Cabling Options for CE

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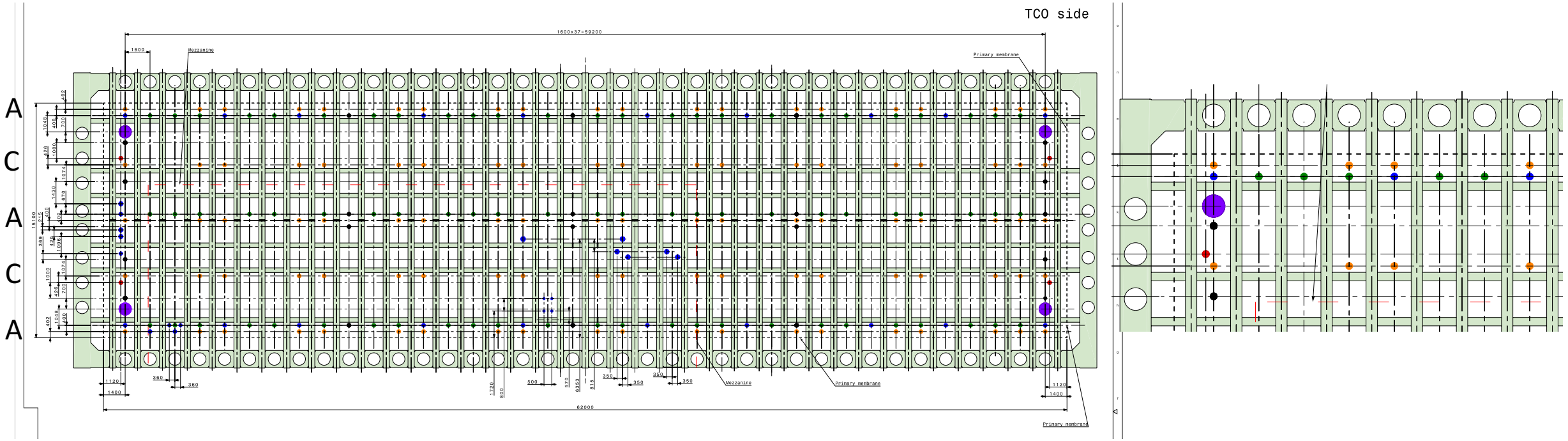
Overview – location of penetrations



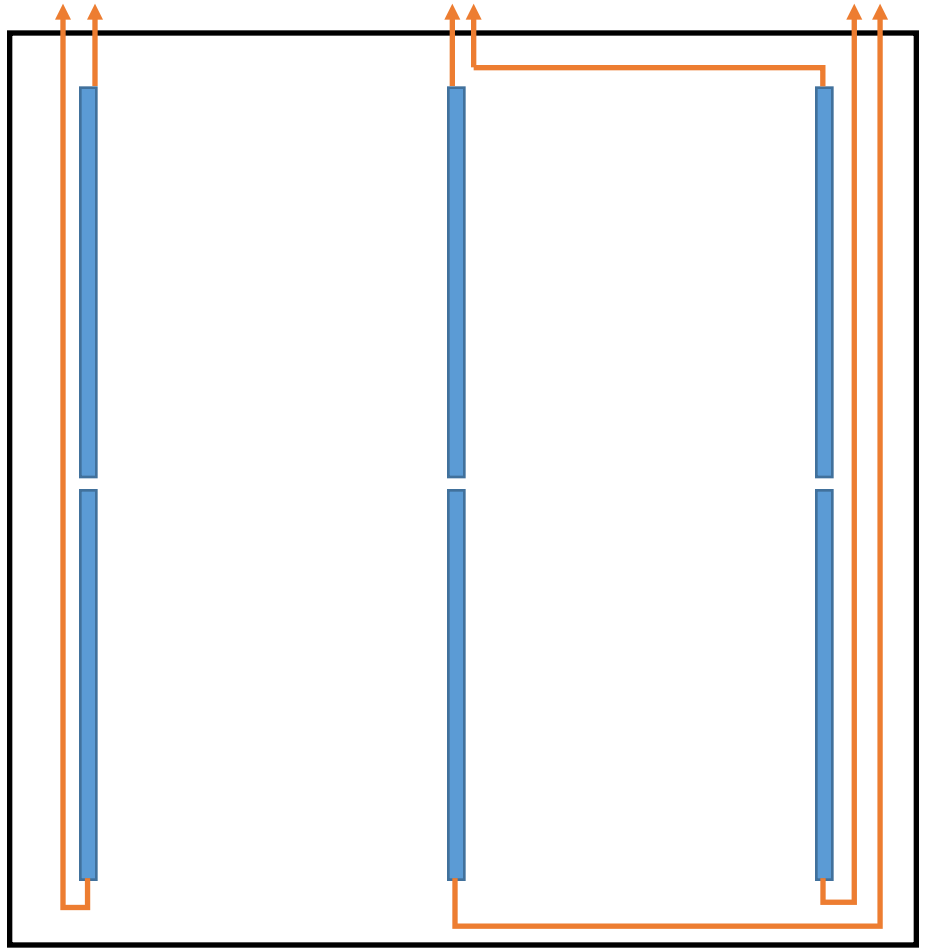
Green = TPC & PD cables; Orange = Detector Support System; Blue = Cryo
DSS penetrations are directly above APAs. Note offsets & irregular spacing of cable penetrations

