

# Laser system coverage

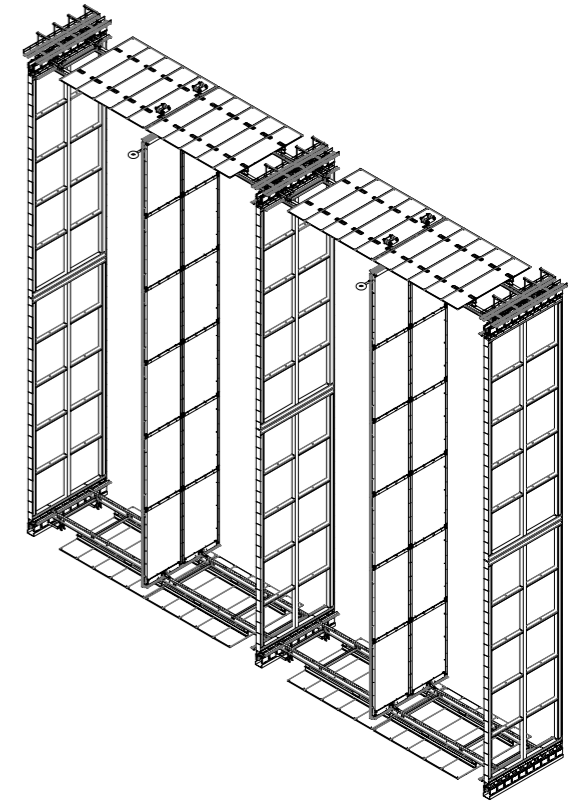
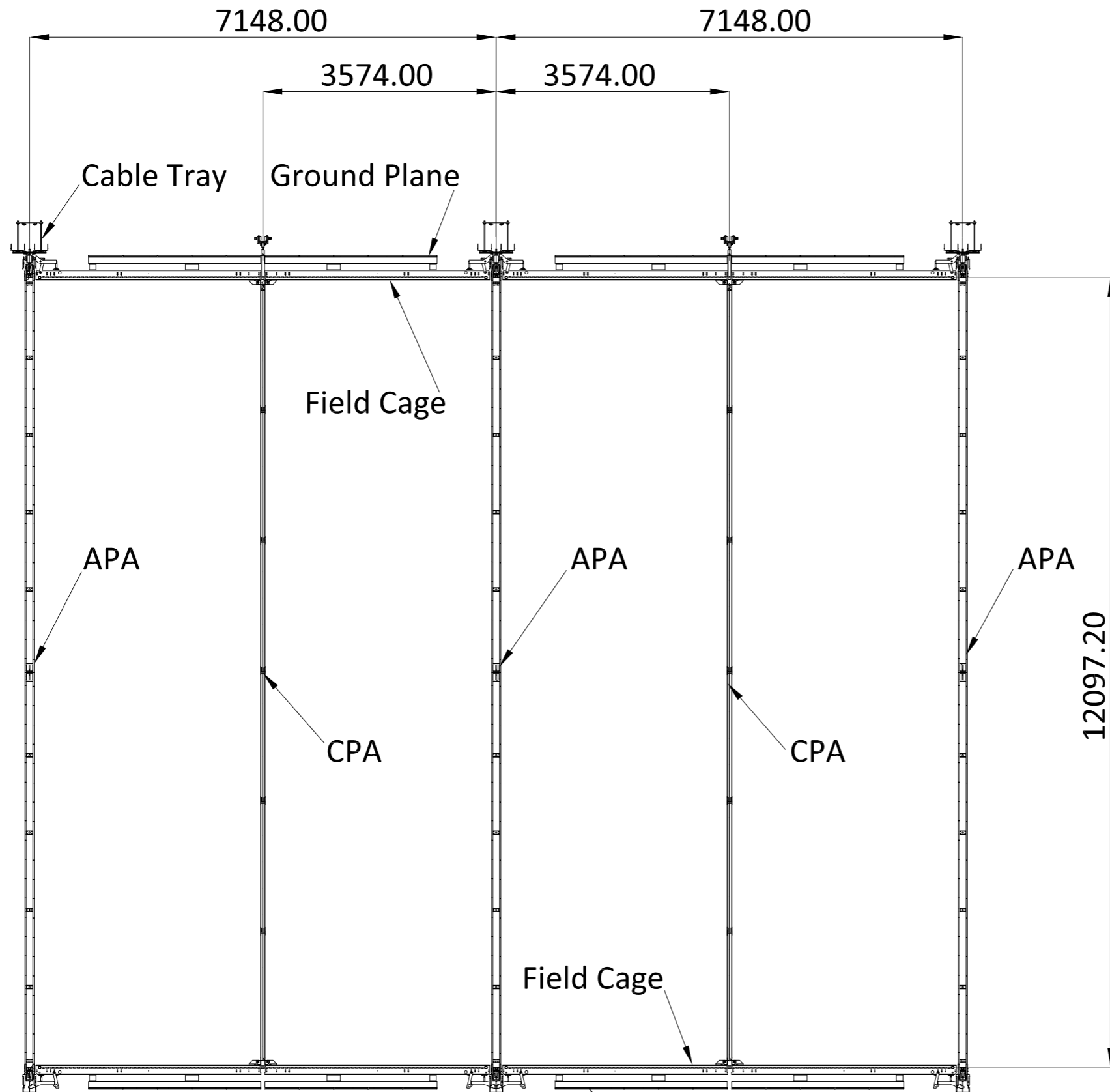
