

INVOLVED PEOPLE

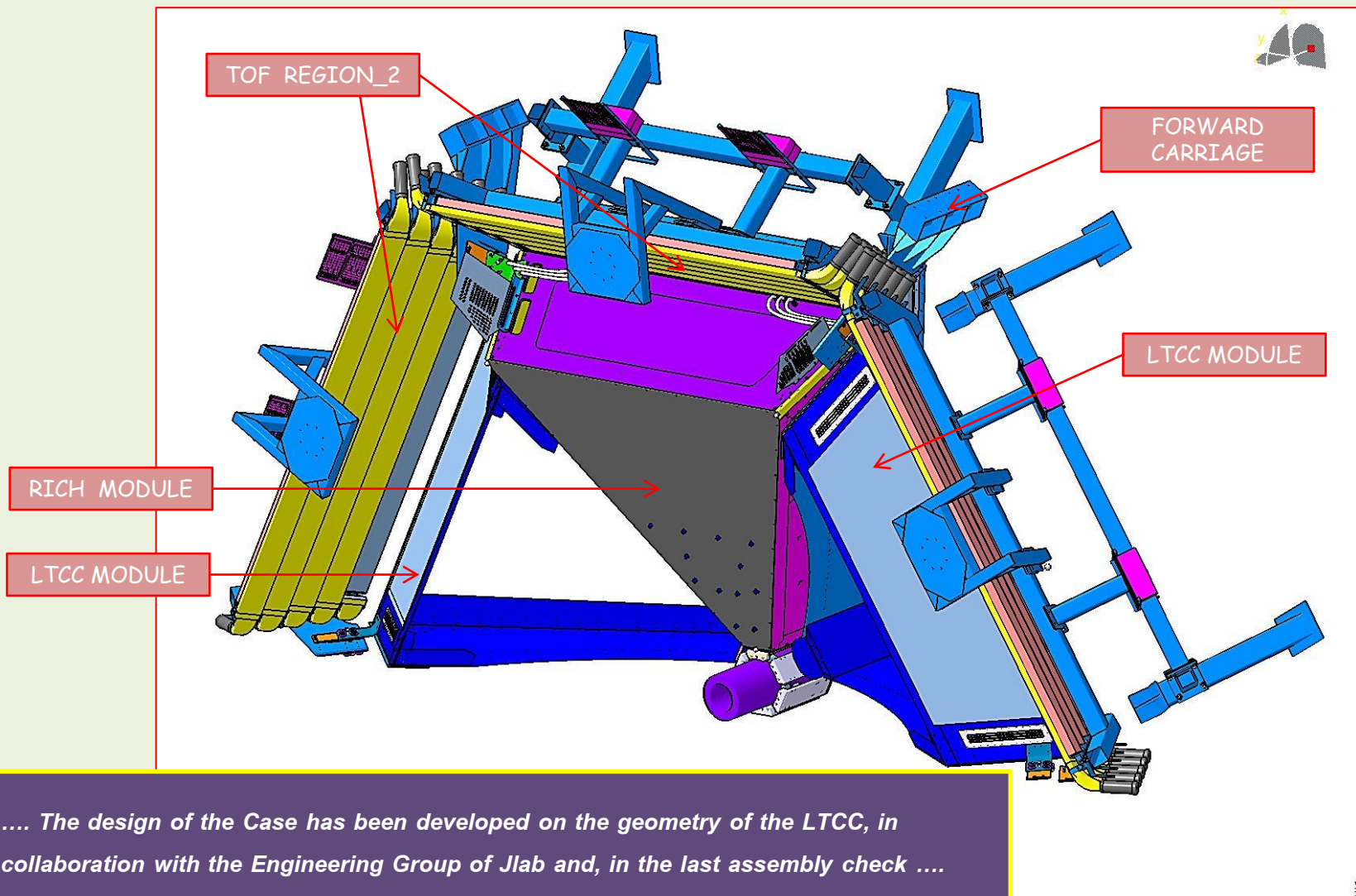
- INFN LNF – Dario Orecchini / Sandro Tommasini
- ARGONNE NL – Kevin Bailey / Thomas O'Connor

OUTLINE

- RICH INTEGRATION IN CLAS 12
- RICH CASE
- RICH CASE COMPONENTS & ACCEPTANCE AREA
- PATCH PANELS
- CABLES & PIPELINES PATHWAYS
- EXIT PANEL
- ENTRANCE PANEL
- ELECTRONIC PANEL SUPPORT FRAME

RICH MECHANICS TIMELINE

- **June/September 2013 JLab - DOE Review**
 - First draft of the RICH detector inside the CLAS12 constraints
 - General definition of the components and materials
- **June 2014 JLab Mechanics Review**
 - Detailed description of the RICH detector
 - Verification of the compatibility with CLAS12
- **April 2015 Meeting at JLab**
 - Final check of the detector geometry
 - Definition of the assembly and installation procedures
- **May 2015**
 - Contract for the RICH Case construction awarded
- **Summer 2015**
 - Finalization of the RICH mechanics construction details
- **October 2015**
 - RICH Case construction started



.... The design of the Case has been developed on the geometry of the LTCC, in collaboration with the Engineering Group of Jlab and, in the last assembly check

- NO INTERFERENCES HAVE BEEN FOUND WITH OTHERS CLAS12 COMPONENTS
- THE RICH MODULE IS FULLY INSIDE THE ASSIGNED VOLUME

CLAS12 – RICH MID TERM REVIEW: RICH CASE OVERVIEW

UPPER CLOSING FRAME - CFRP 25mm Thickness
(Boundary frame in monolithic carbon, plus a core of Nomex Honeycomb)

