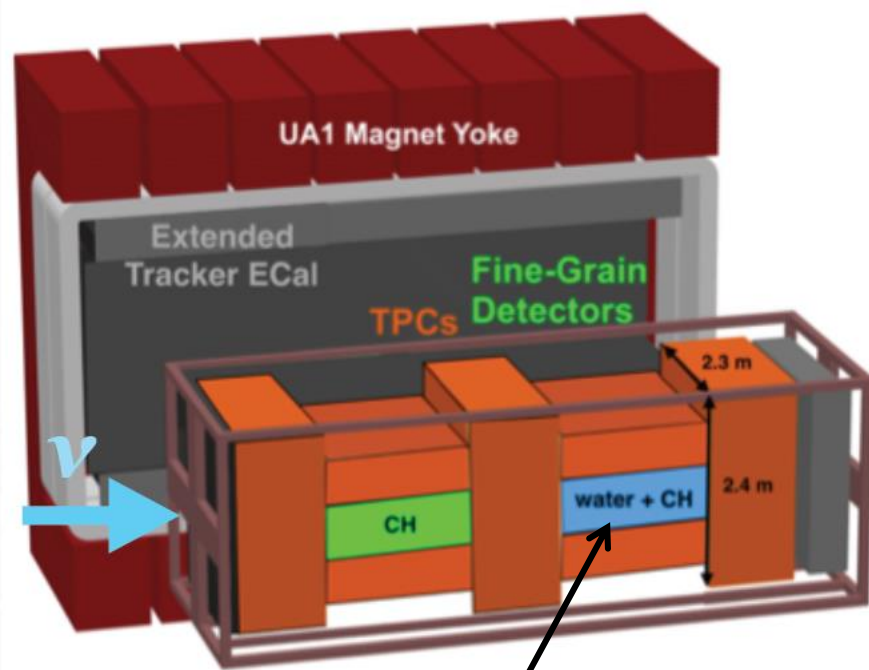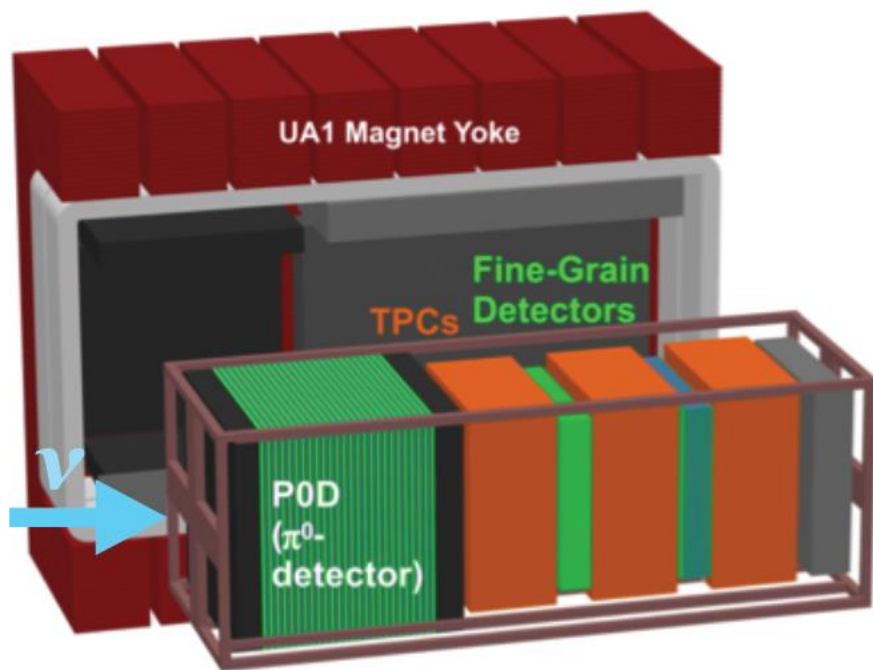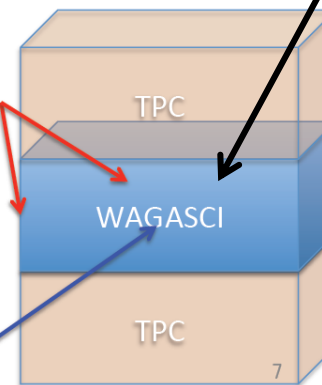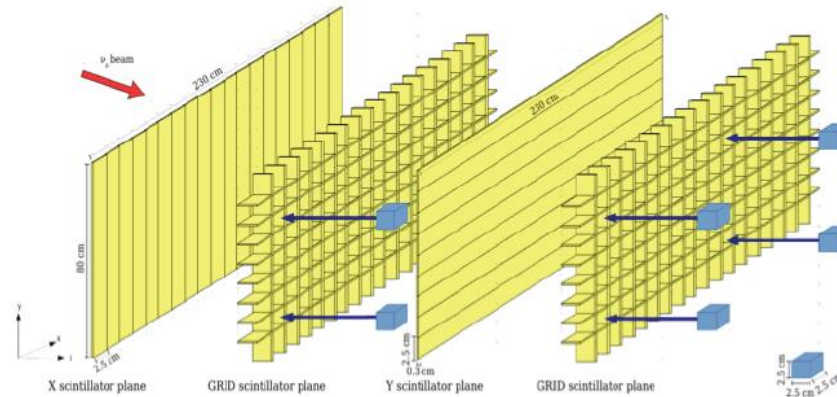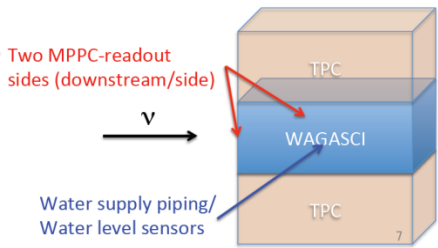