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Calibration Consortium Meeting  
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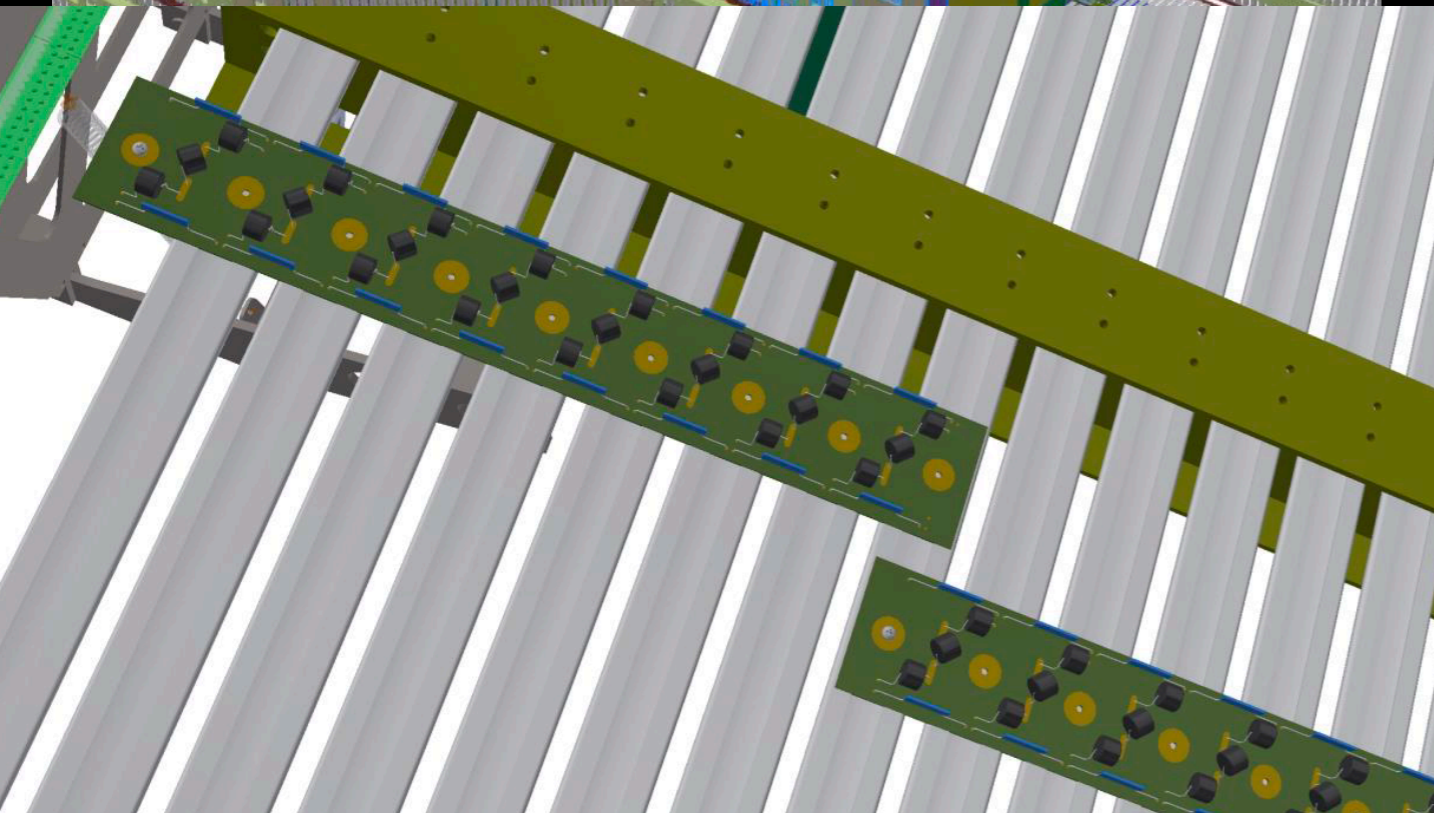