UPPER STIFFENING FRAME
CFRP - 10mm Thickness

OVERVIEW OF LOW X0 MATERIAL
BUDGET COMPONENTS

LATERAL STIFFENING FRAME
CFRP - 10mm Thickness

UPPER STIFFENING FRAME
CFRP - 10mm Thickness

LATERAL PANEL ALUMINUM
HONEYCOMB - 25mm Thickness

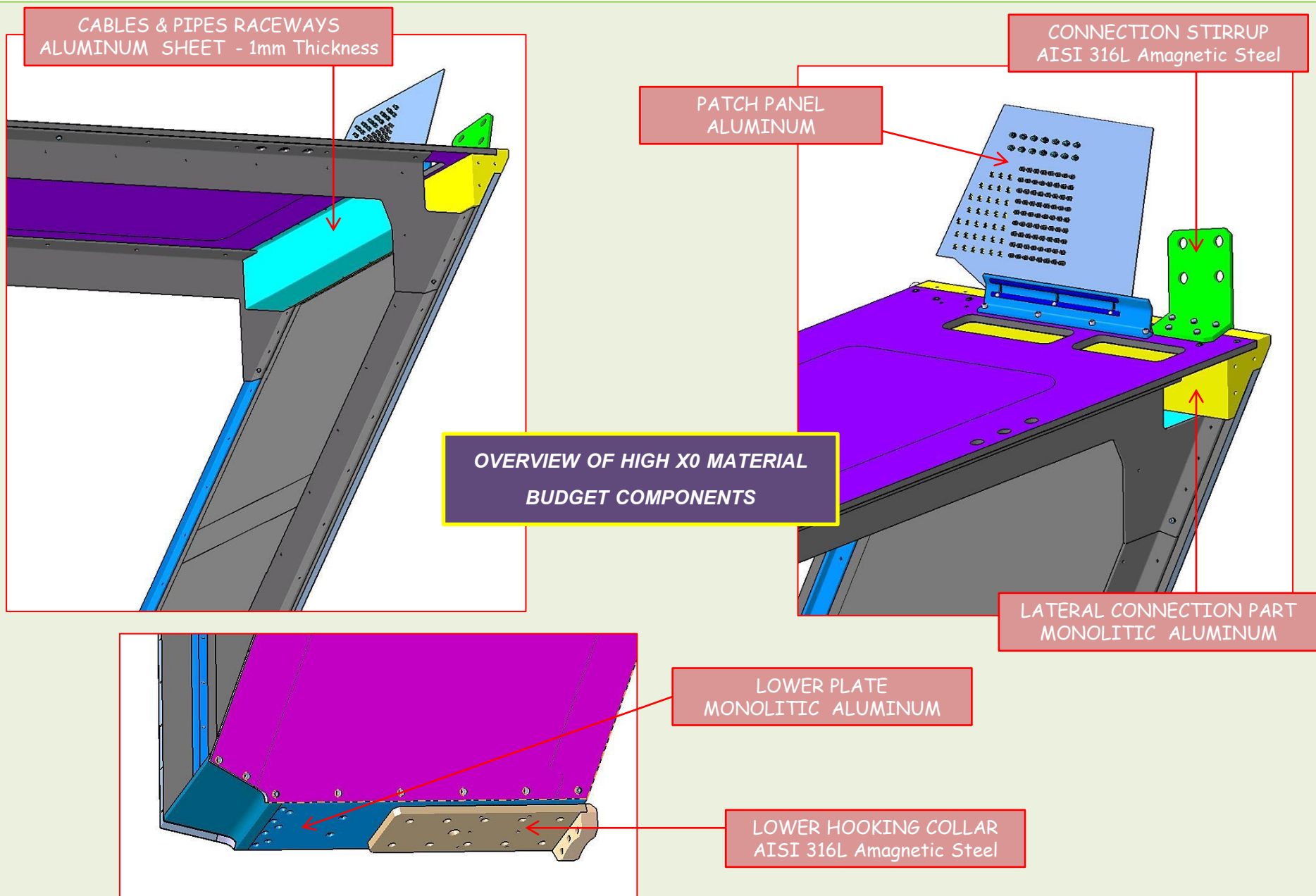
INTERMEDIATE CONNECTION FRAME
CFRP - 10mm Thickness

