WA105

Overview

of general mechanical design

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ETH zürich

- Overview of general mechanical design

  - Detector Overview

    - Purity Monitors
    - Cryo Cameras
    - Beam Plug
    - HV degrader

  - Top FTs

  - CRP (B. Aimard - *CRP Design)*

  - Field Cage
    - Mechanical Design
    - Electrical Parts (A. Chatterjee - *field cage and electrical components)*

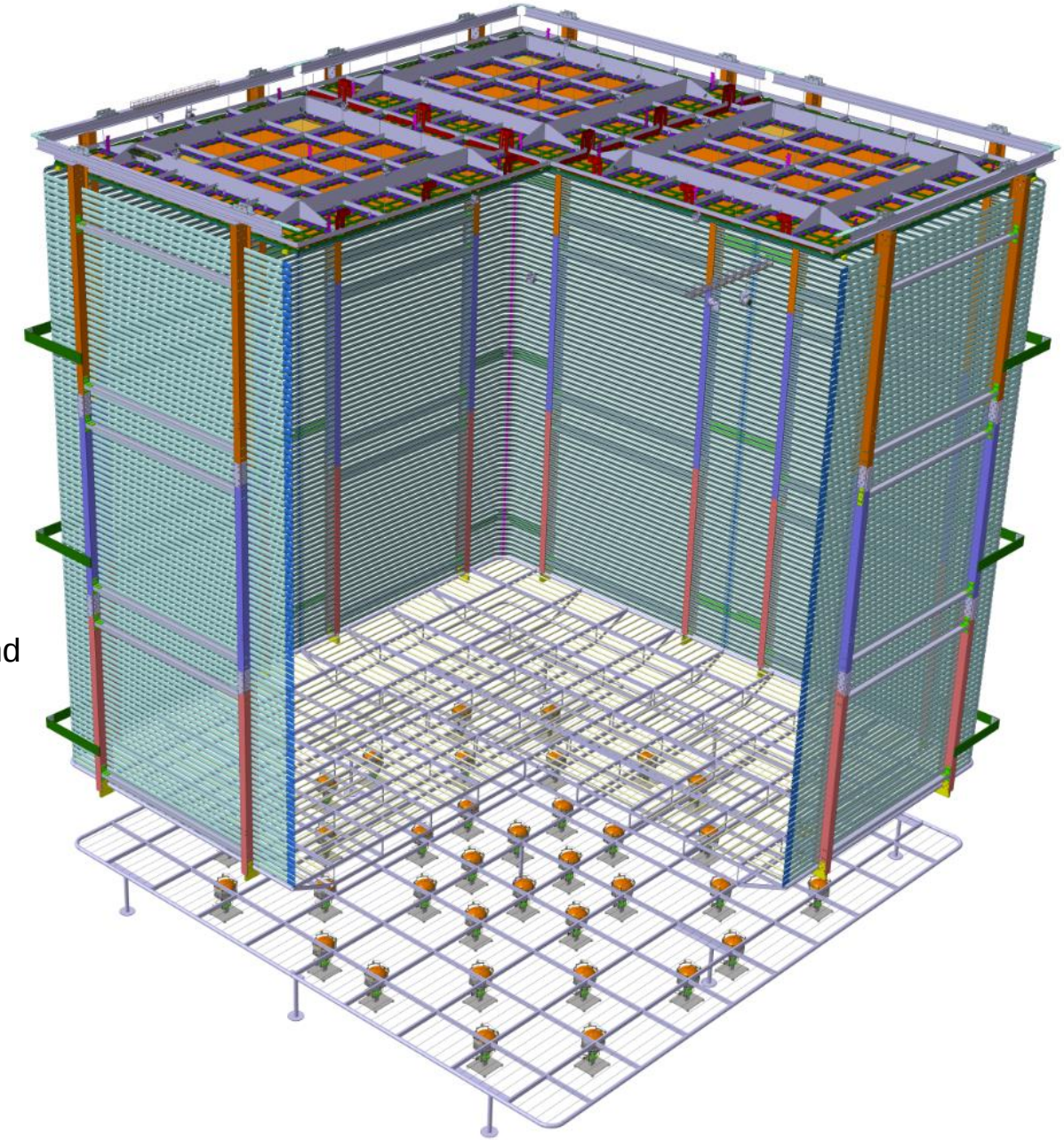
  - Cathode

  - Groundgrid

  - PMTs (T. LUX - *PMT system design and cold test)*

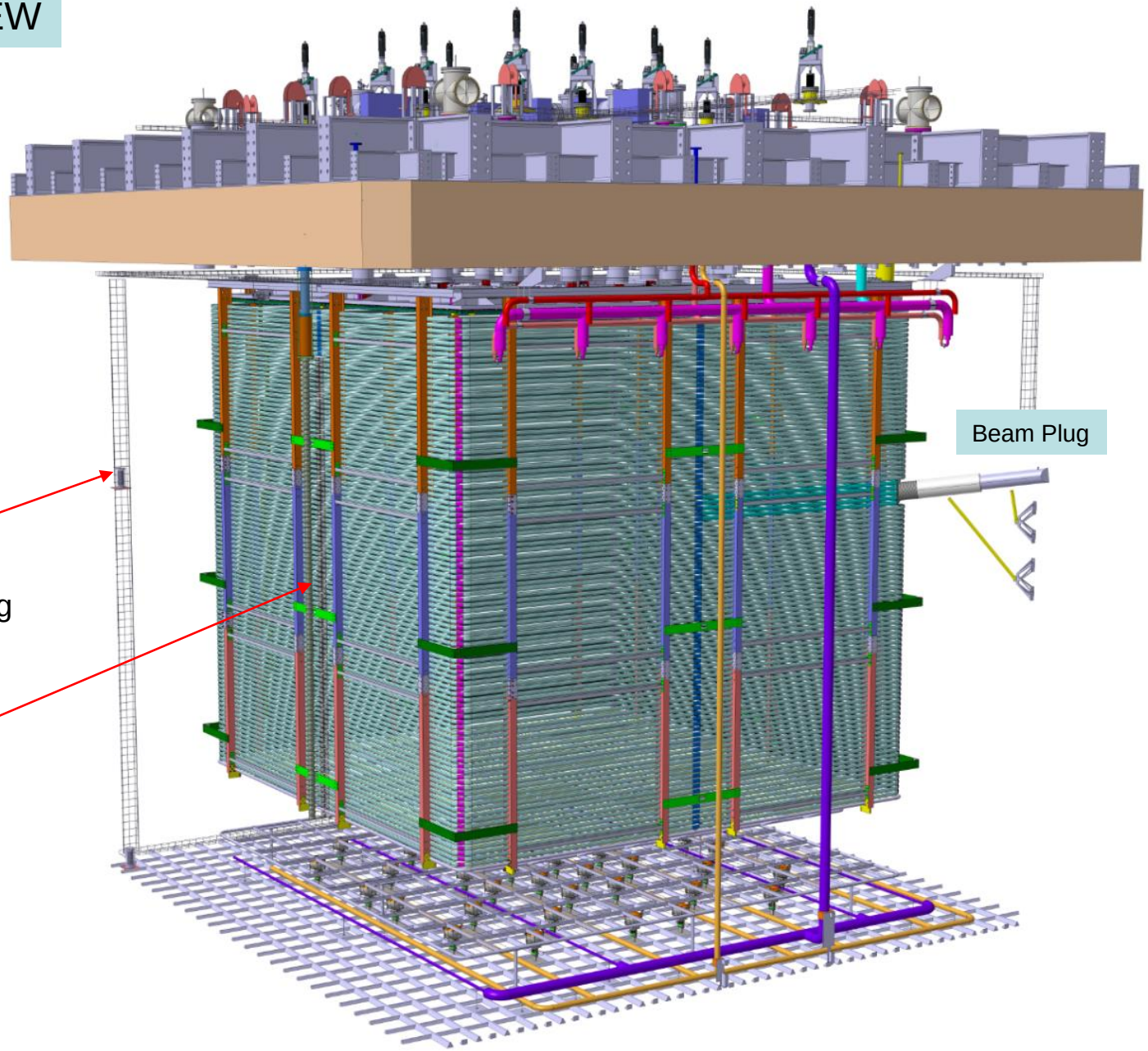
DETECTOR OVERVIEW

- 4x CRP Modules 3x3m²
  (B. Aimard - *CRP Design)*
- Field Cage (8x Modules)
- Cathode (4x Modules)
- GroundGrid (4x Modules)
- 36 x PMTs → 2 Layouts, both compatible with Internal Cryogenic and actual design of the Groundgrid



