CRP cabling

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VD Top Electronics CDR Review

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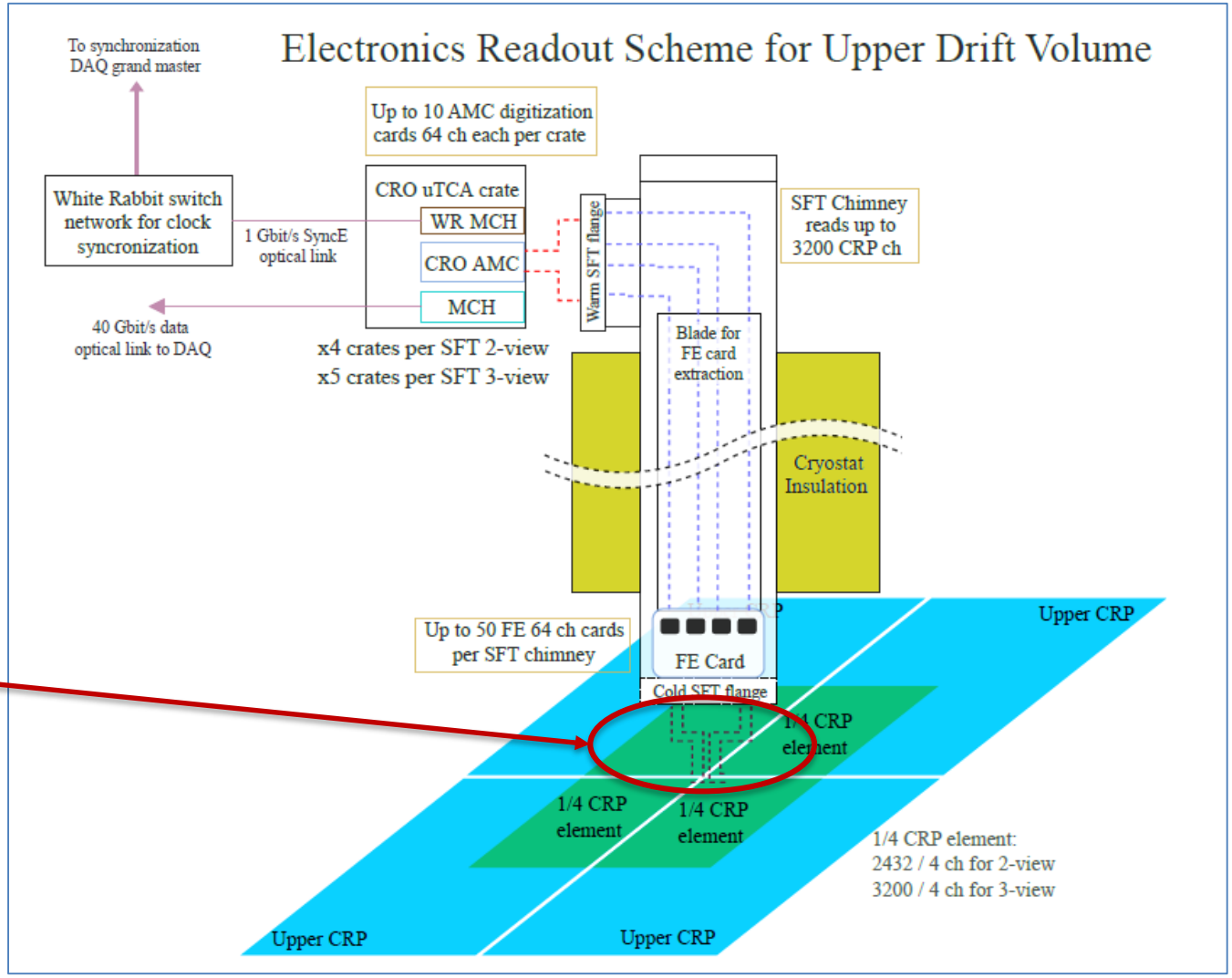
CRP interface to Top electronics:

Interface between the electronics and the CRPs is defined at the level of the cold flanges