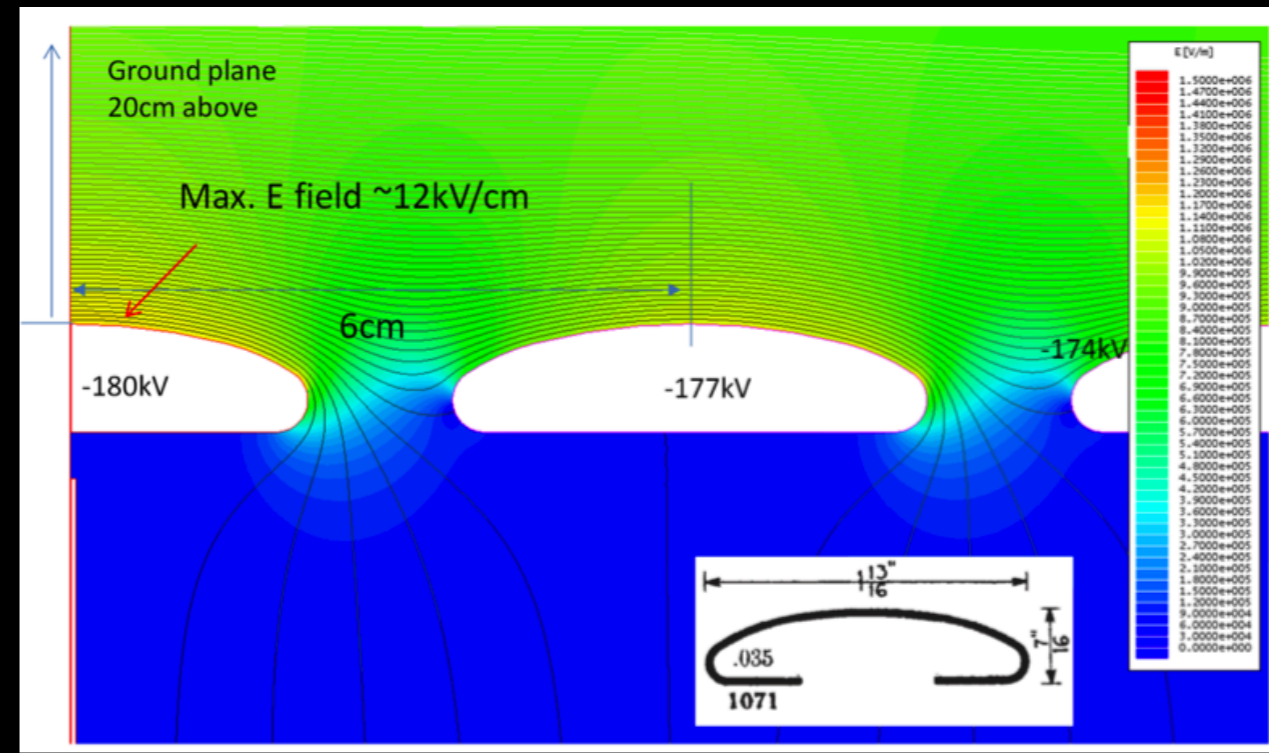
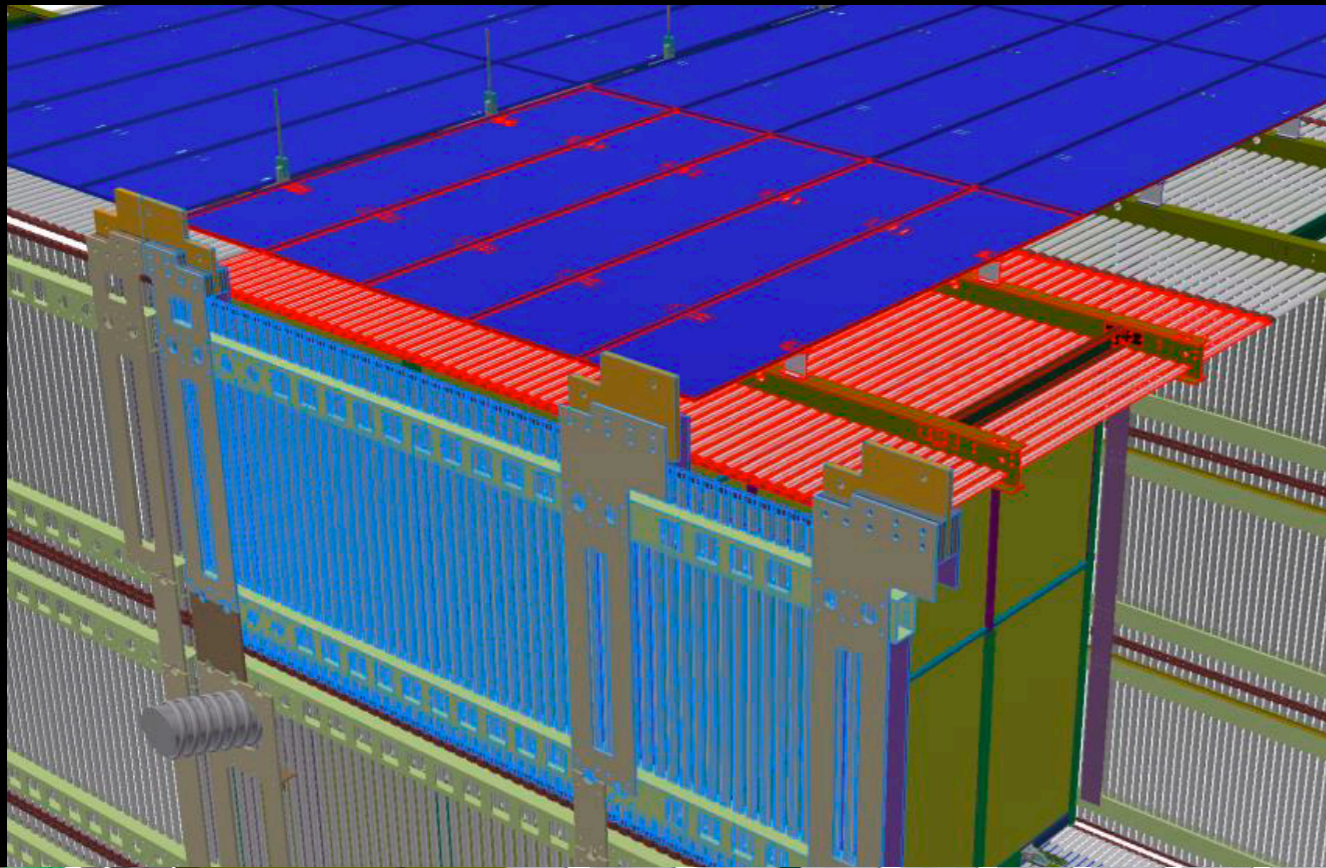
# Laser system coverage