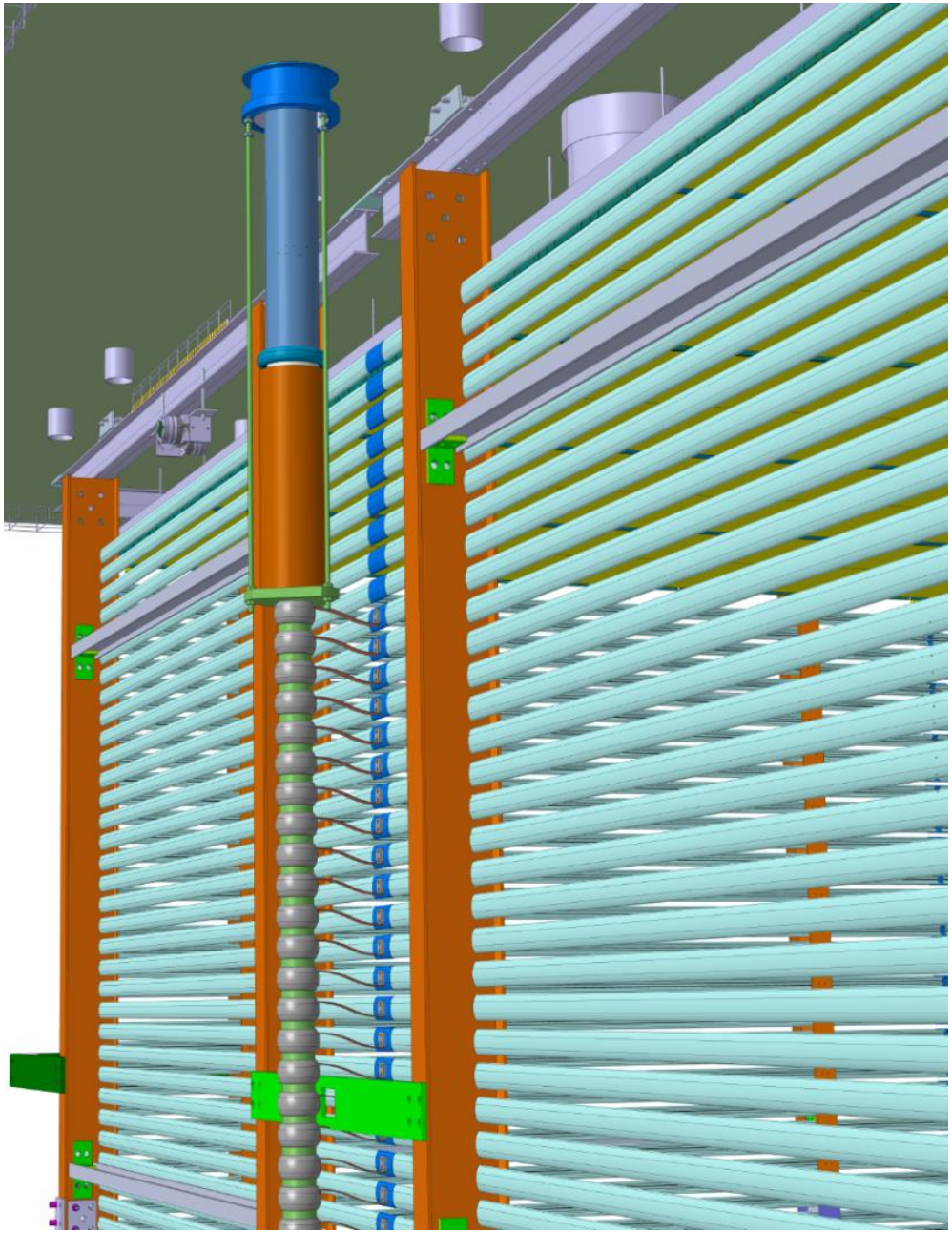
DETECTOR OVERVIEW

- Top FTs
- Internal Cable Trays
- 4 x Purity Monitor
- Internal Cryogenic piping
- Beam Plug
- HVFT degrader



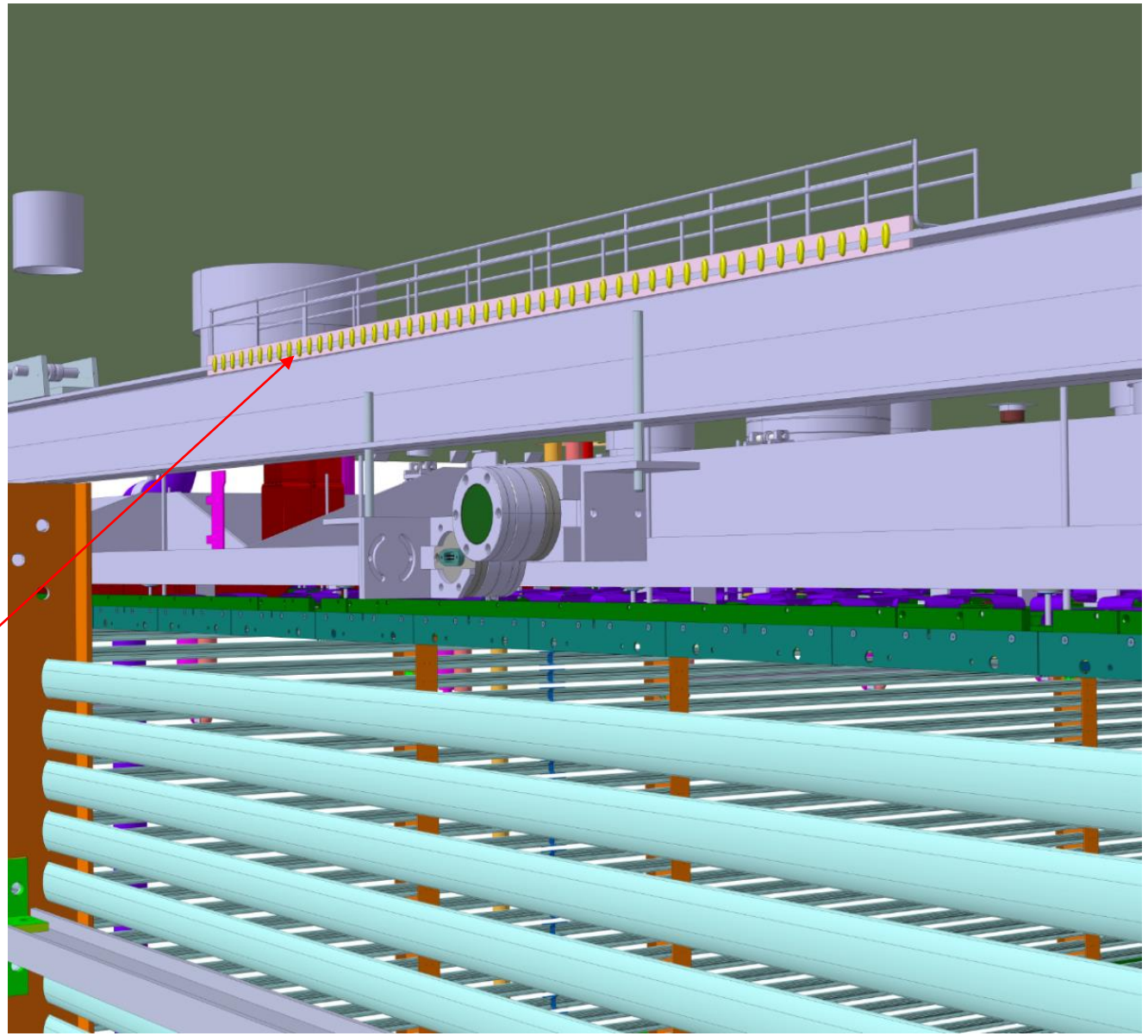
DETECTOR OVERVIEW

- HV Degrader decoupled from the HVFT
- Hung at the HV Crossing Pipe
- Stainless Steel Rings connected to the Field Cage Alu rings
- See L.Molina Bueno Talk - *HV system*



DETECTOR OVERVIEW

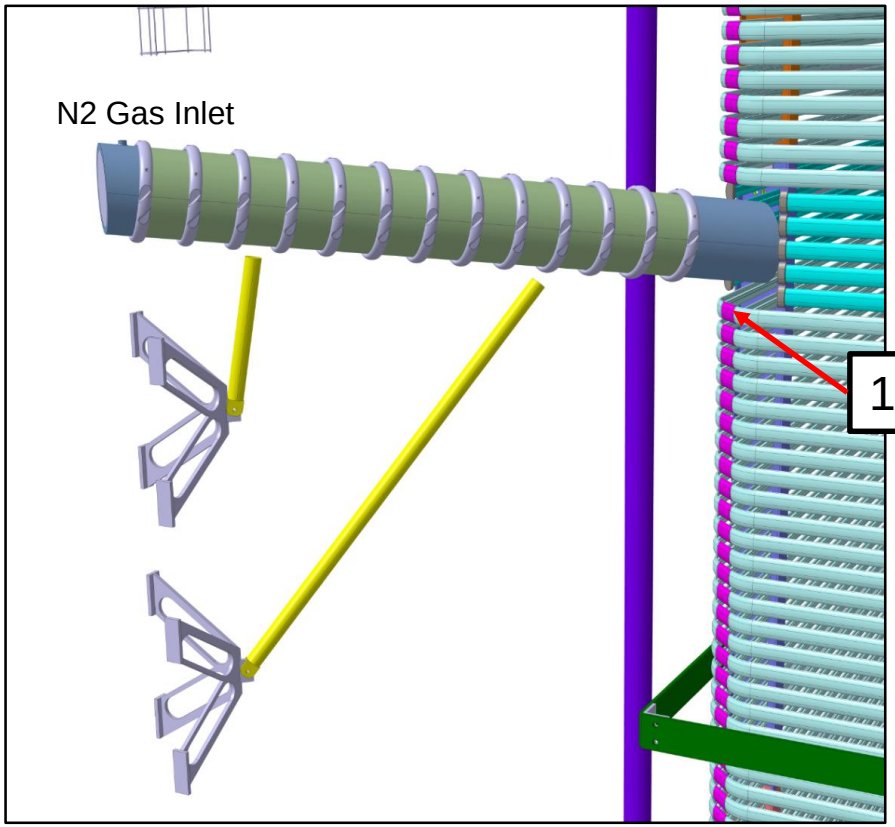
- 4 x Cryocameras
- Same design of the 3x1x1
- Fixed at the Top SS I-Beam of the Field Cage modules
- LEDs