Working on a possible structure (BOX) to contain the WAGASCI elements… *Water + Scintillators* Material optimization and active parts… quite challenging!!

Two MPPC-readout sides (downstream/side)

ν
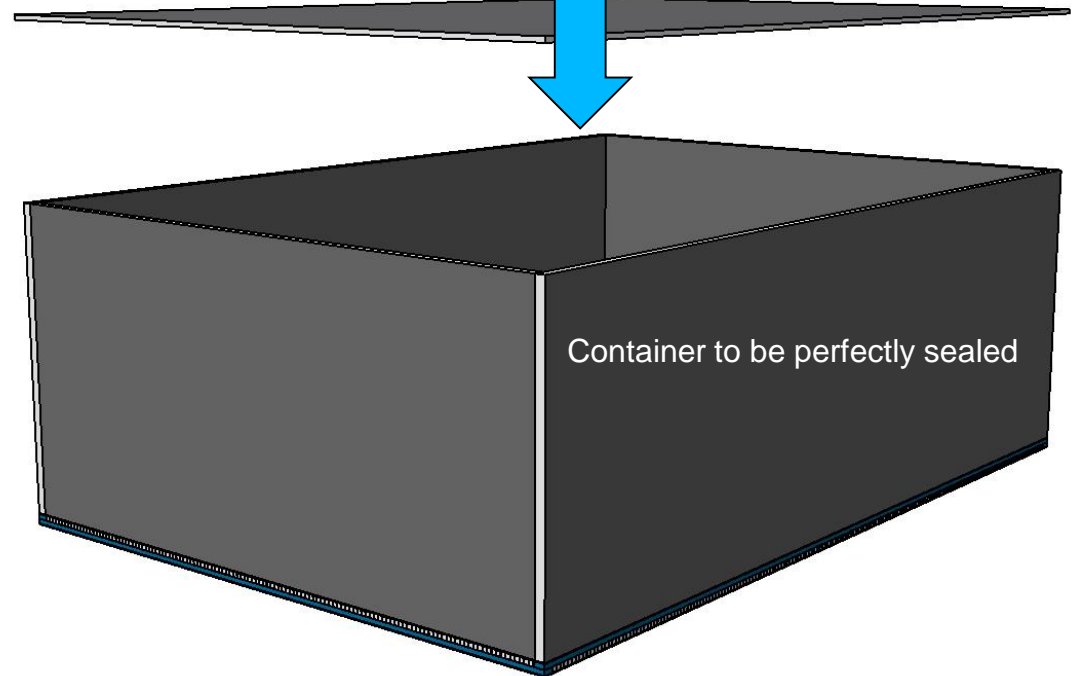
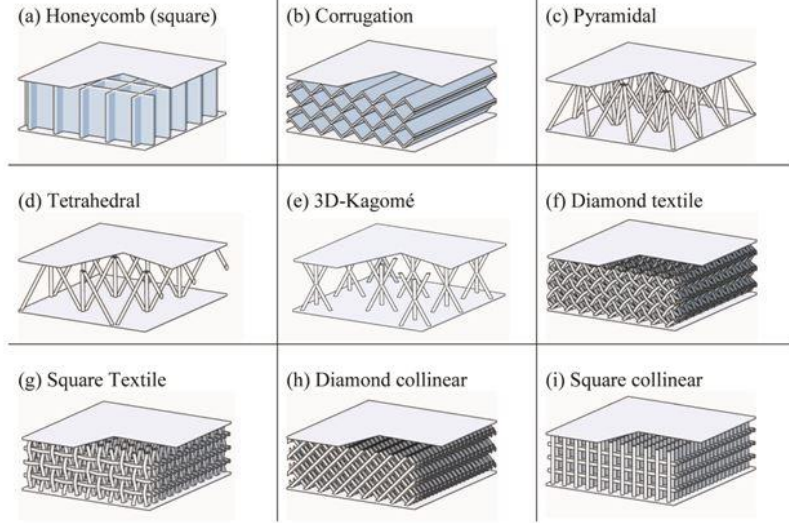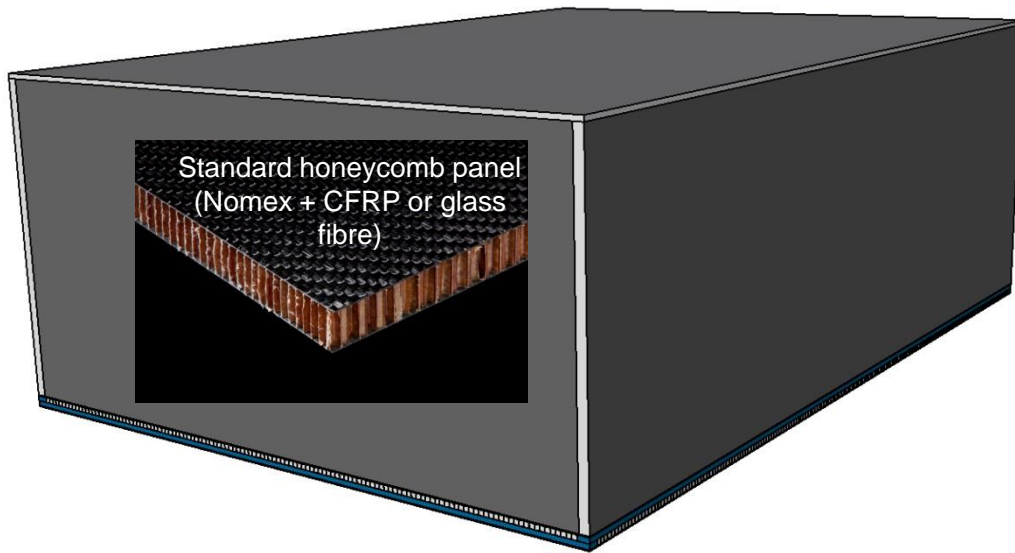Water supply piping/ Water level sensors