- How well the laser systems covers the DUNE detector depends strongly on whether we penetrate or not the field cage
- End-walls. Feedthroughs ~40 cm from FC
  - likely hard to penetrate.
  - microBOONE -style
- Top FC roof. Feedthroughs on top of FC, ~40 cm from APA's
  - Should be better to penetrate, SBND-style
  - How bad is the coverage if we don't enter?

# View of DUNE from end-wall

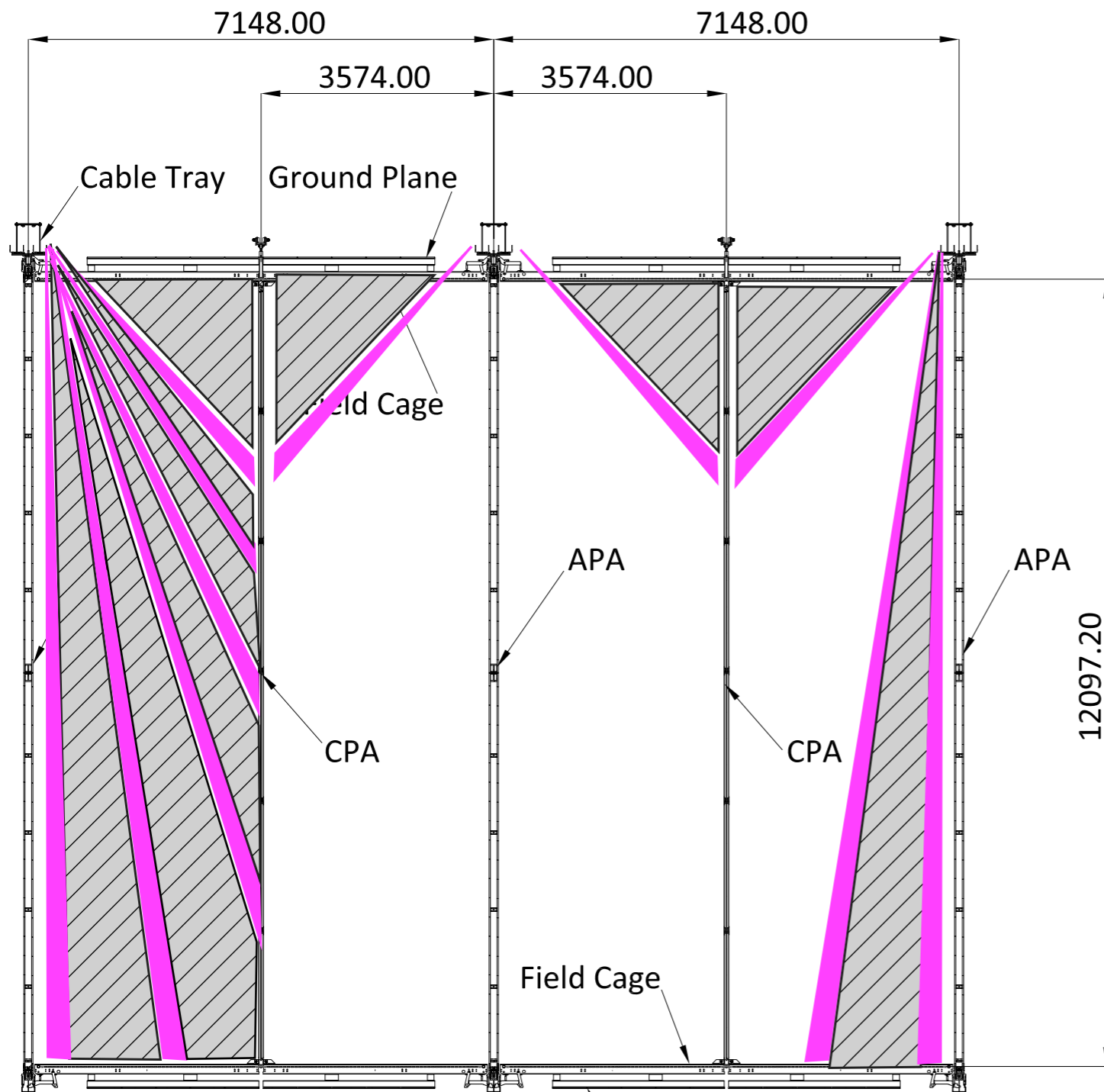


# Field cage constraints



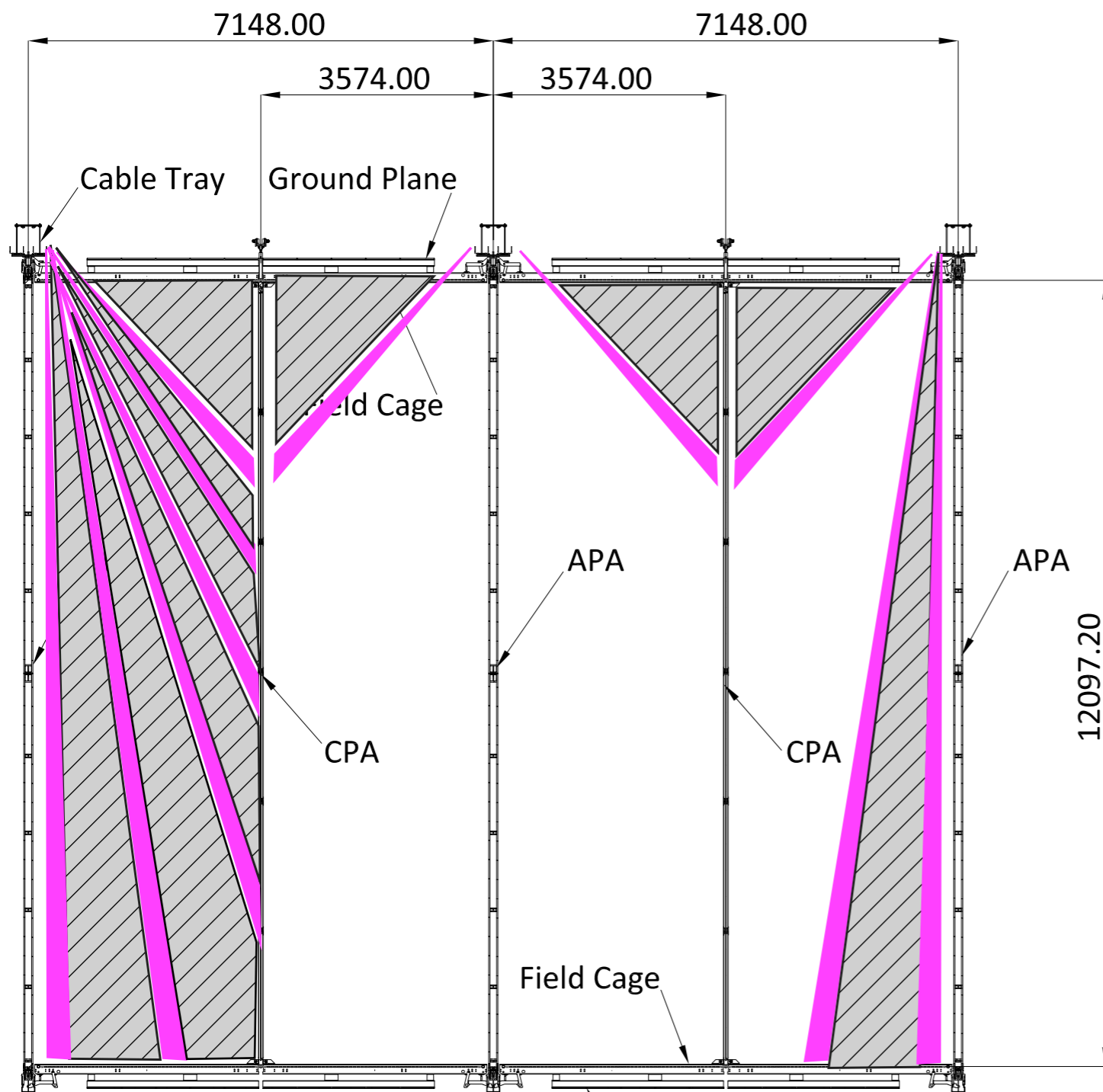
- Period 60 mm
  - Wide profiles: 46mm
  - Narrow gaps: 14 mm
  - max angle ~ 45 deg
- Ground plane
  - so can't be too far up

# Coverage from outside



- Assuming laser starts 40 cm above FC
- **Magenta:** laser passing through 1.4 cm gaps
- **Grey:** shadows caused by 4.6 cm profiles
- For simplicity, assume that coverage in this projection holds at other z planes

# % of FC area covered



- TOP: only about 40 cm (10 %)
  - Most of top FC goes unseen
- Beam width at bottom
  - single slot through gaps  $\sim 43$  cm  
( $= 1.4/40 \cdot 1240$ )
  - single profile shadow  $\sim 143$  cm  
( $= 4.6/40 \cdot 1240$ )
  - $43/(143+43) \sim 23\%$

# Coverage from outside top

- Not counting voxel, only area of of the FC covered, very trivial calculation
  - 10% on top
  - 23% on bottom
- Not compensated by other top lasers
  - same dark areas
- Could be partly compensated by end-wall lasers
  - but those are also not covering too much
  - and only at the end-wall, no overlap in middle