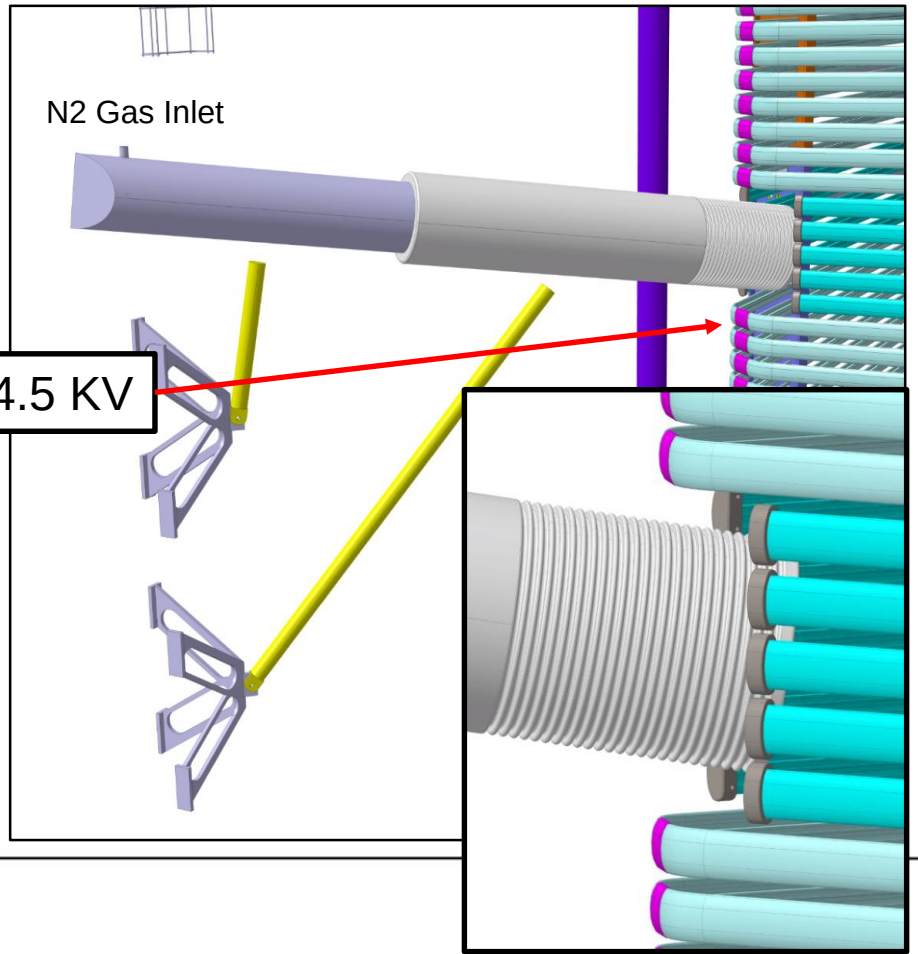


Currently on 2 design for the Beam Plug (lenght ~1.7m)

- Single Phase Design
- Filled with Nitrogen Gas (~1 bar)
- 13 Field Rings
- Fixed at the Cryostat

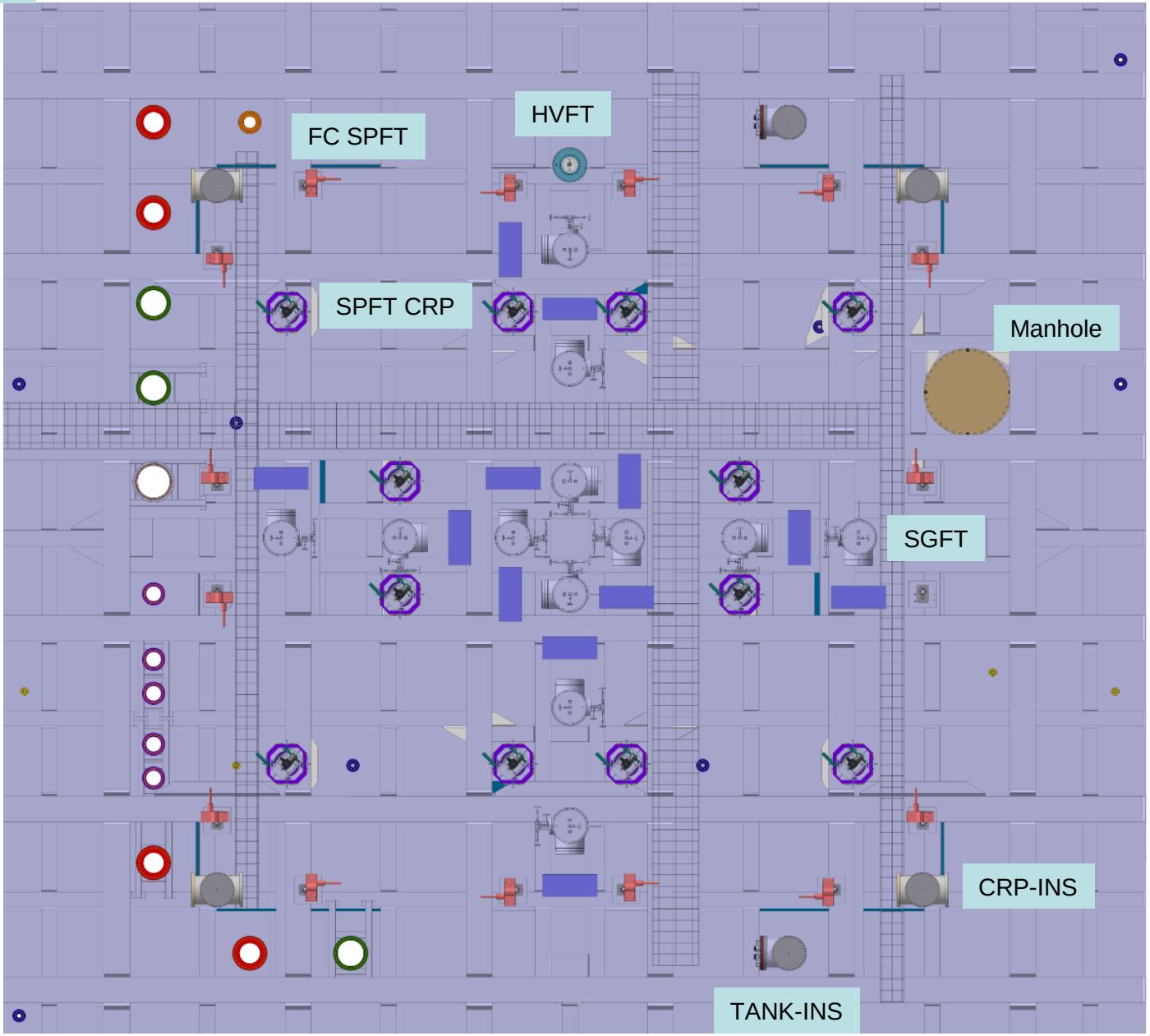
- No Voltage Degrader
- Corrugated Insulator (avoid surface charging up) High Molecular Density PE
- Filled with Nitrogen (~1bar)
- Fixed at the Cryostat