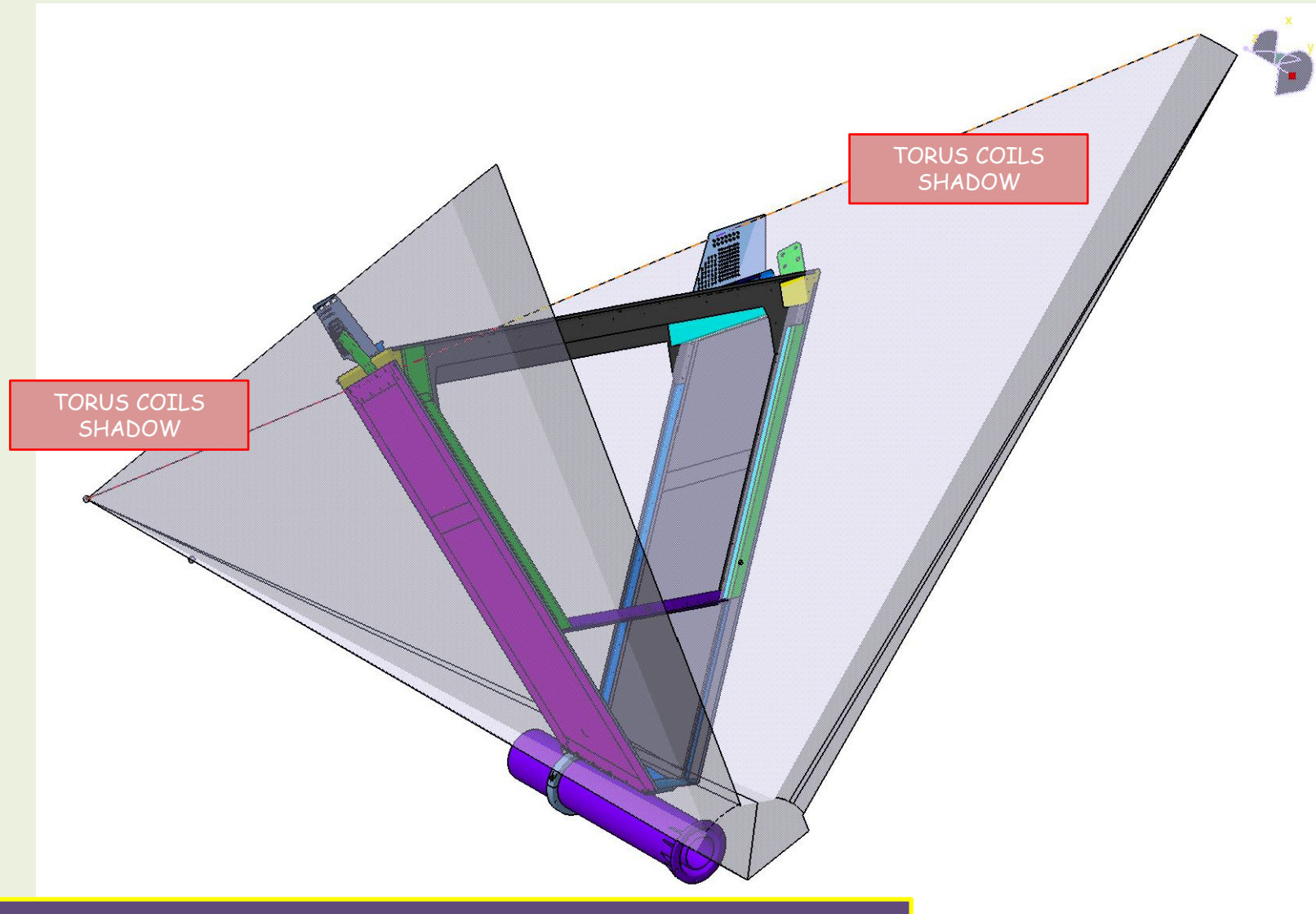
ENTRANCE SIDE VIEW

EXIT SIDE VIEW

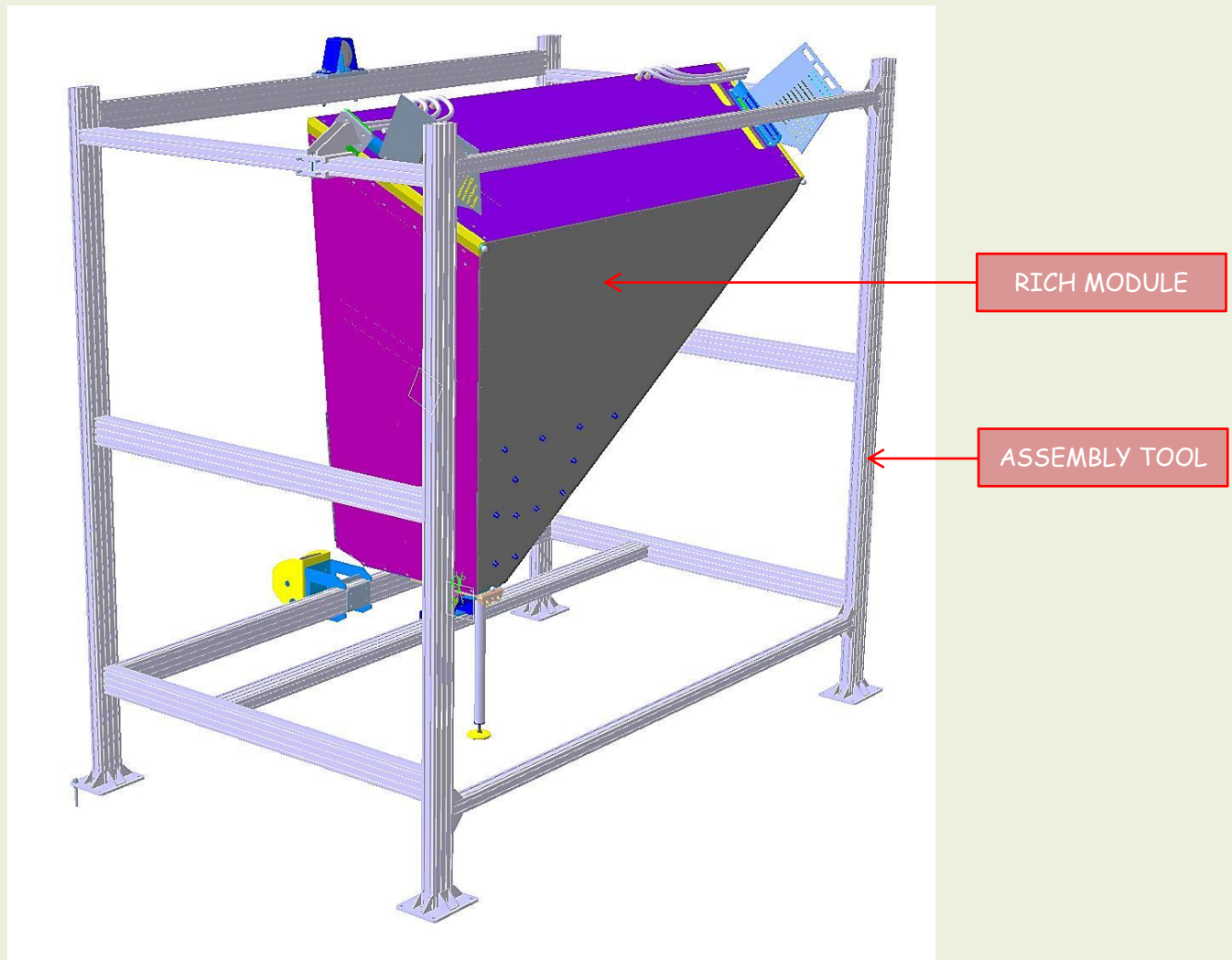
- > THE RICH CASE IS UNDER CONSTRUCTION IN TECNAVAN (Veroli – Italy).
- > THE ASSEMBLY TEST WILL BE DONE AT THE END OF 2015
- > THE CASE WILL BE AT JLAB IN MARCH 2016