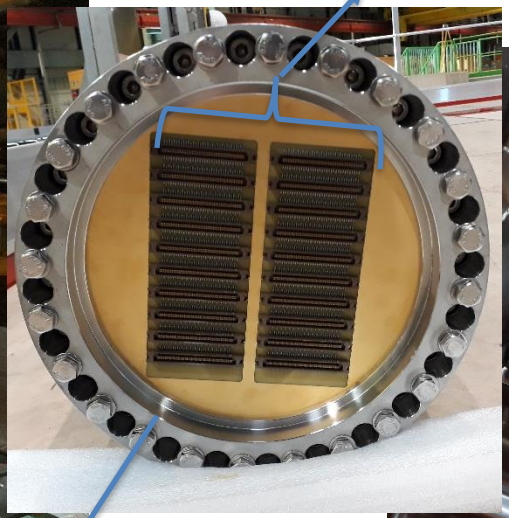


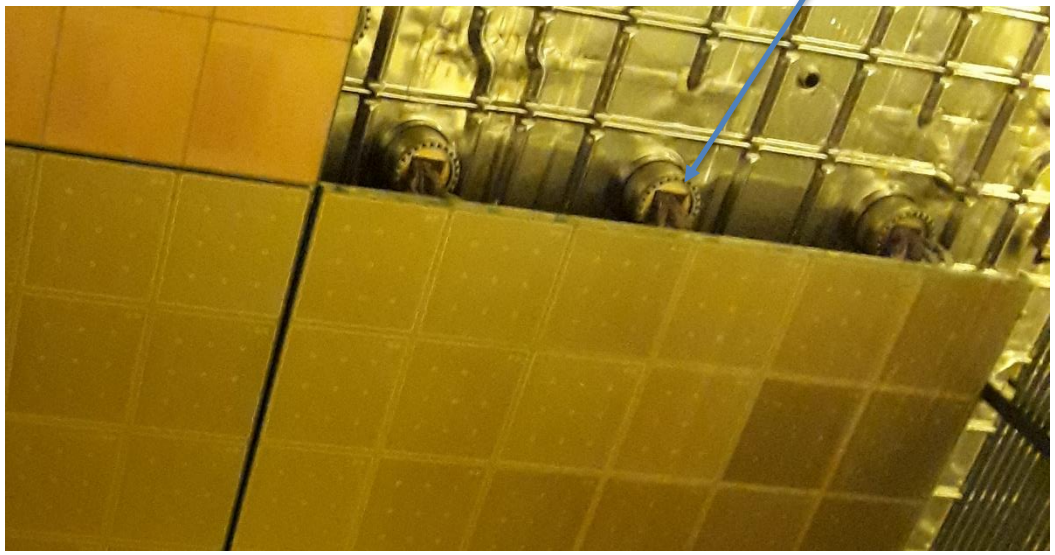
Part in the scope of the CRP consortium

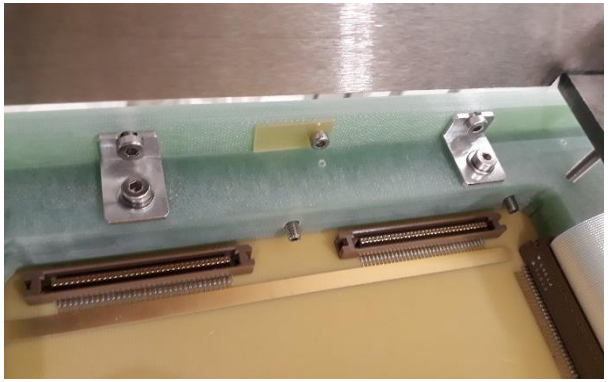
Cabling: flat cables going from top drift CRP anodes to the cold flanges of the chimneys as for DP CRPs.