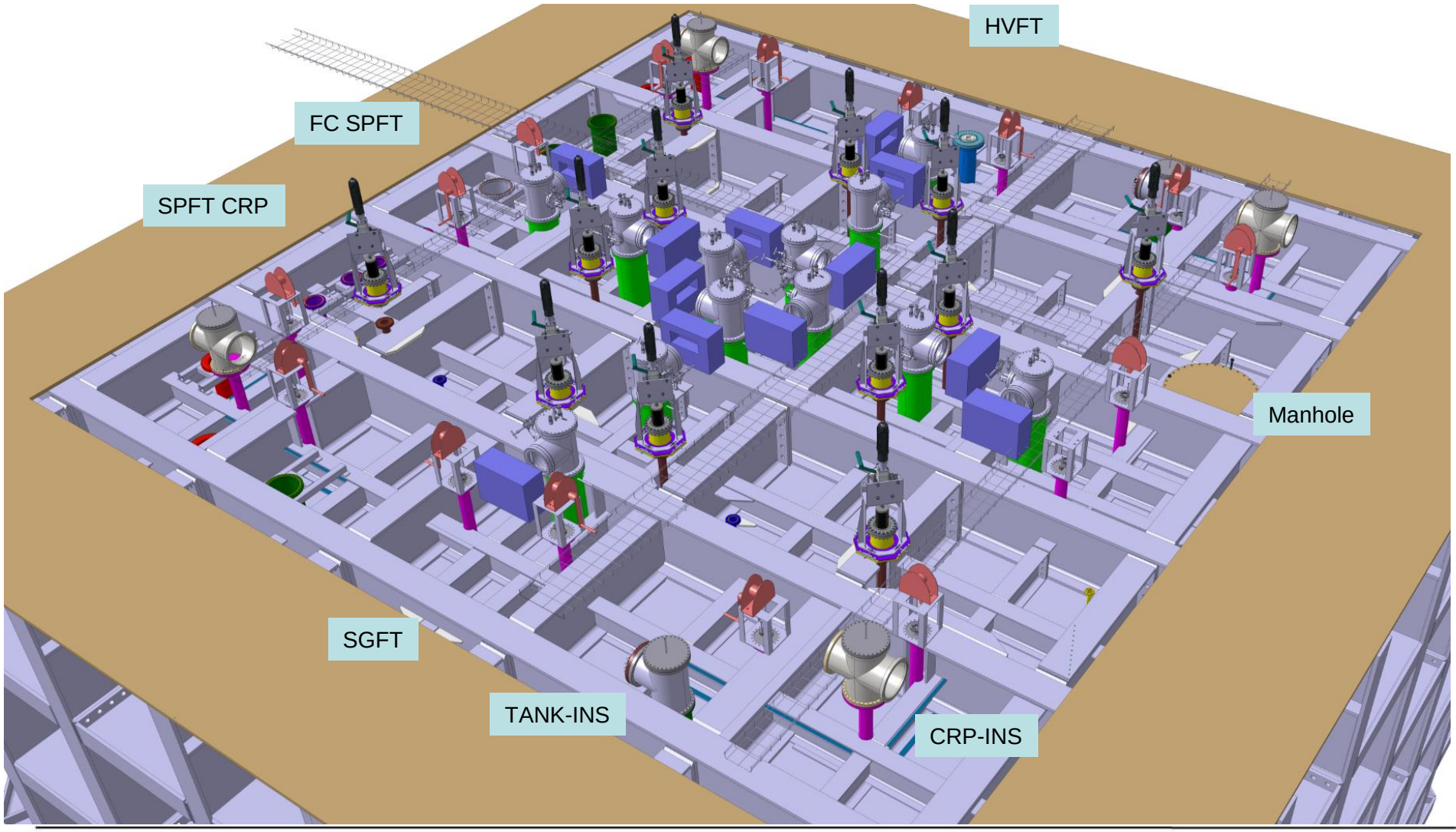


TOP FTs at the Cryostat

- 12 x SGFT + µTCA
- 12 x SPFT CRP
- 16 x FC SPFT
- 4 x CRP-INS
- 2 x TANK-INS
- 1 x HVFT



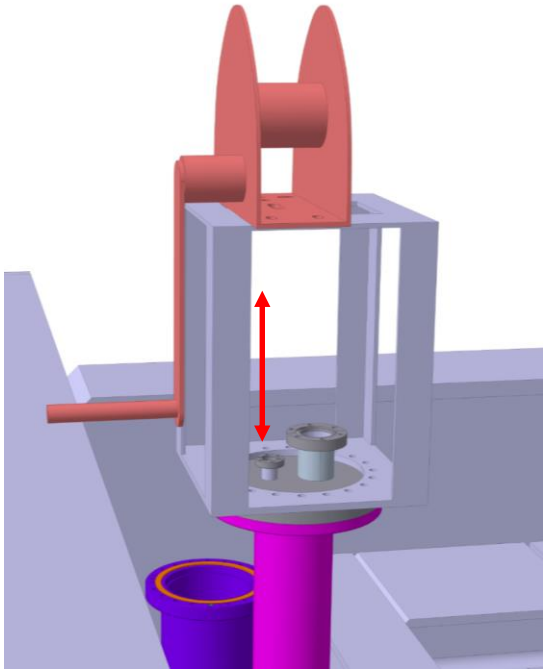
TOP FEEDTHROUGH



TOP FEEDTHROUGH

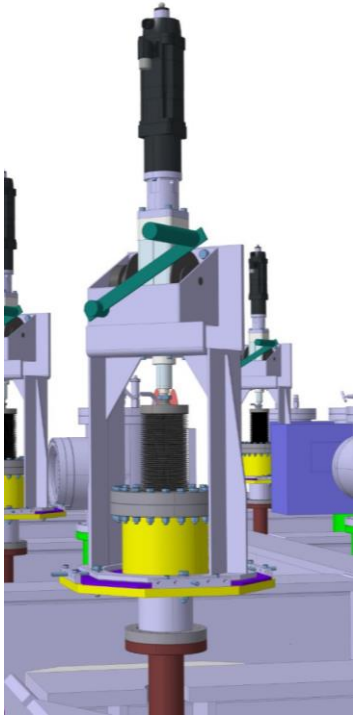
12 x FC SPFT

- CF160 with 2 Small Chimney
- CF40 Field Cage Lifting
- CF16 Field Cage fixing



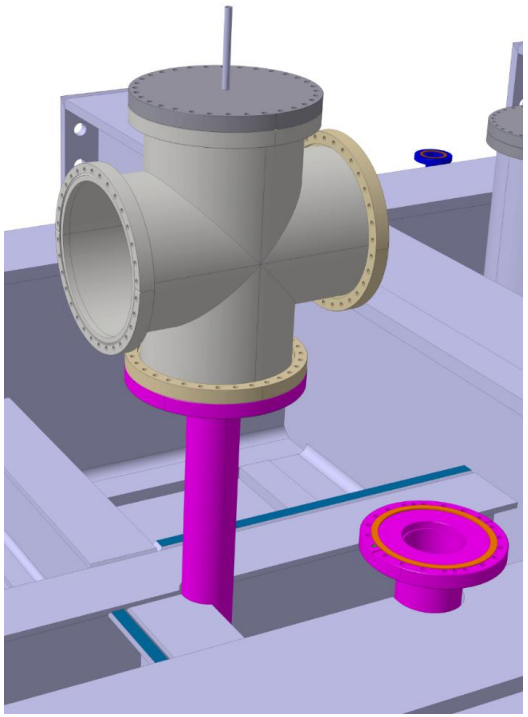
12 x SPFT CRP

- CF100 at the Crossing pipe
- Motor for vertical regulation
- X-Y Manual Regulation
- Manual Lifter for CRP Installation



4 x CRP-INS

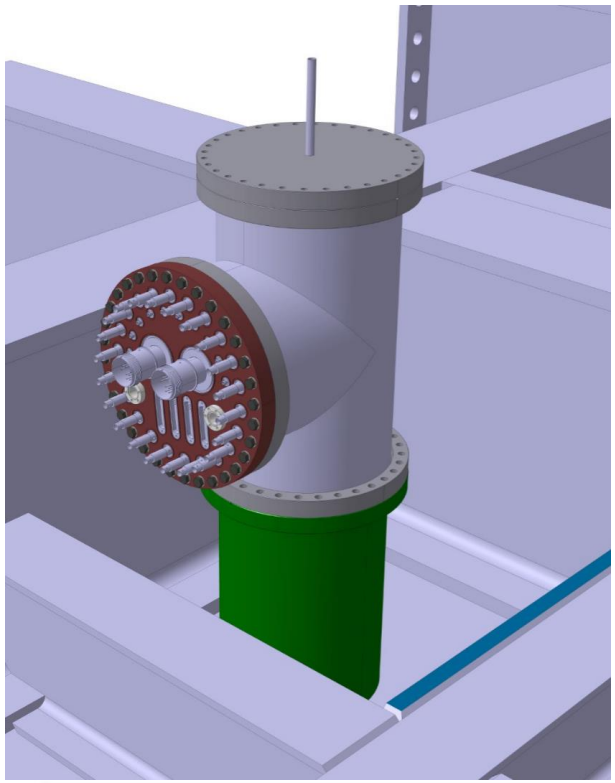
- CF250 Cross
- Flange with connectors not yet integrated



TOP FEEDTHROUGH

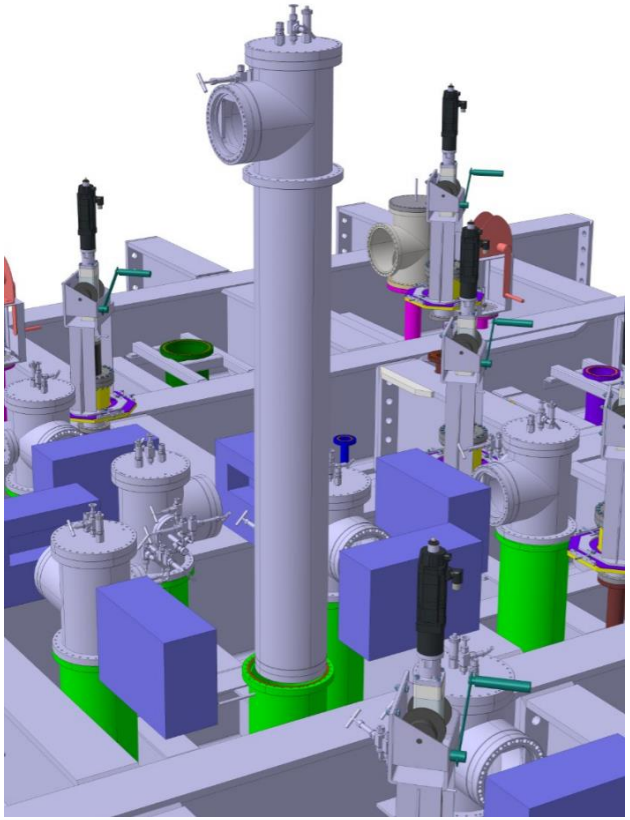
2 x TANK-INS

- CF250 Tee
- CF250 with connectors (design BERN group)