CLAS12 – RICH MID TERM REVIEW: RICH CASE OVERVIEW



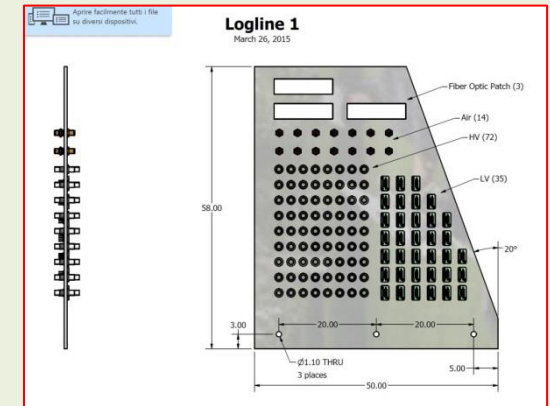
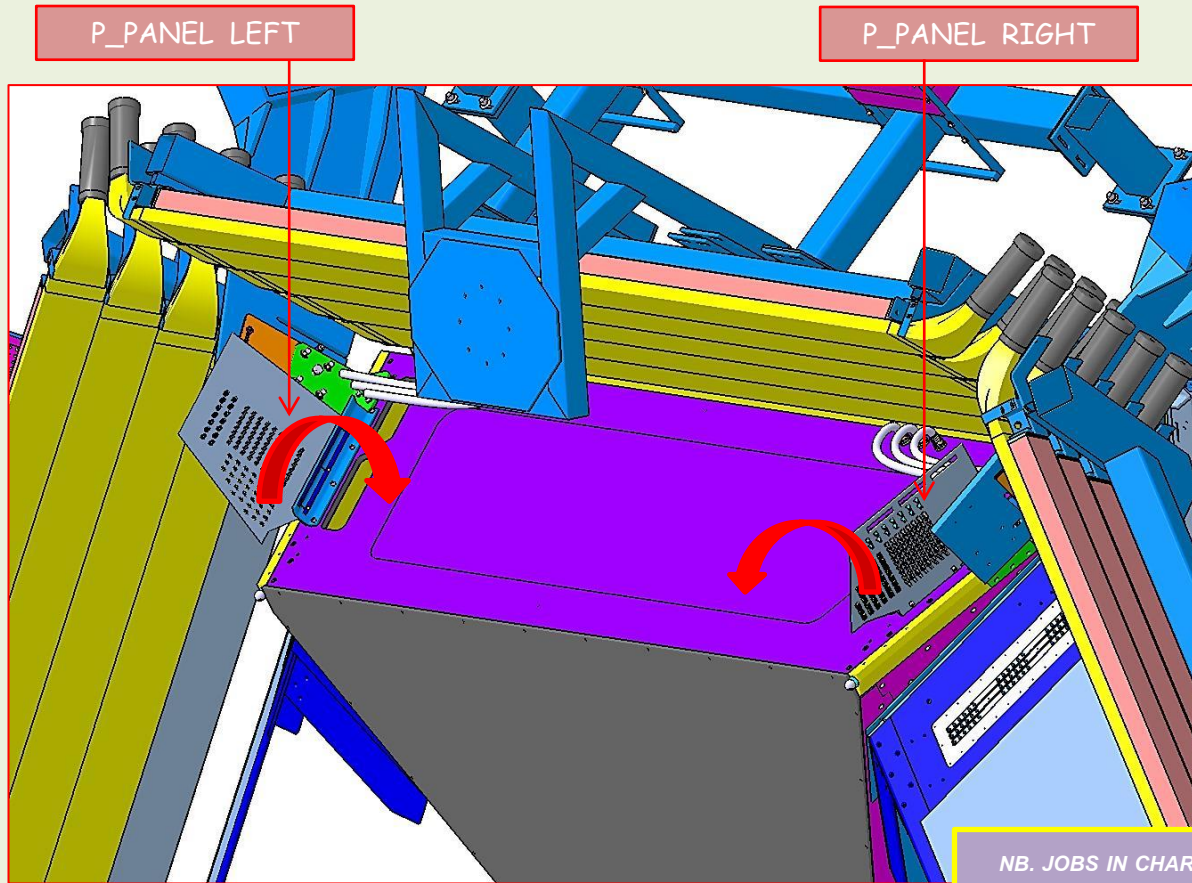


- ONLY LOW MATERIAL BUDGET COMPONENTS ARE IN THE ACCEPTANCE AREA
- HIGH MATERIAL BUDGET COMPONENTS ARE IN THE TORUS COILS SHADOW



- > THE RICH MODULE ASSEMBLY TOOL IS UNDER CONSTRUCTION IN TECNAVAN (Veroli – Italy)
- > THE FULL ASSEMBLY TEST WILL BE DONE AT THE END OF 2015
- > THE TOOL WILL BE DELIVERED AT JLAB TOGETHER WITH THE CASE IN MARCH 2016