Cables for the bottom APAs

- IF CE power and signal cables can be routed through the APA frames
  - This will minimize cable lengths.
  - Cables will be routed to cryostat penetrations “above” each pair of APA frames.
  - The time needed needed in the toaster may be problematic.
- I believe it is crucial that we preserve the option to route cables to the lower APAs up the sides of the cryostat.
  - I have been concerned that this would require hanging cable ways from small bolts in the top of the cryostat (see corner detail in backup).
  - ~~After a conversation with Bill Miller, I believe this can be done by adding a beam to the support structure that is parallel to the long sides of the cryostat (outside the outer APAs) and using this beam to support vertical cable ways.~~
  - After a conversation with Vic Guarino, I believe this can be done…

How long would cables need to be to go up the sides?

- Only the cables to the bottom center APA need to be much longer (~7m) than if they are routed through the APA frames.



Action Items

- We should preserve the option to route lower APA cables up the side of the cryostat
  - Design the necessary support beams and cable raceways.
  - Design the cable trays (at the top of the cryostat) necessary to route central APA cables to one side ~~& vice versa~~.
  - Design the cable trays required at the bottom of the cryostat.
  - These do not (now) need to be detailed designs, only proof that this cabling option is viable.

Implications of this option

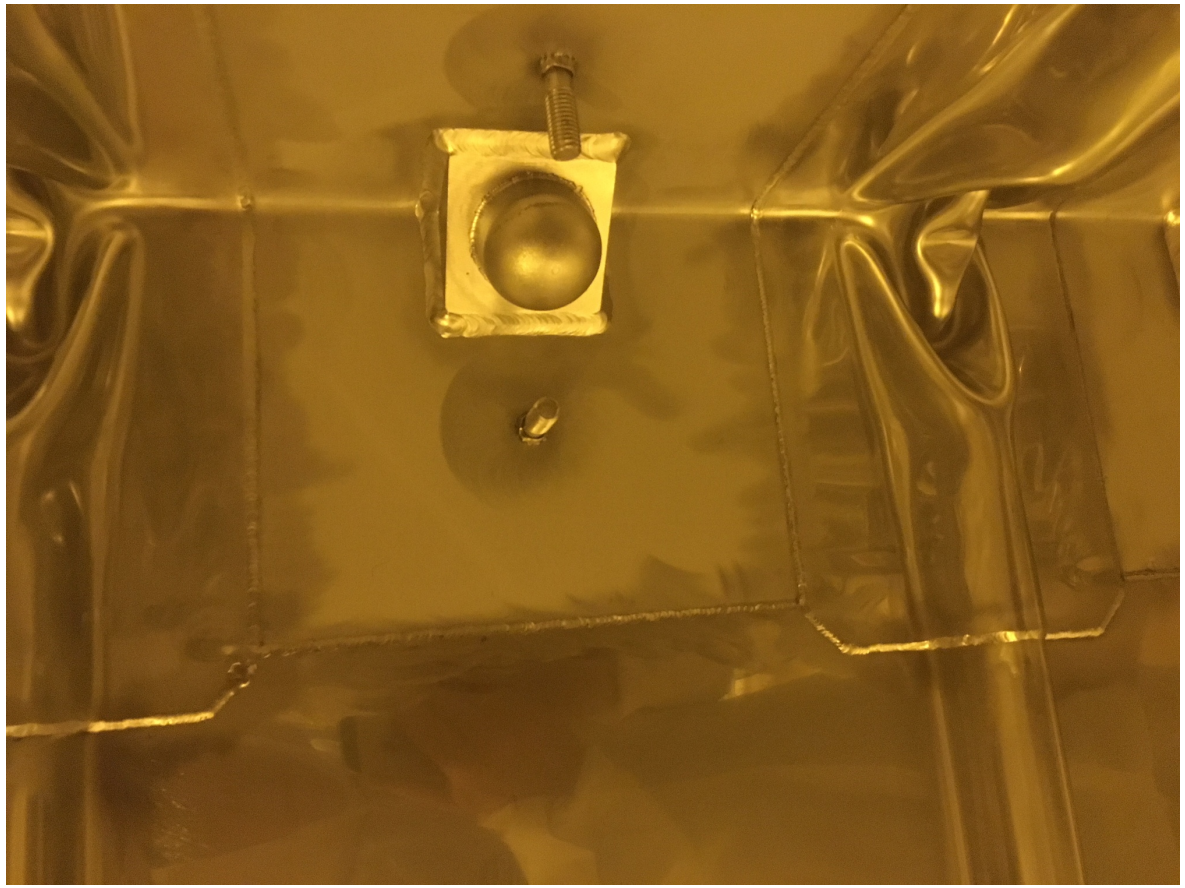
- Longer cables (but still shorter than the 30m assumed in the COLDATA spec)
- Cables for lower APAs would need to be connected inside the cryostat
  - This would reduce the time required in the toaster
  - But would necessitate working at the bottom of the cryostat with very little clearance
    - Might require preinstalling the cold boxes with short cables and putting junction boxes or in-line connectors on the bottom of the cryostat.