+ water
(worst case scenario)

Key idea: propose some "sandwich" material (panels) with close behavior of honeycombs (standard)

See next for more details…

Container to be perfectly sealed

Standard honeycomb panel (Nomex + CFRP or glass fibre)

(a) Honeycomb (square)　(b) Corrugation　(c) Pyramidal

(d) Tetrahedral　(e) 3D-Kagomé　(f) Diamond textile

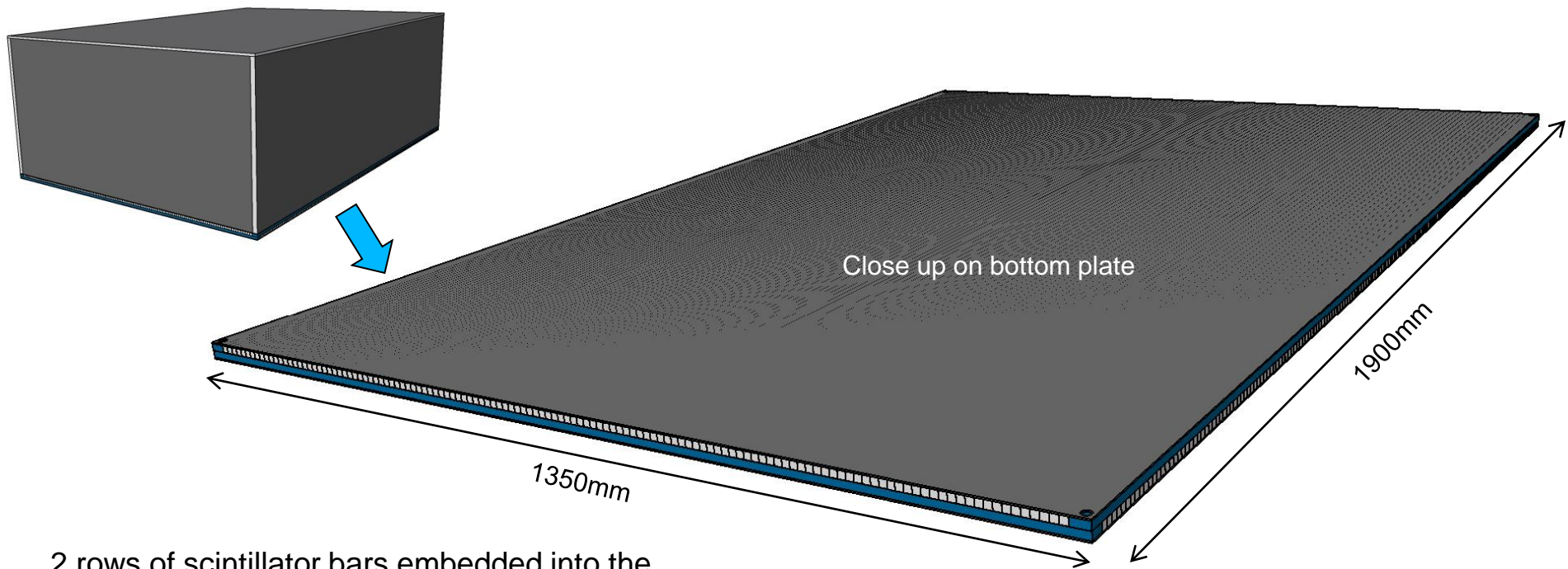(g) Square Textile　(h) Diamond collinear　(i) Square collinear

Connections (clamping) between panels not shown here (preliminary…)