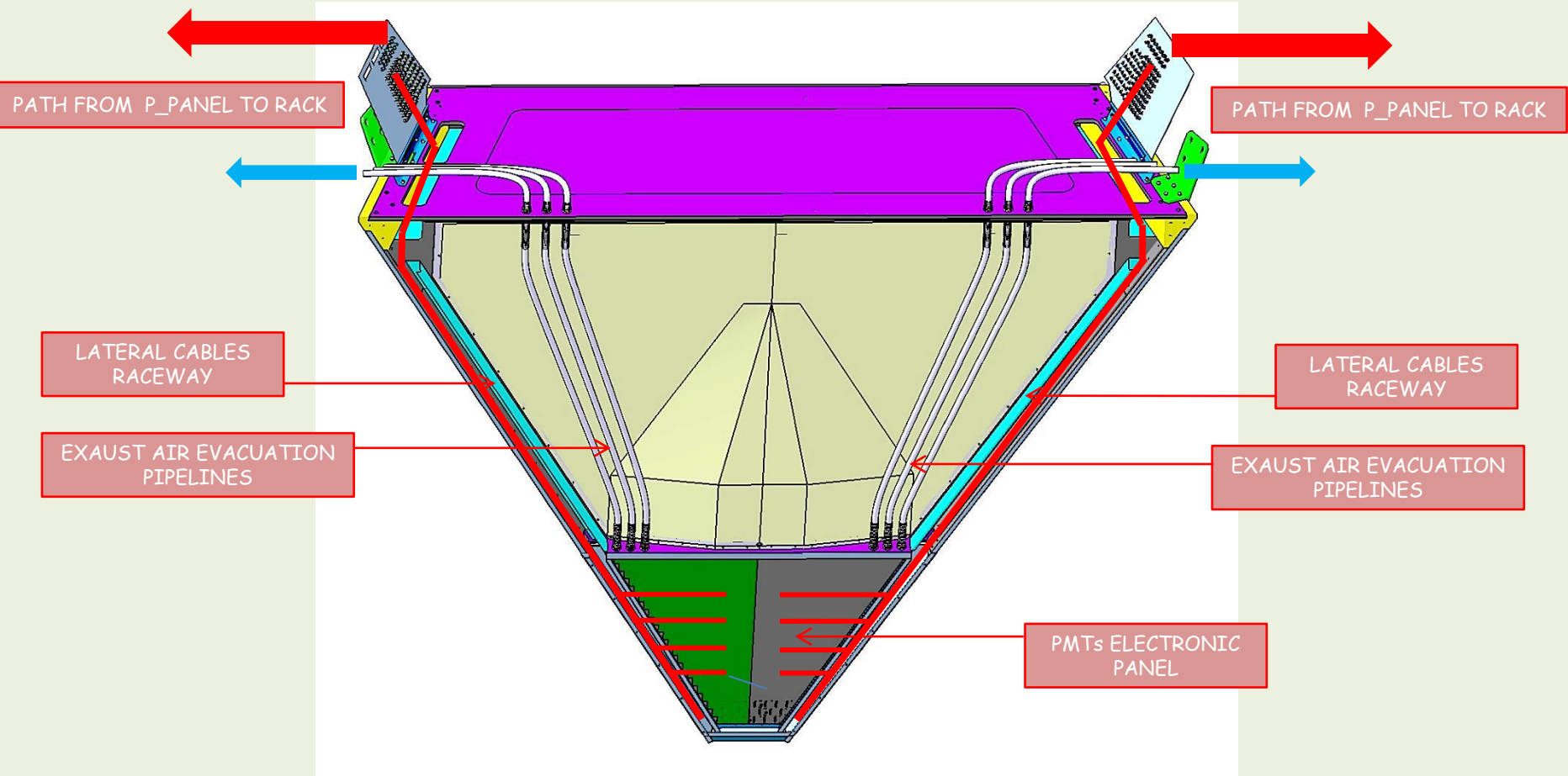
CLAS12 – RICH MID TERM REVIEW: **PATCH PANELS OVERVIEW (T. O'CONNOR)**



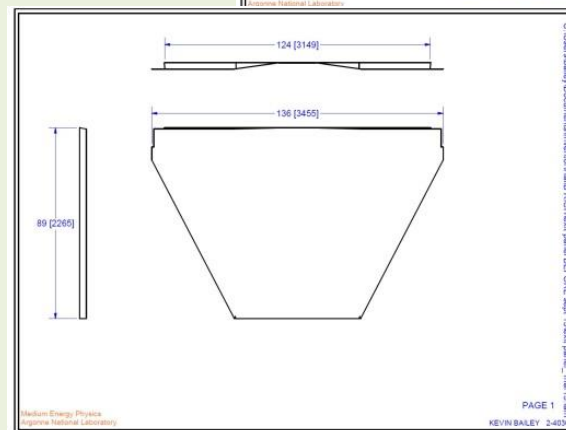
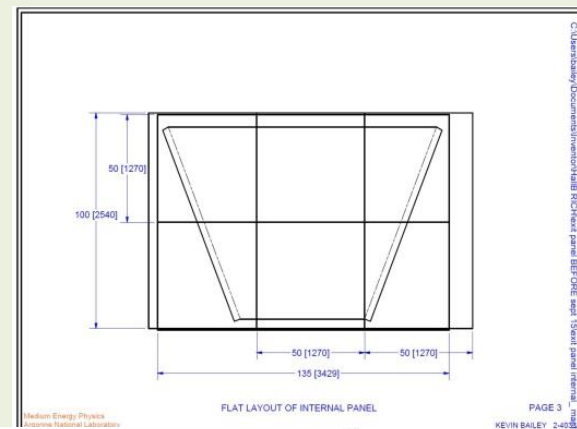
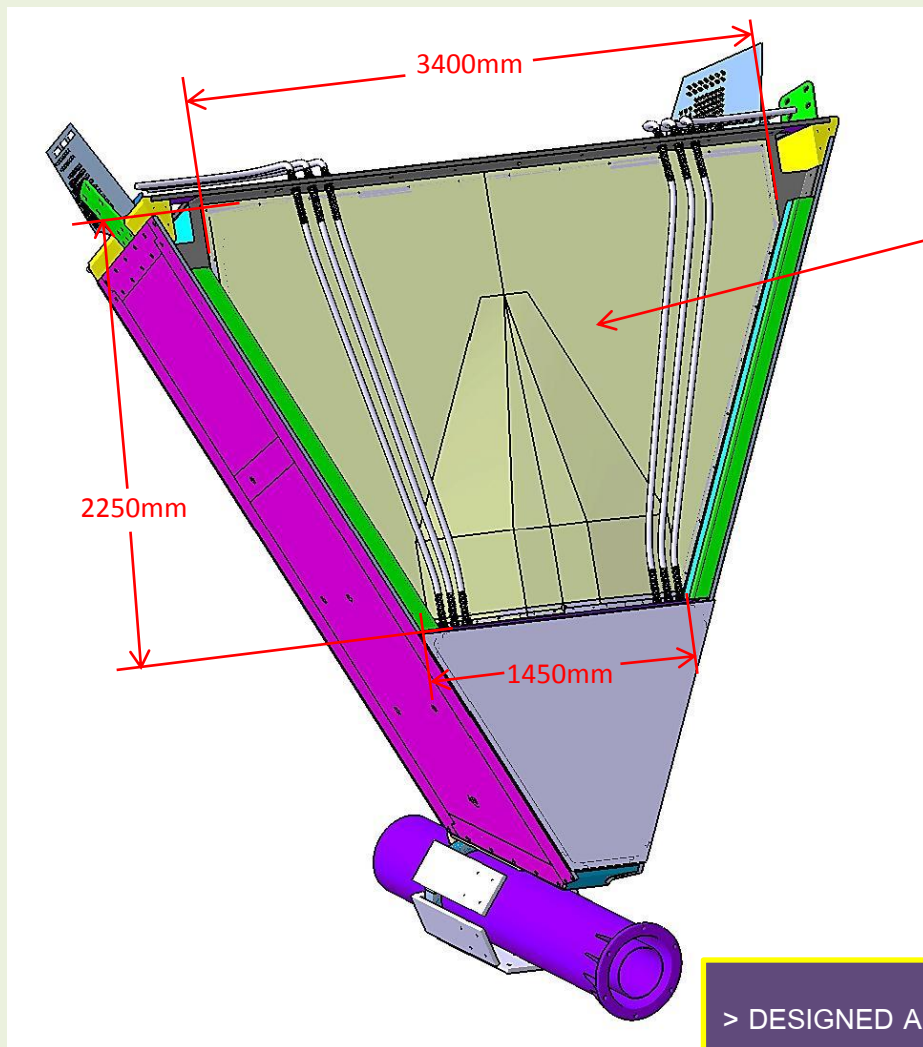
NB. JOBS IN CHARGE OF THOMAS O'CONNOR
(ARGONNE NL)