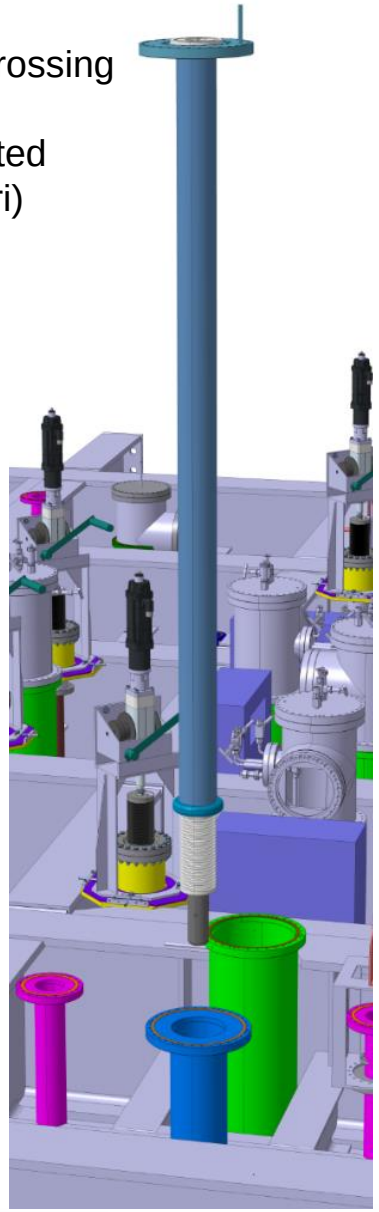
12 x SGFT

- CF250 Tee
- (design completed F. Sergiampietri)

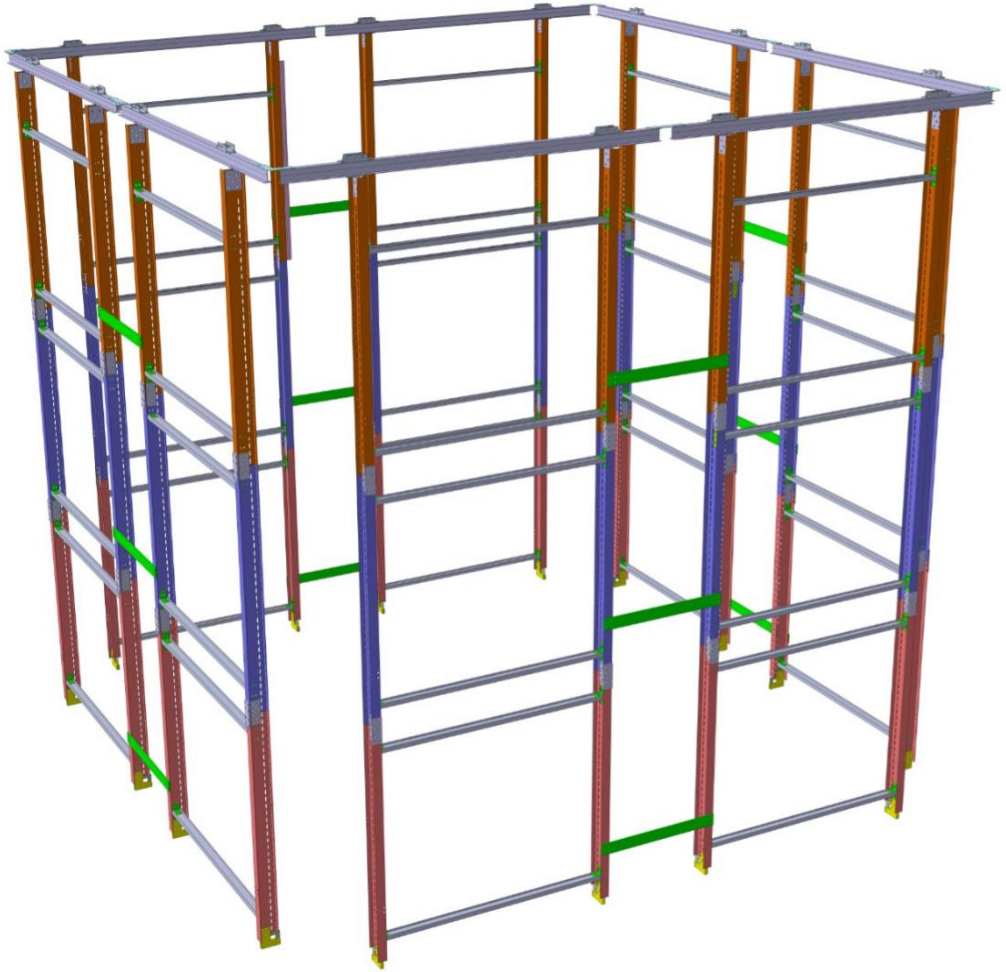


1 x HVFT

- CF250 at the Crossing Pipes
- (design completed F. Sergiampietri)



FIELD CAGE



- FRP skeleton consists in 8 identical modules
- Each modules has 3 sub-modules
- Hanging system is Stainless Steel

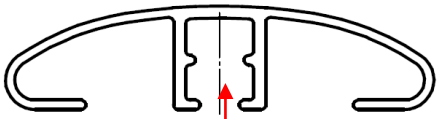
6-inch Main I-Beam

Horizontal Reinforcement 3 inch I-Beam

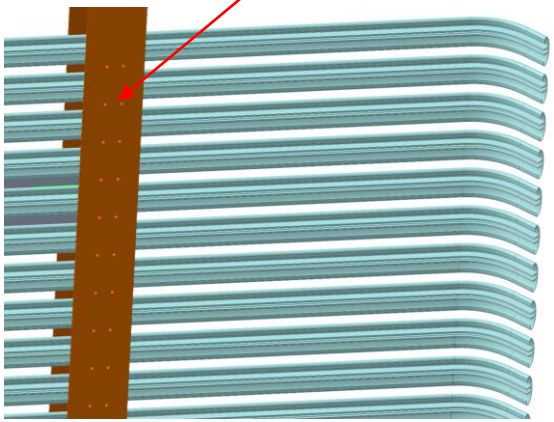
FIELD CAGE

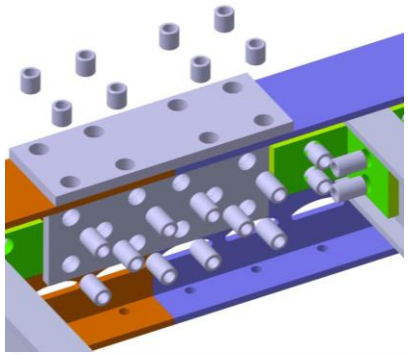
SS Hanging System

- HV divider Column

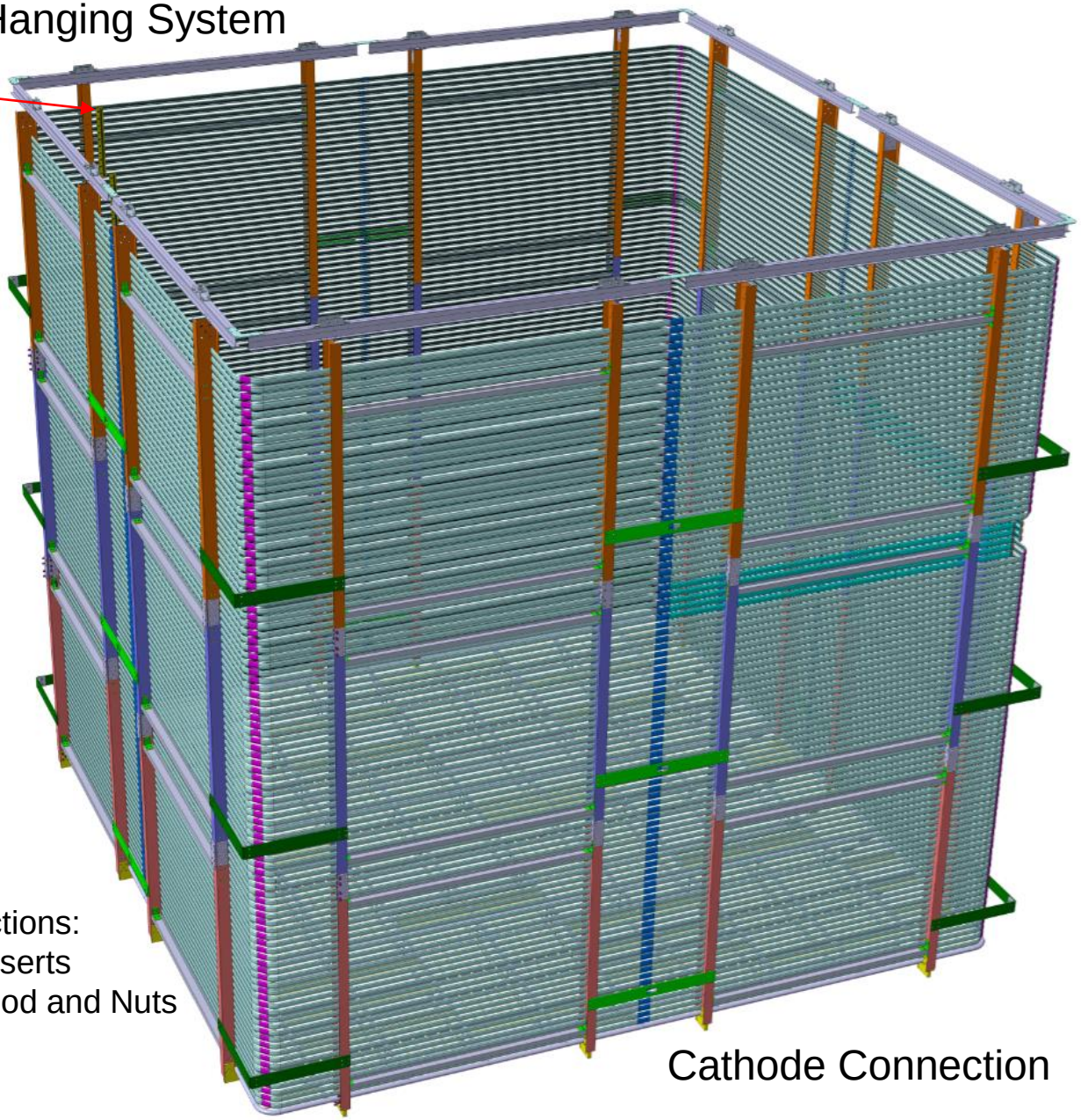


- M4 Nuts inserted in the profile
- Alu Profiles fixed at corner side with M4 screws (reduce shrinking)