Need to decide where to put the read out sides (SiPMT, MPPC?…)
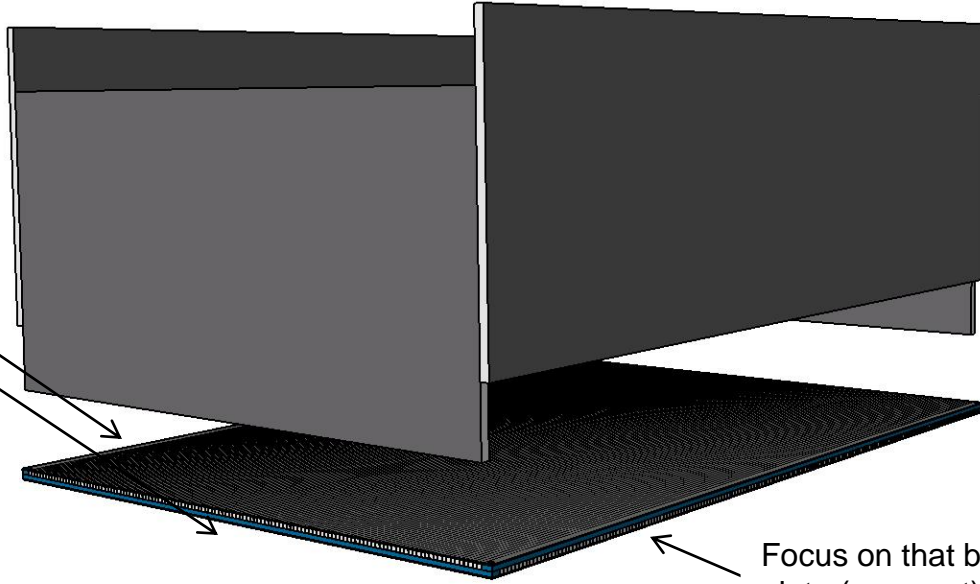
Focus on that bottom plate (see next)

Close up on bottom plate

1900mm

1350mm

2 rows of scintillator bars embedded into the panel (sandwiched..)
… acting as a panel core!

2mm thick CFRP (carbon) facing material

10x10mm
Sci Bar ends
(no connector shown)