- > DESIGNED AND REALIZED BY ARGONNE
- > THE LAYOUT HAS BEEN DEVELOPED RESPECT ALL THE PLANNED CONNECTORS
- > DESIGNED TO BE OUT OF THE ACCEPTANCE AREA
- > DESIGNED TO BE ROTATED TOWARD THE RICH UPPER CLOSING PANEL DURING THE MOVING AND INSTALLATION PHASES
- > **THE P_PANELS WILL BE AT JLAB FOR THE END OF AUGUST 2016**

CLAS12 – RICH MID TERM REVIEW: CABLES & PIPELINES PATHWAYS OVERVIEW



- OPERATION THAT WILL BE DONE IN THE ASSEMBLY AREA
 - THE CABLES (HV – LV – DIGITAL) WILL BE ROUTED FROM THE BOARDS IN THE LATERAL RACEWAYS.
 - ALL THE CONNECTORS WILL BE CONNECTED ON THE PATCH PANELS HOUSING.
- OPERATION THAT WILL BE DONE AFTER THE INTEGRATION IN CLAS12 APPARATUS
 - THE CABLES AND THE AIR PIPELINES WILL BE ROUTED FROM THE PATCH PANELS TO THE RACKS.



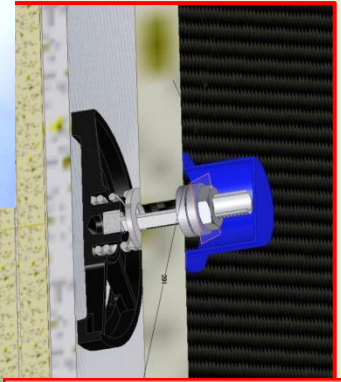
NB. JOBS IN CHARGE OF KEVIN BAILEY
(ARGONNE NL)

- > DESIGNED AND REALIZED BY ARGONNE
- > DESIGNED IN ALUMINUM SHEET (0.5 mm in thickness)
- > **THE EXIT PANEL WILL BE AT JLAB FOR THE END OF AUGUST 2016**

CLAS12 – RICH MID TERM REVIEW: ENTRANCE PANEL OVERVIEW

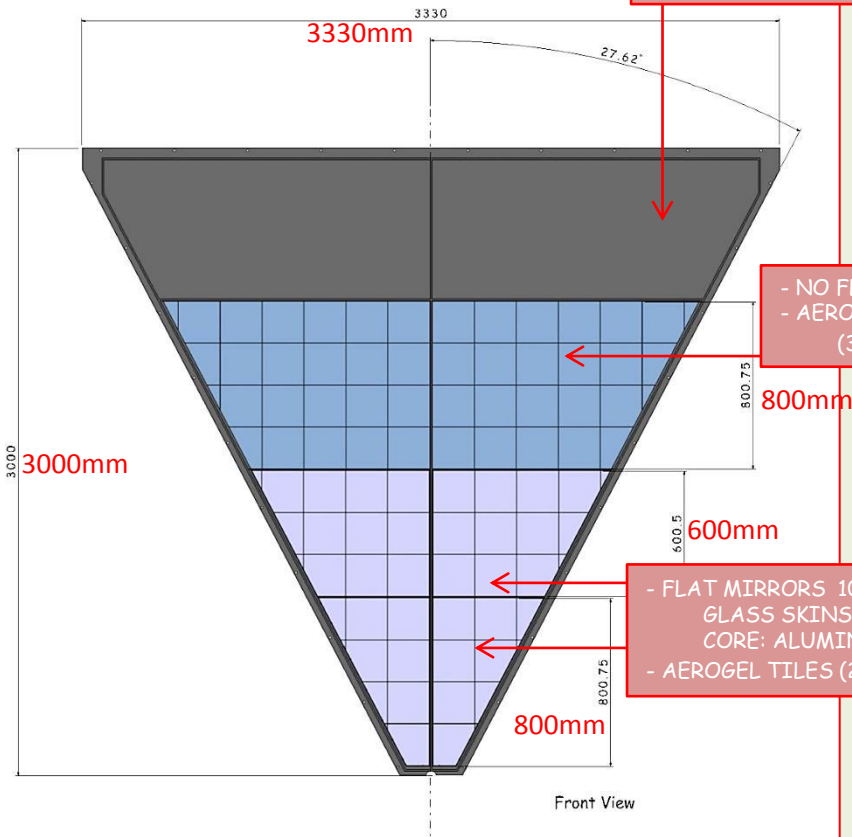
> THE ROLE OF THE ENTRANCE PANEL IS:
 TO SUPPORT THE MODULES OF FLAT MIRRORS PLUS AEROGEL TILES
 TO REALIZE THE GAS-TIGHT AND THE LIGHTTIGHT

> THE CONSTRUCTION IS IN PARALLEL WITH THE CASE AND THEY WILL
 DELIVERED TOHETER IN MARCH 2016



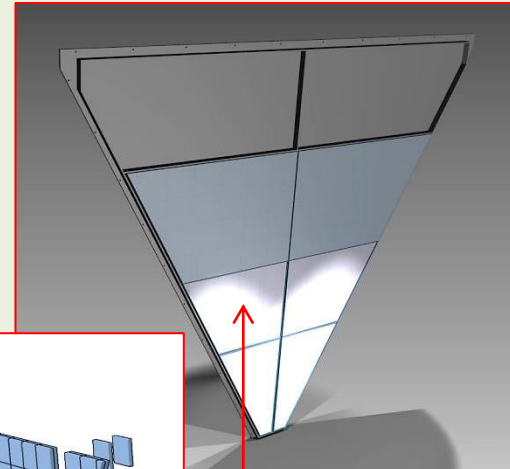
- FLAT MIRRORS SUPPORT AND ADJUSTMENT BRACKET