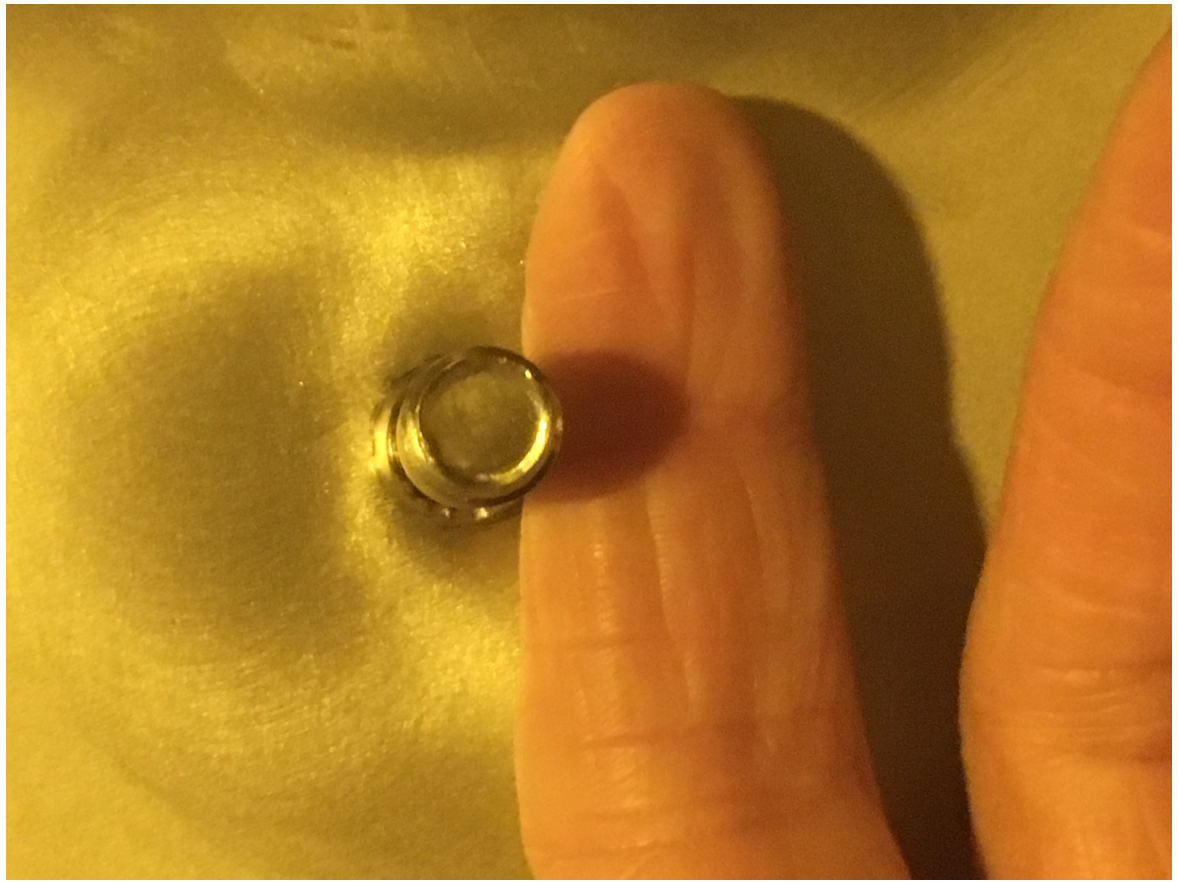
Backup

How long would cables need to be to go up the sides? (this slide was show at the CERN meeting)

- If all cables are routed to penetrations above the APA pair
  - Lower level “outer” APA cables would need to be 2-4m longer than if they can be routed through the frames (21-23m instead of 19m?)
  - Lower level “central” APA cables would need to be 12-14m longer (31-33m?)
- If central APA cables are routed to outer penetrations
  - Outer APA cables on one side (top and bottom or bottom only) would be routed to the central penetrations.
    - Upper level APA cables for 2/3 of APAs could need to be 6-7m longer (12-13m?)
    - 1/3 of lower level APA cables would be as above (21-23m?)
    - 2/3 of lower level APA cables would need to be 6-8m longer than if they went through the APA frames (25-28m?)

Cryostat corner bolts





(This is actually a picture of side bolts rotated 90 degrees)