20mm

Side beams
(aluminum for FEA)
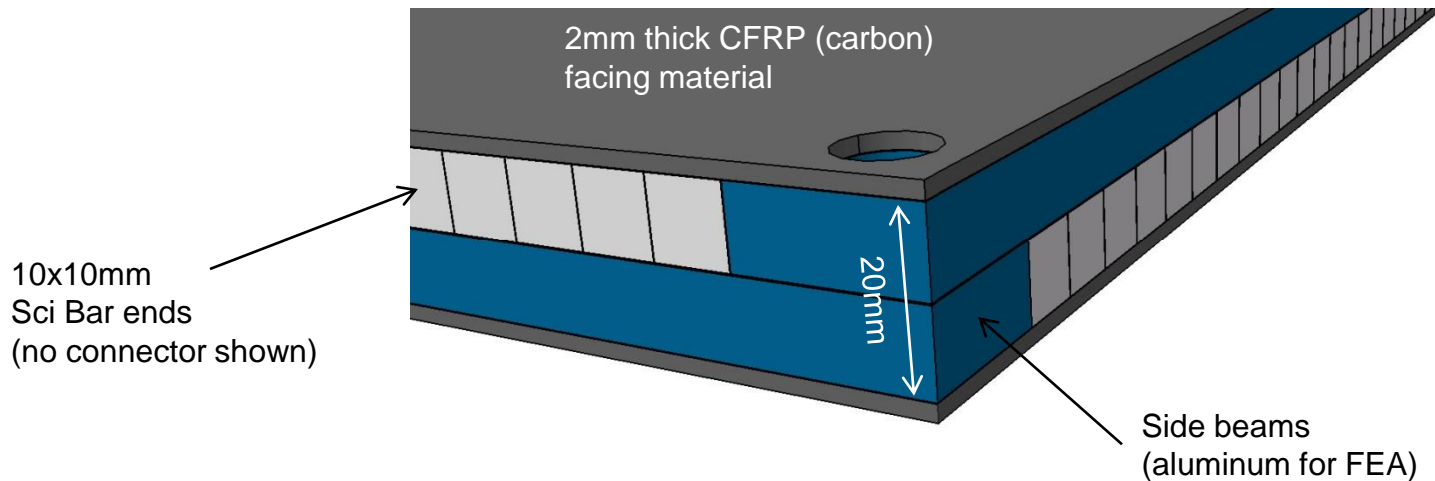
Exploded view to show the glue interfaces
(3 max, no glue considered between bars… conservative fro FEA!)
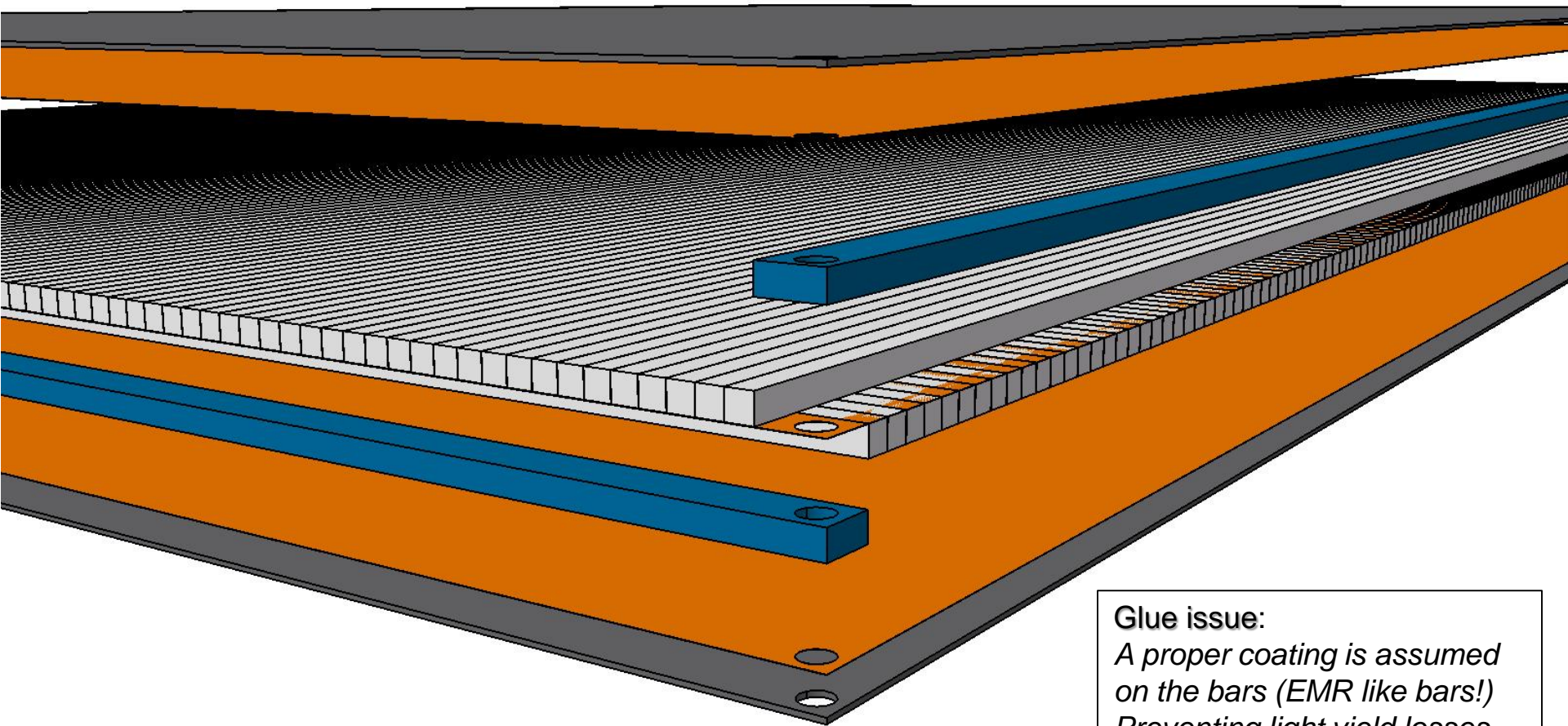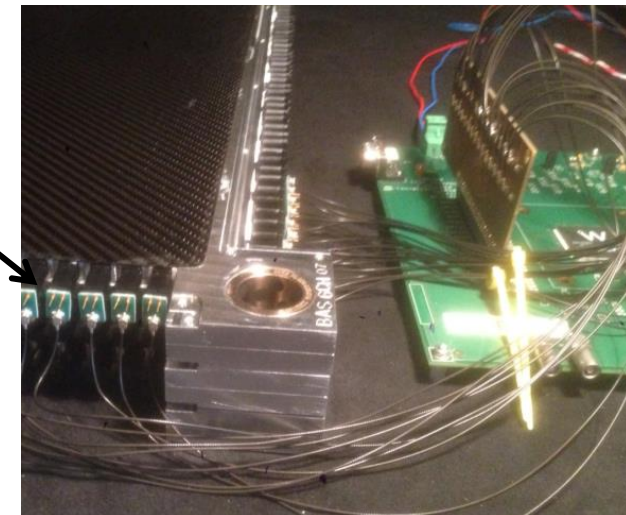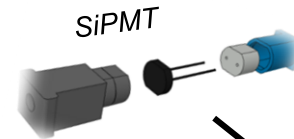
Glue issue:
A proper coating is assumed on the bars (EMR like bars!) Preventing light yield losses…