- SUPPORT PANEL (15mm thickness)
 SKINS CFRP (0,5mm thickness)
 CORE NOMEX HONEYCOMB

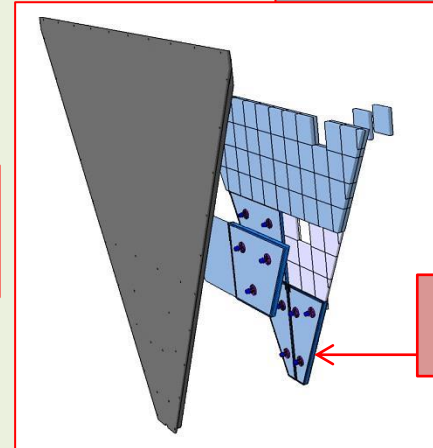


- NO FLAT MIRROR
 - AEROGEL TILES
 (30+30mm tickness)

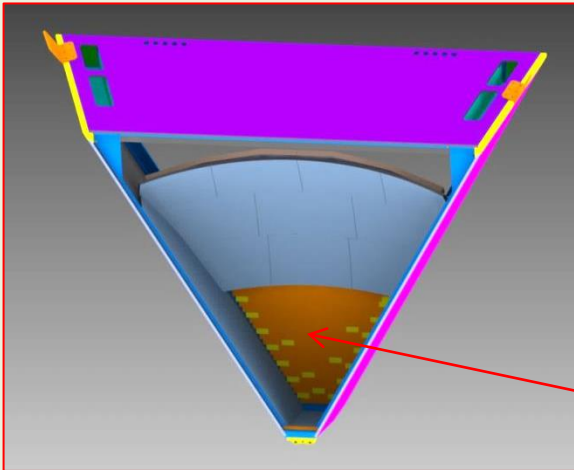
- FLAT MIRRORS 10mm Thickness
 GLASS SKINS 0,7mm
 CORE: ALUMINUM HONEYCOMB
 - AEROGEL TILES (20mm tick.)



- MODULES OF FLAT MIRRORS PLUS AEROGEL TILES



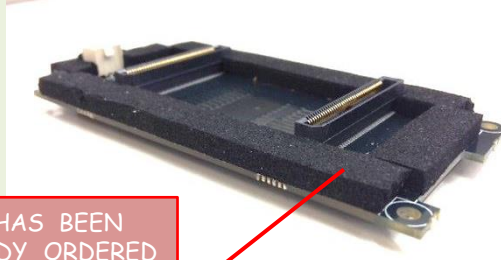
CLAS12 – RICH MID TERM REVIEW: **ELECTRONIC PANEL OVERVIEW**



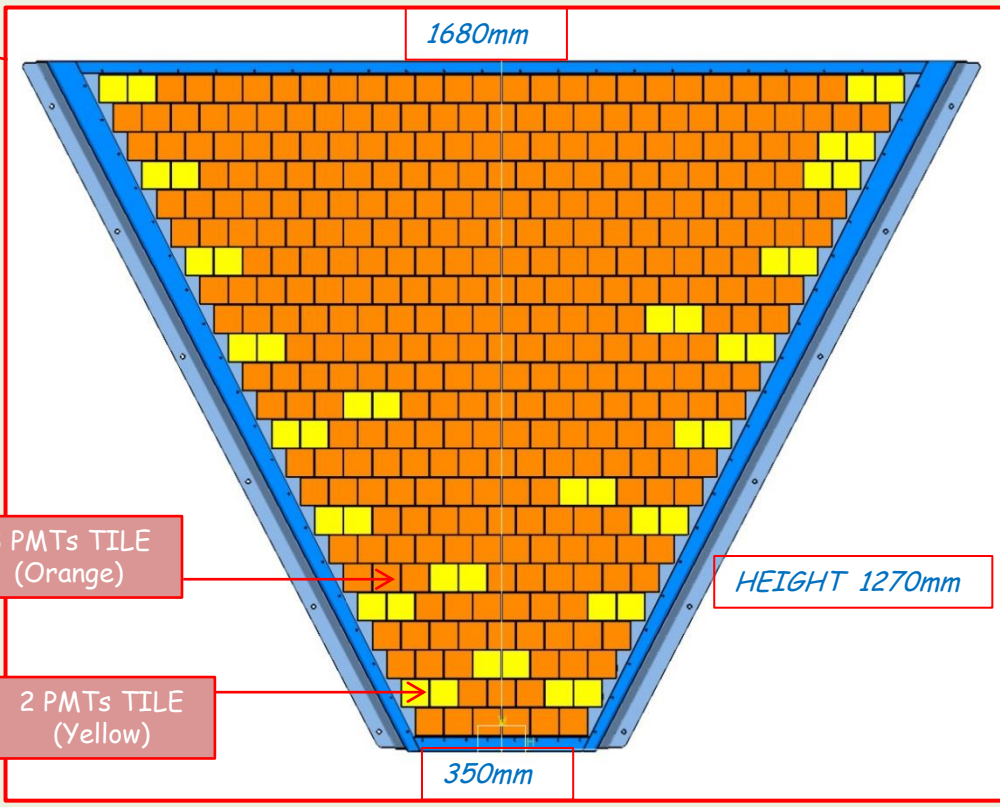
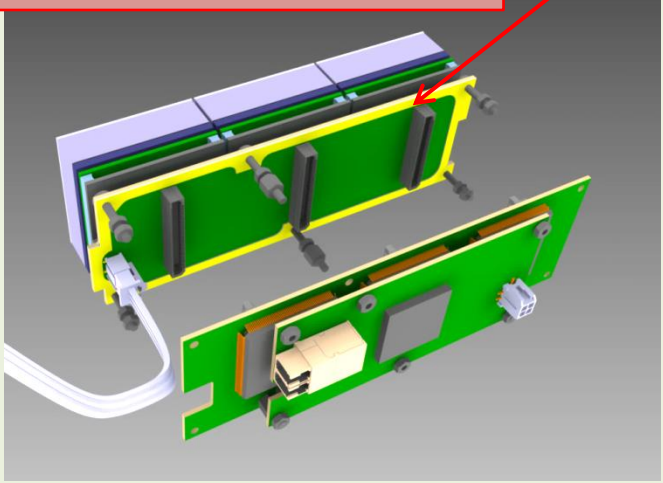
E_PANEL MAIN NUMBERS:

- **391 PMTs**
- **23 LAYERS**
(1° LAYER > 6 PMTs)
(23° LAYER > 28 PMTs)
- **2 PMTs TILES: 23** > $23 \times 2 = 46$ PMTs
- **3 PMTs TILES: 115** > $115 \times 3 = 345$ PMTs

(-3 PMTs TILES HAVE BEEN PREFERRED)



DEDICATED NEW SEAL HAS BEEN DESIGNED AND ALREADY ORDERED

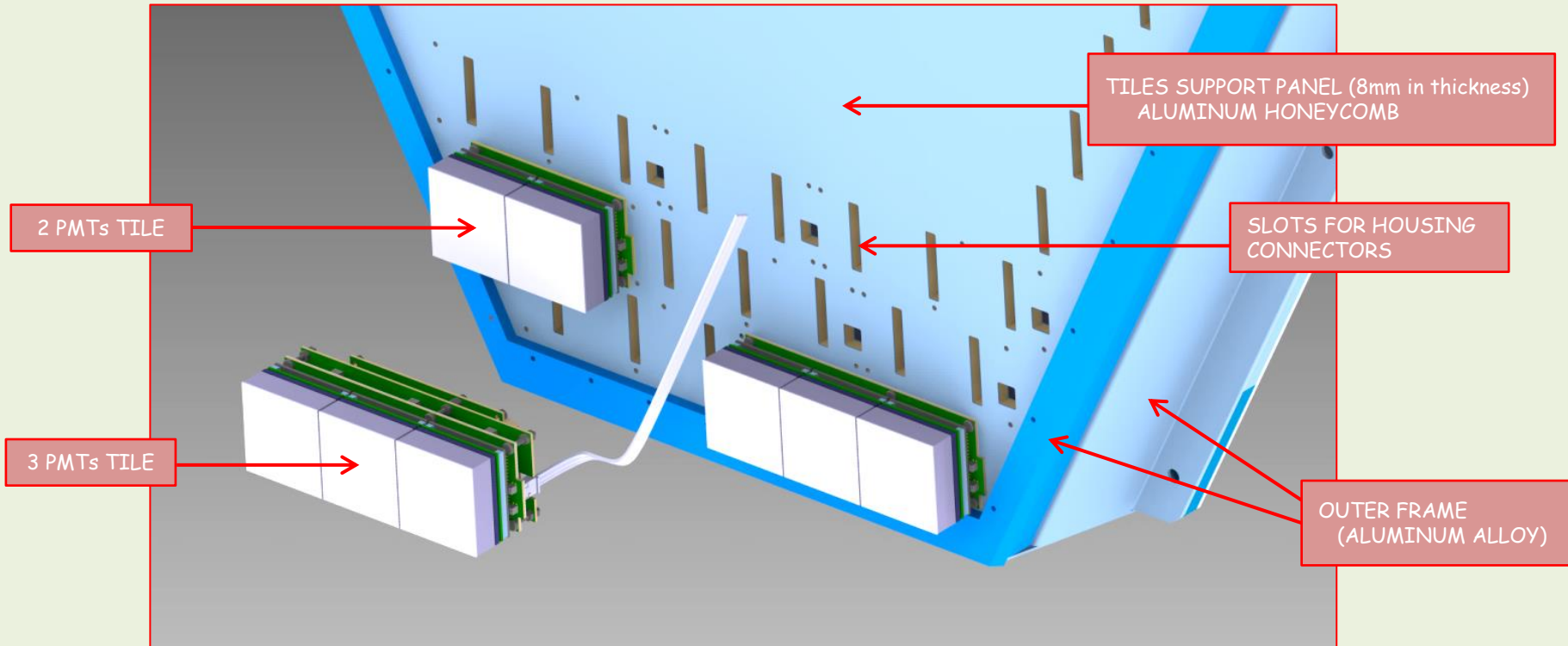


3 PMTs TILE (Orange)

2 PMTs TILE (Yellow)

HEIGHT 1270mm

CLAS12 – RICH MID TERM REVIEW: **ELECTRONIC PANEL SUPPORT FRAME OVERVIEW**



ASSEMBLY PROCEDURE AND LIGHTTIGHT
HAVE SUCCESSFULLY TESTED

> THE DESIGN OF THE SUPPORT FRAME HAS BEEN COMPLETED.
> IT WILL BE DELIVERED AT JLAB TOGHETER WITH THE CASE AND THE
ASSEMBLY TOOL IN MARCH 2016



CONCLUSIONS

- **RICH INTEGRATION IN CLAS 12**
THE RICH MODULE IS FULLY INSIDE THE ASSIGNED VOLUME
- **RICH CASE**
THE RICH CASE IS UNDER CONSTRUCTION IN TECNAVAN (Veroli – Italy)
- **RICH COMPONENTS & ACCEPTANCE AREA**
ONLY LOW X0 MATERIALS ARE IN THE ACCEPTANCE AREA
- **PATCH PANELS**
DESIGN HAS BEEN DONE. DETAILS ARE UNDER DEVELOPMENT
- **CABLES & PIPELINES PATHWAYS**
THE SYSTEM AND THE COMPONENTS HAVE BEEN DESIGNED
- **EXIT PANEL**
DESIGN HAS BEEN DONE. DETAILS ARE UNDER DEVELOPMENT
- **ENTRANCE PANEL**
THE DESIGN HAS BEEN COMPLETED. THE ORDER IS UNDER PREPARATION
- **ELECTRONIC PANEL SUPPORT FRAME**
THE DESIGN HAS BEEN COMPLETED. THE ORDER IS UNDER PREPARATION