All connections:
- G10 inserts
- FRP Rod and Nuts

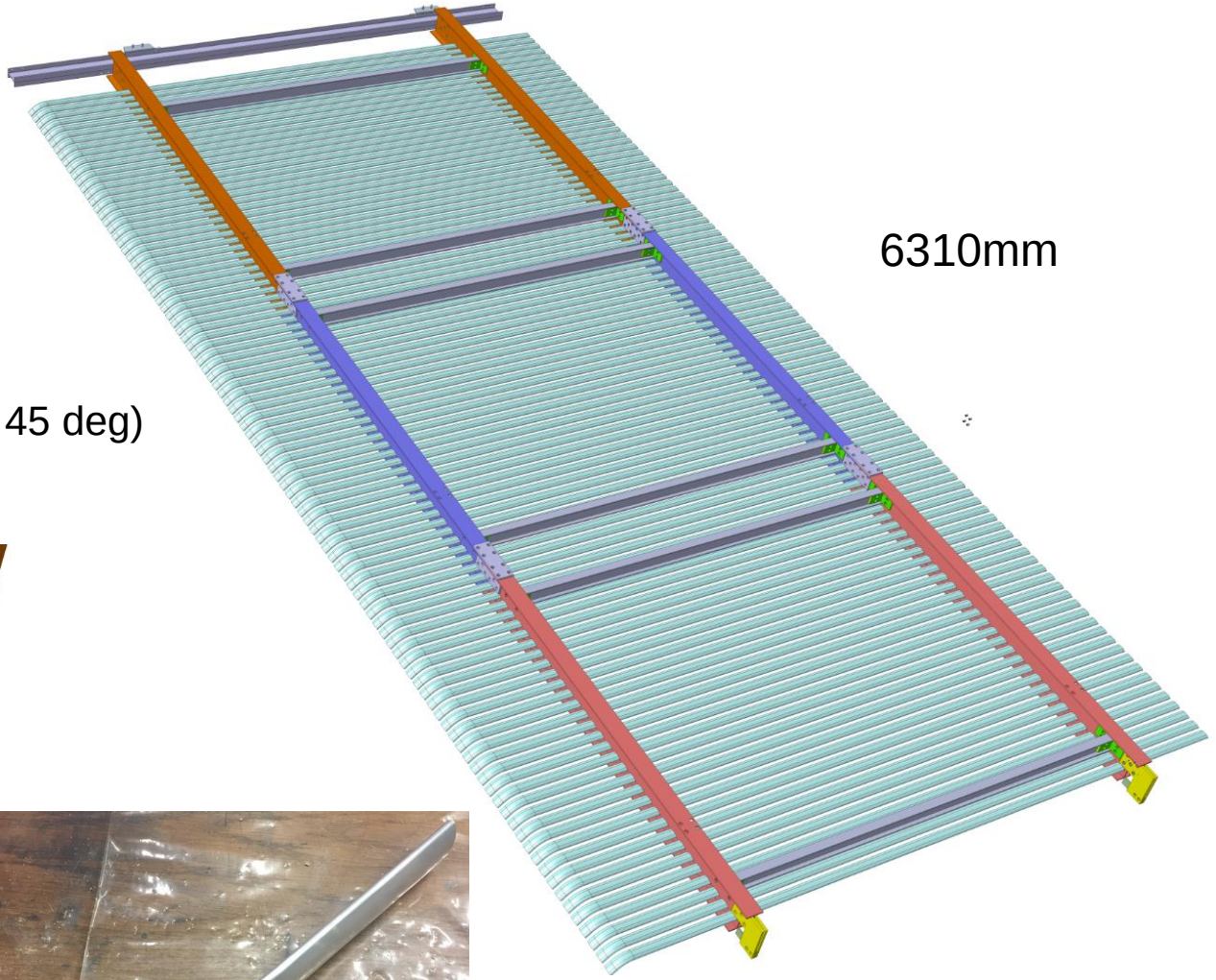


Cathode Connection

FIELD CAGE

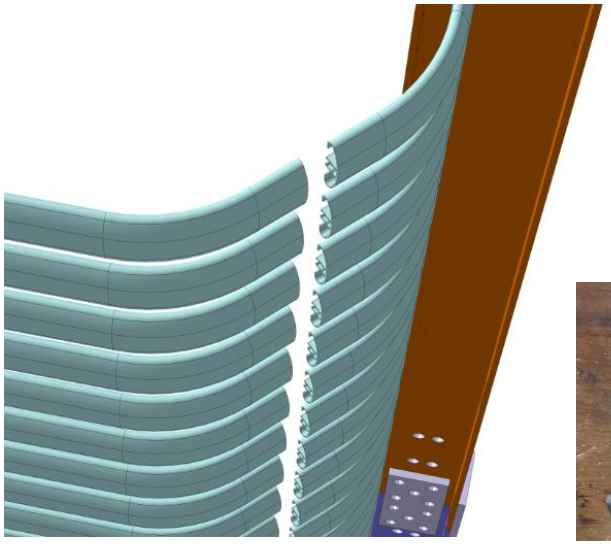
3010mm

SS Hanging System

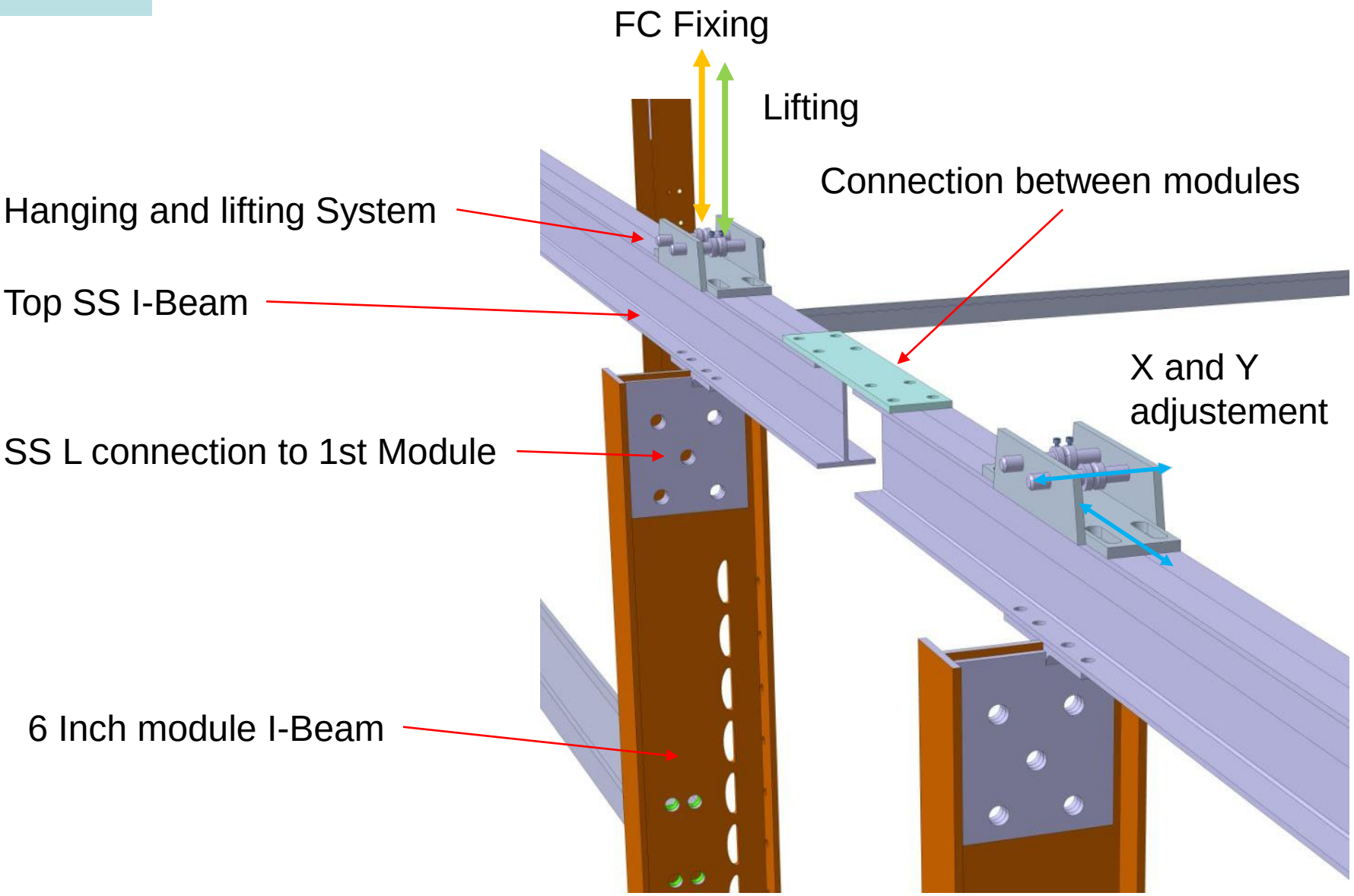


6310mm

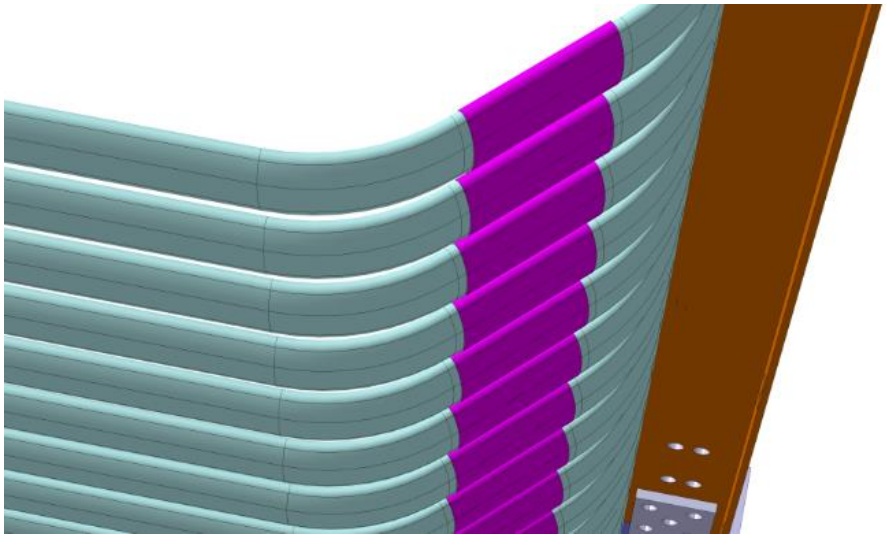
98 ALU Profile (One end bended 45 deg)

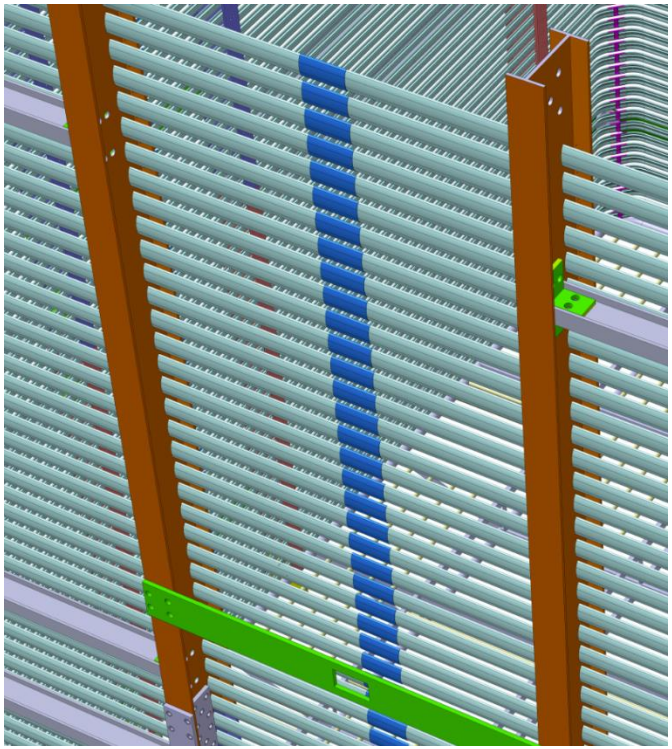


Cathode Connection