REMINDER…

Older Neutrino Projects @ DPNC…
TASD modules production

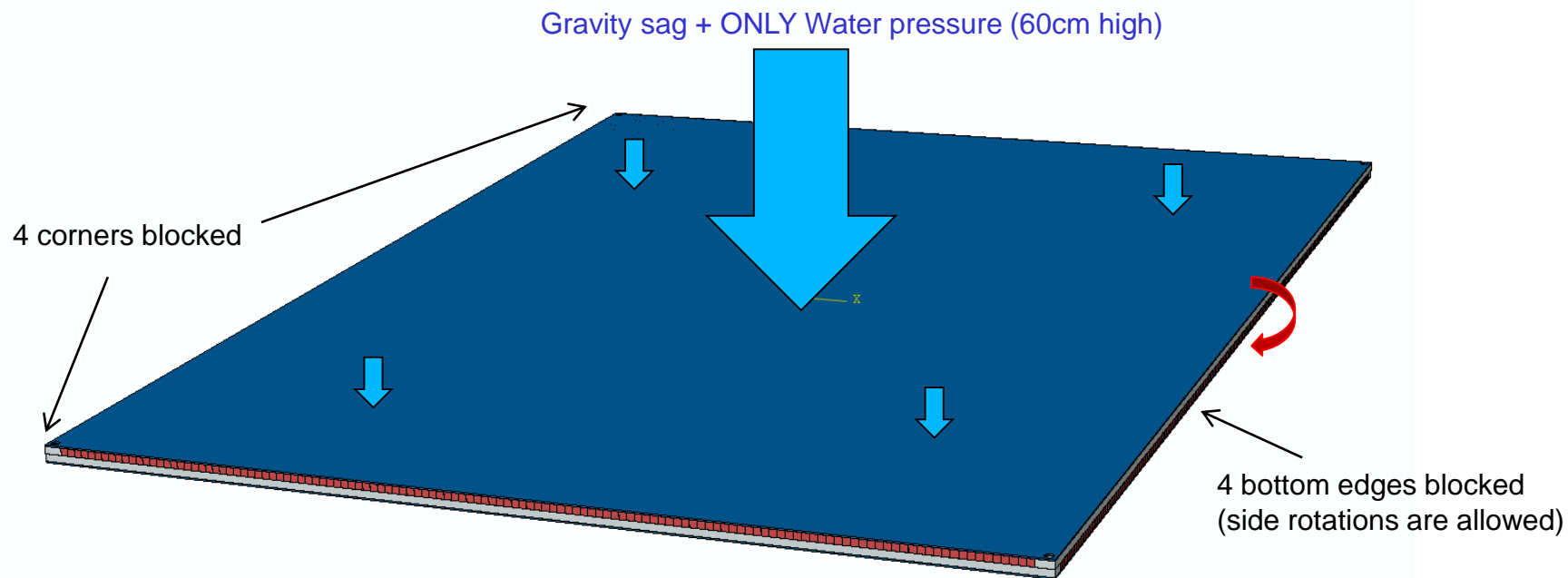*Scintillating bars being assembled*

CFRP covering

Pressing tool
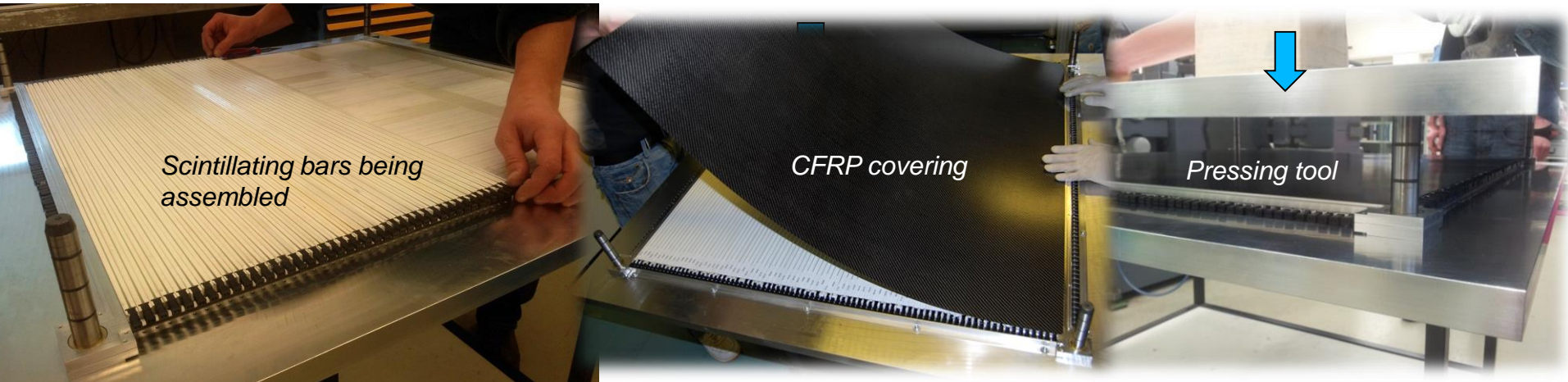
50 X-Y modules have been produced (from May to September at CERN). Still stored at CERN (see below…).
No glue used to bond the CFRP plates with bars! Due to absorption thru the coating…

SiPMT

First FEA (mechanical simulation)

Loading & Boundary conditions (somehow conservative…)

Gravity sag + ONLY Water pressure (60cm high)

4 corners blocked

4 bottom edges blocked
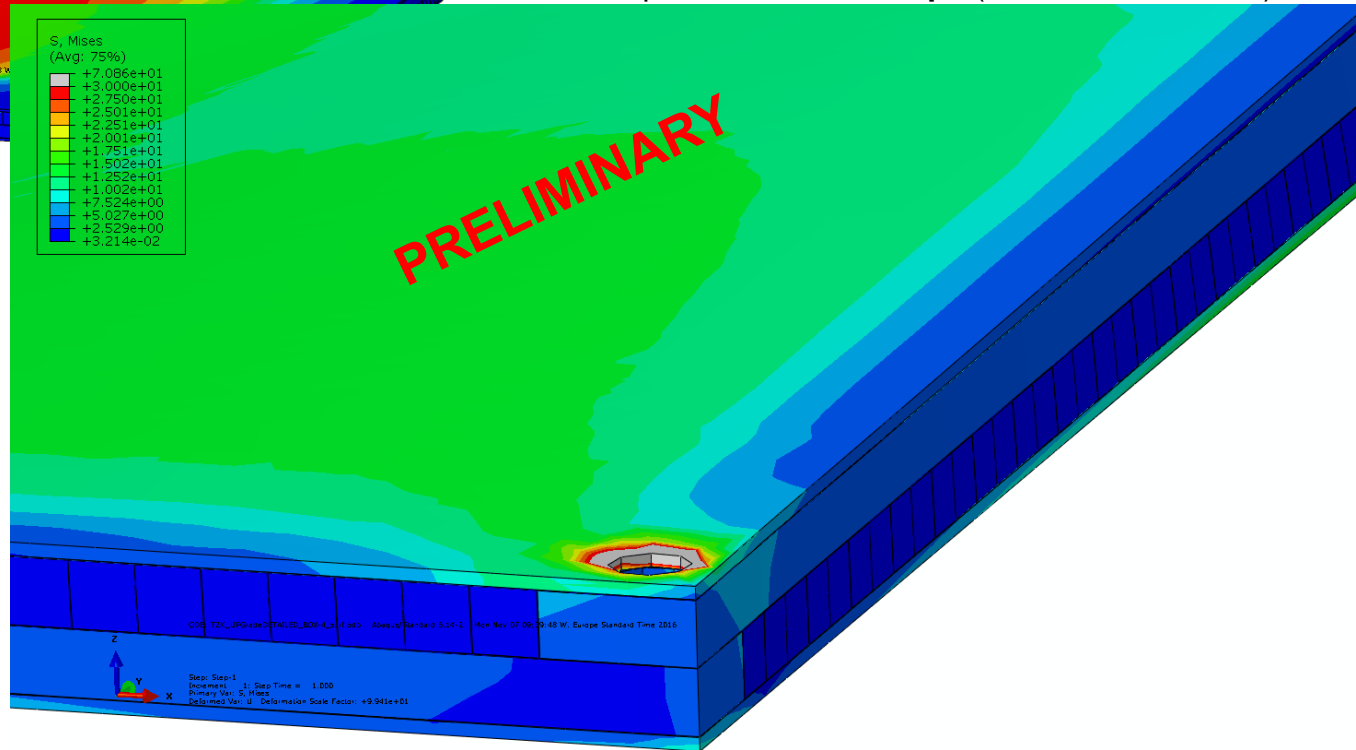(side rotations are allowed)
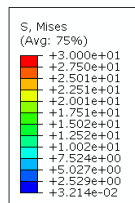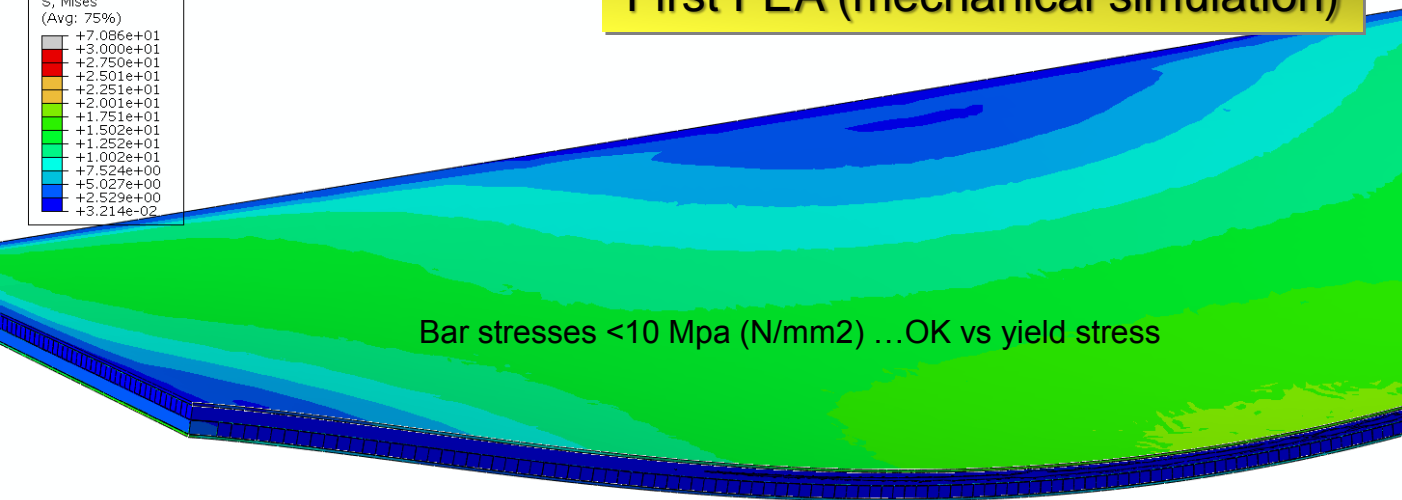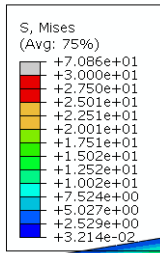
First FEA (mechanical simulation)