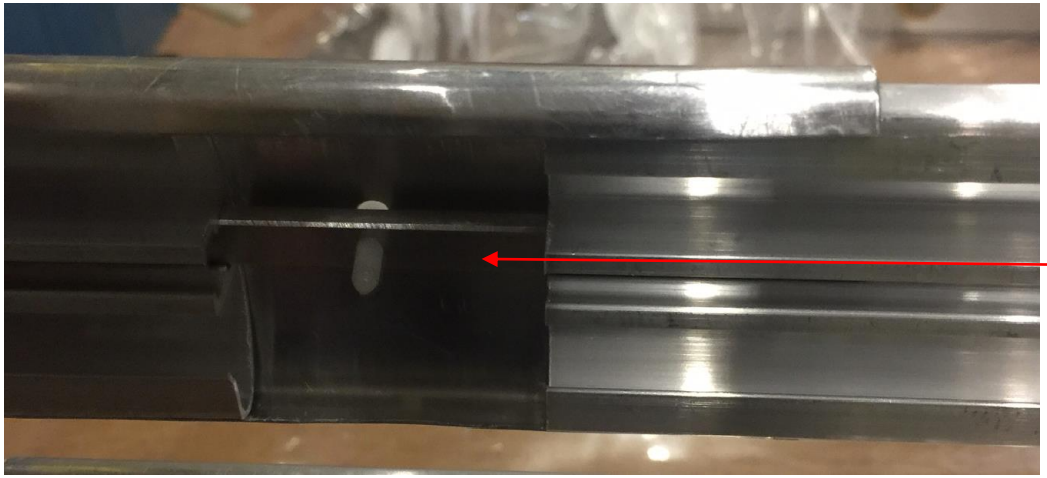

FC Fixing
Lifting
Connection between modules
Hanging and lifting System
Top SS I-Beam
X and Y
adjustement
SS L connection to 1st Module
6 Inch module I-Beam

FIELD CAGE





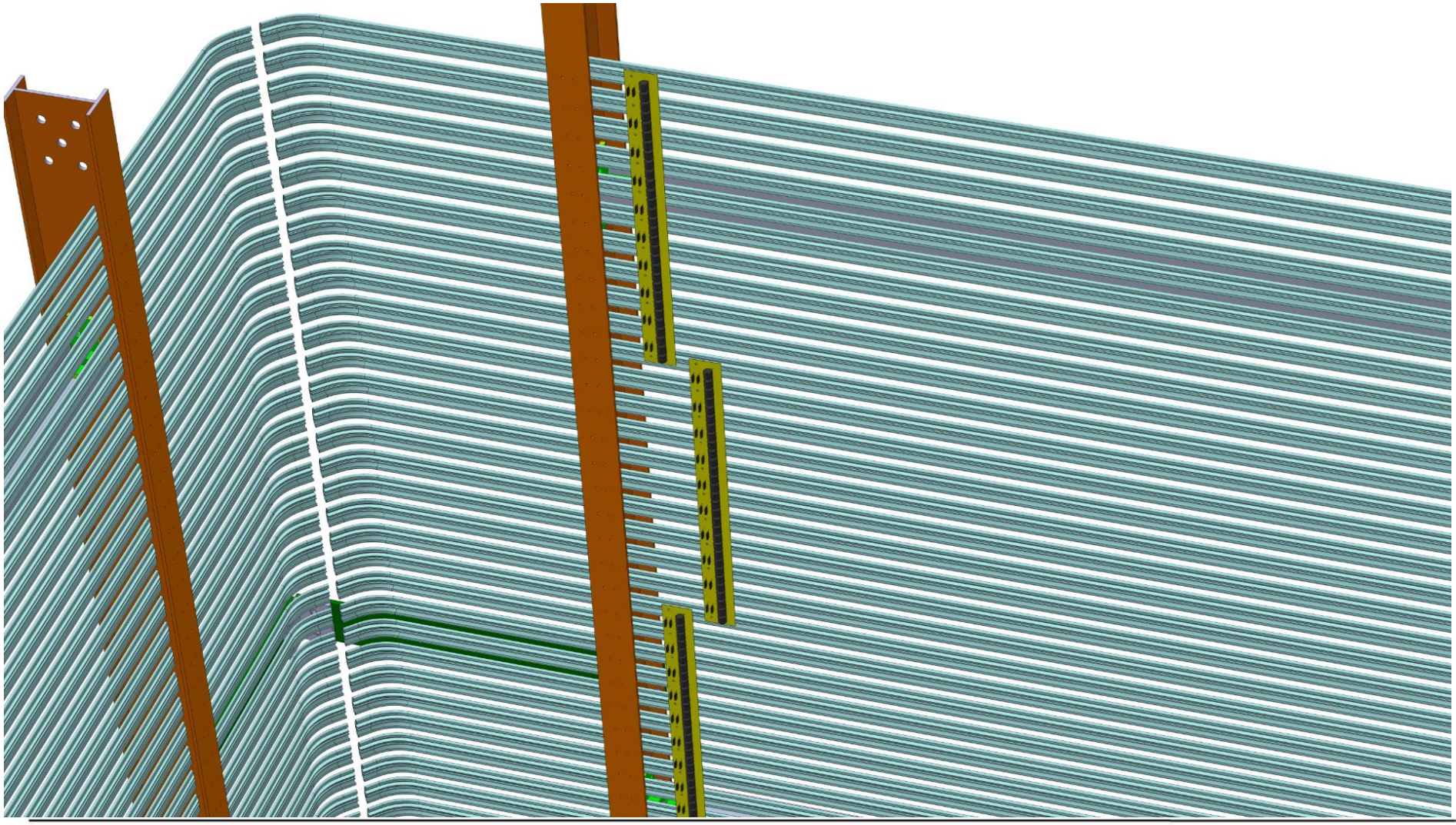
All the clips are straights



Centered with a bar in the profile and the clip is fixed to the bar with a screw → mechanical and electrical connection ensured.

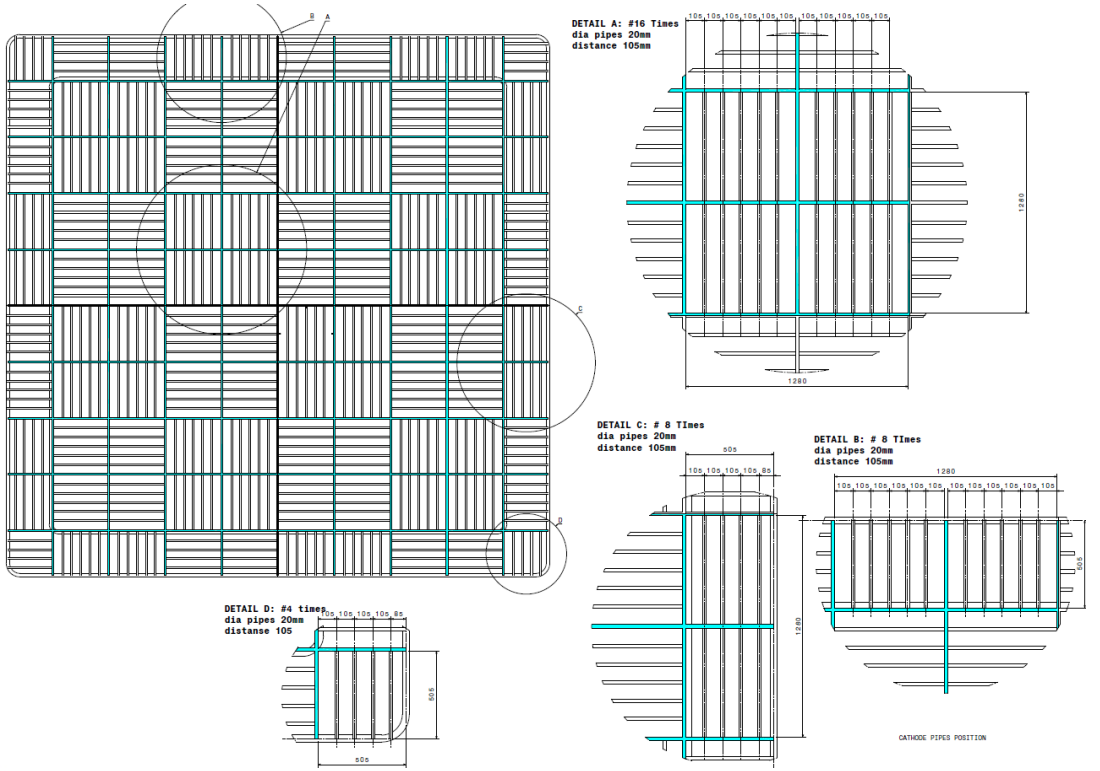
FIELD CAGE

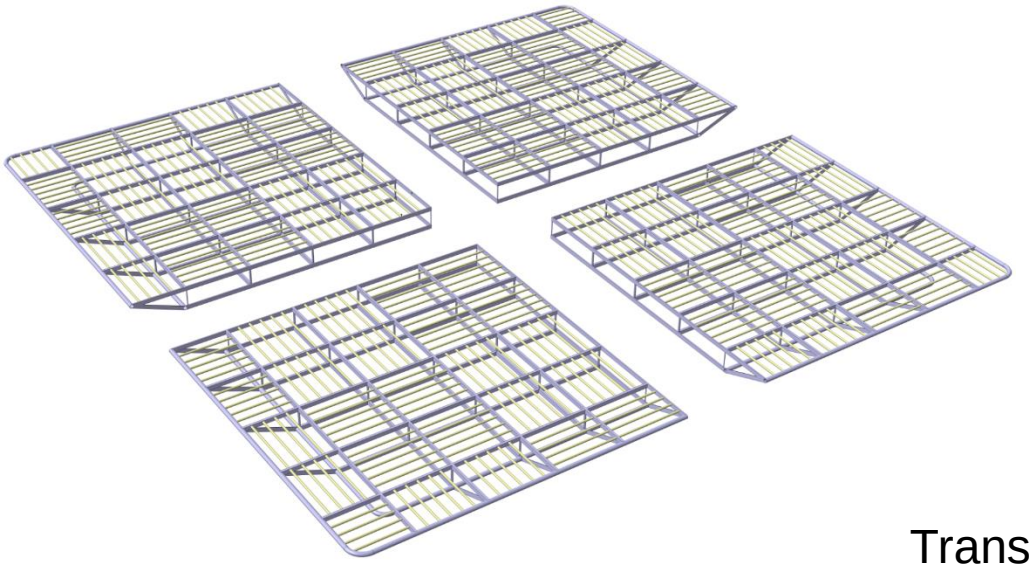
- PCB Board HV divider connect 11 profiles
- Connection overlapp each PCB board
- Connected with M4 Screw and Nut to the Alu Profile (same fastening system at the FRP I-Beam)
- See A. Chatterjee Talk - *field cage and electrical components*



CATHODE

- 4 identical Modules bolted together
- 20 mm dia SS pipes with 105mm pitch
- Crossed pipes orientation
- Material: Stainless Steel
- External Round pipe Dia 40mm
- Internal rectangular Pipe 20x40x2 with round edges

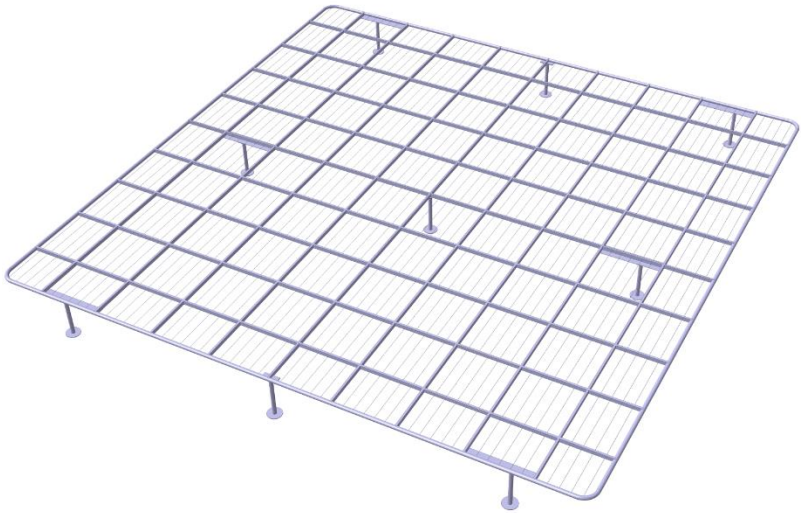




Transportation BOX Size: 3.2m x 3.2m x 0.5m

GROUNDGRID

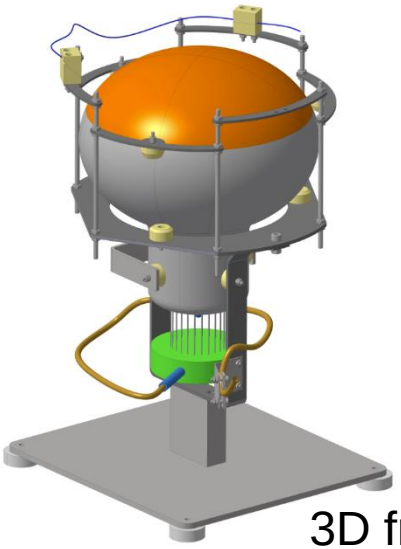
- 4 identical Modules bolted together
- 6m long SS wires
- Material: Stainless Steel
- External Round pipe Dia 40mm
- Internal rectangular Pipe 20x40x2 with round edges
- 9 feet placed on the flat part of the Membrane

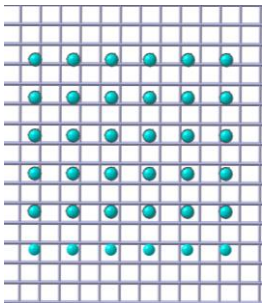


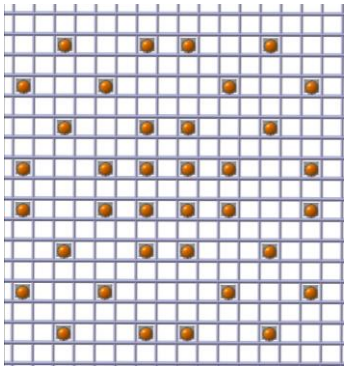
Transportation BOX Size: 3.2m x 3.2m x 0.2m

PMTs

- PMT fixed on a stainless steel plate placed on the center of the flat membrane through 4 feet
- Currently 2 Layout for the PMTs
- See T. LUX Talk - *PMT system design and cold tests*







3D from CIEMAT

Thank you...