Maximum deflection is **1.9mm** (in case of these conservative boundary conditions!)
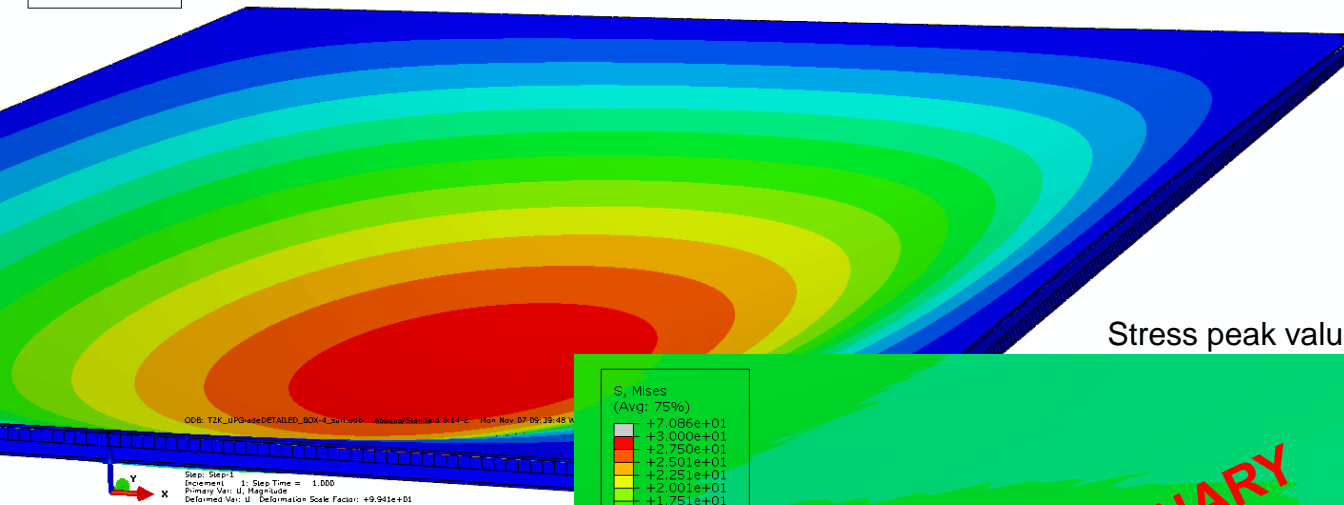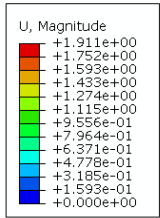
Stress peak value is <**71 Mpa** (concentration effect)

First FEA (mechanical simulation)

Bar stresses <10 Mpa (N/mm2) …OK vs yield stress

Glue stresses <10 Mpa (N/mm2) …OK vs yield stress
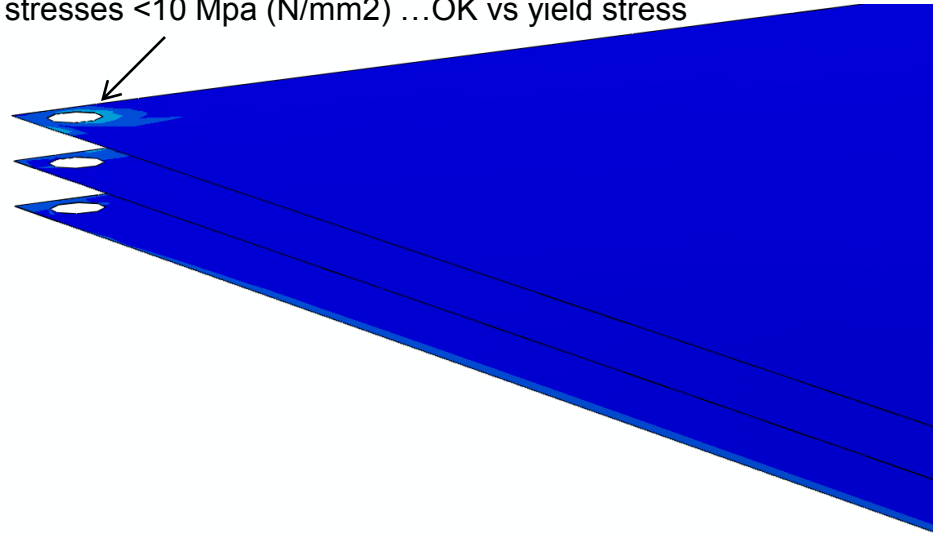
PRELIMINARY

Outlooks…

- Next steps will be to add the rest of the BOX to get better behavior (shift the Boundary Conditions to... The rest of mechanics!)

- Thermo mechanical simulations to set the storage temperature limits (important!)

- If promising, start some prototypes to TEST and compare with FEA

- One of the remaining issues is about CFRP electrical conduction (?).. Due to TPC vicinity…

Testing