ProtoDUNE-DP: real life example

20 connectors => 640 channels

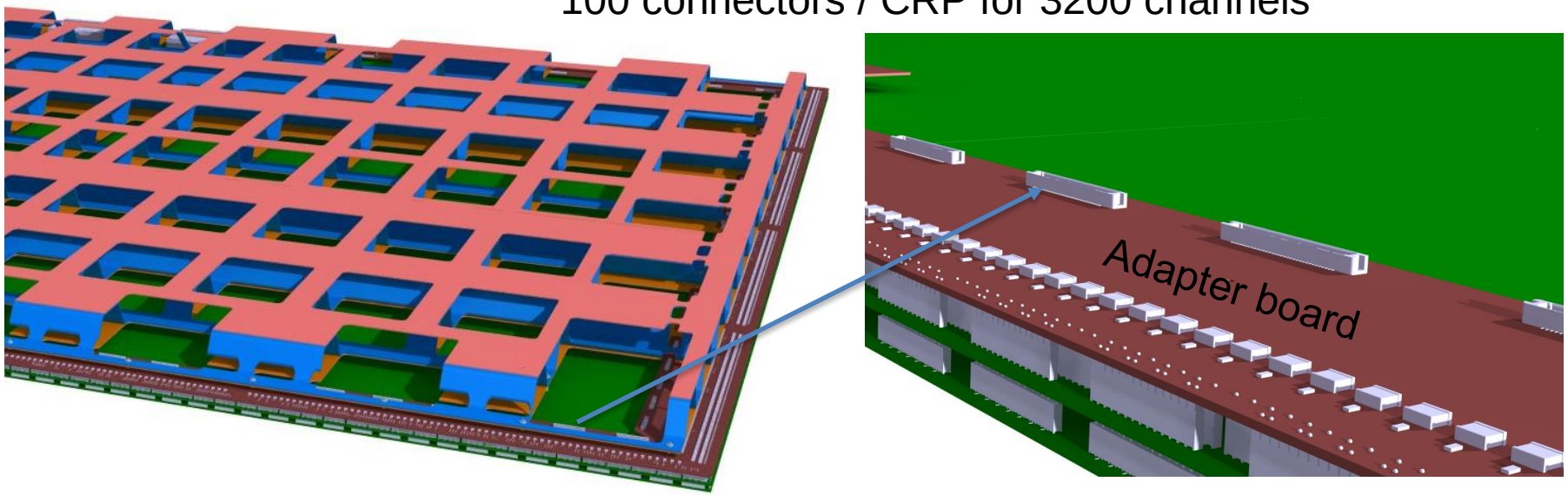




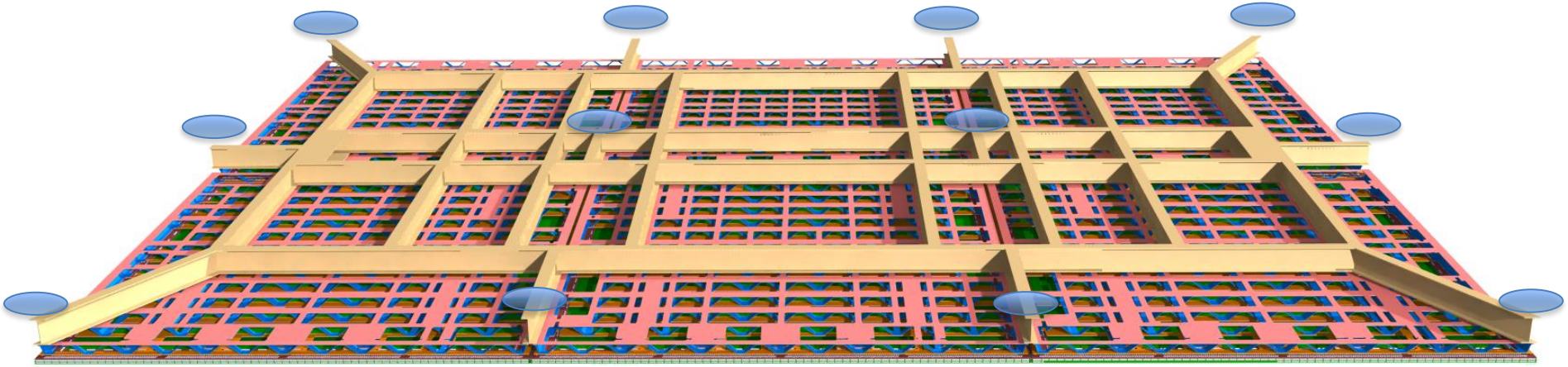


VD CRP top topology:

100 connectors / CRP for 3200 channels



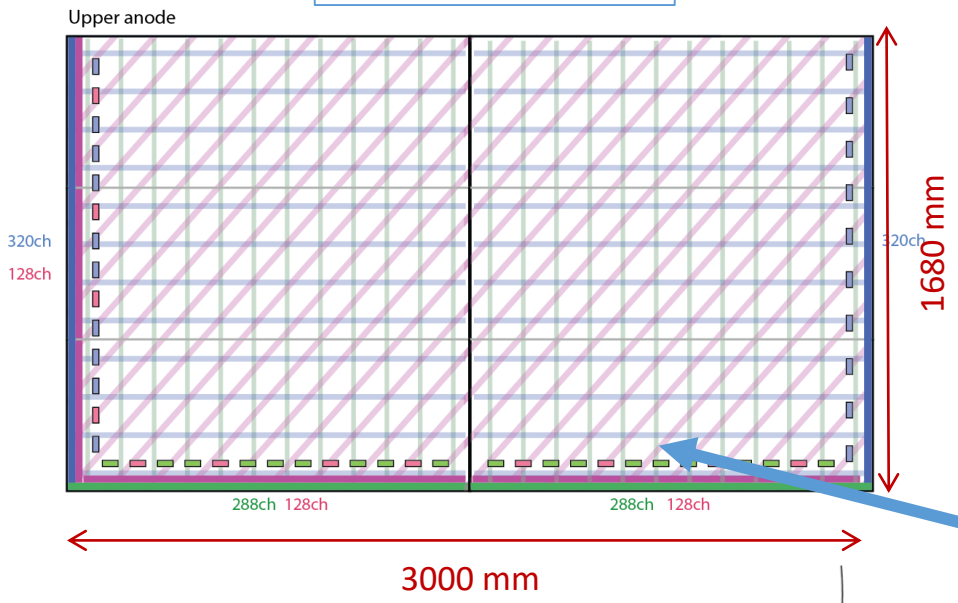
6 CRPs attached to a single Superstructure => 12 chimneys involved and 600 cables



CRP connector layout:

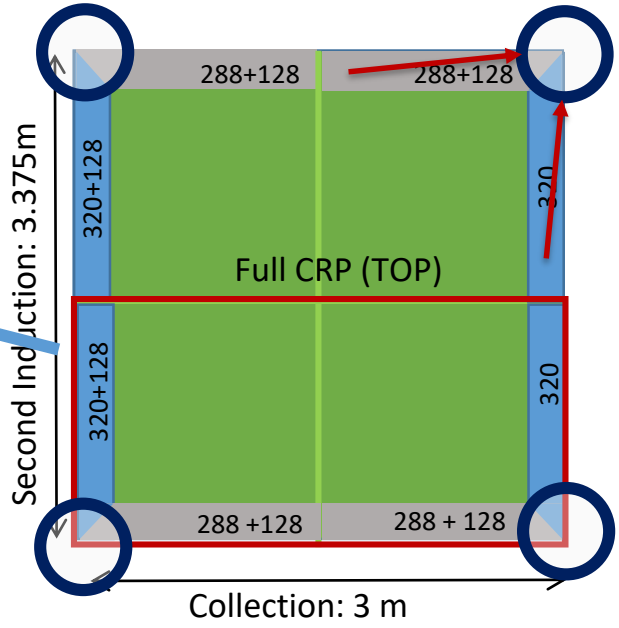
For the (48°, 0°, 90°) => 3200 channels / CRP

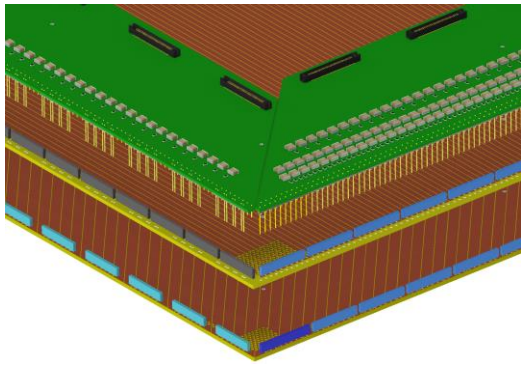
1/2 of a CRP (TOP)

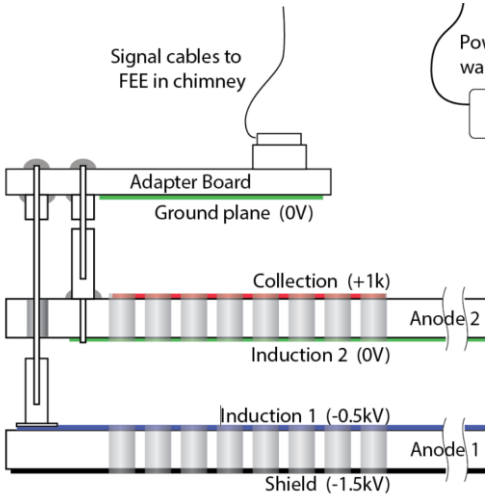


Channel count per ½ CRP

1st induction:	384
2nd induction:	640
collection:	576





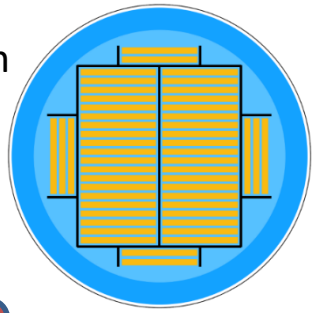


Chimney layout: Top Electronic (use same design as for DP)

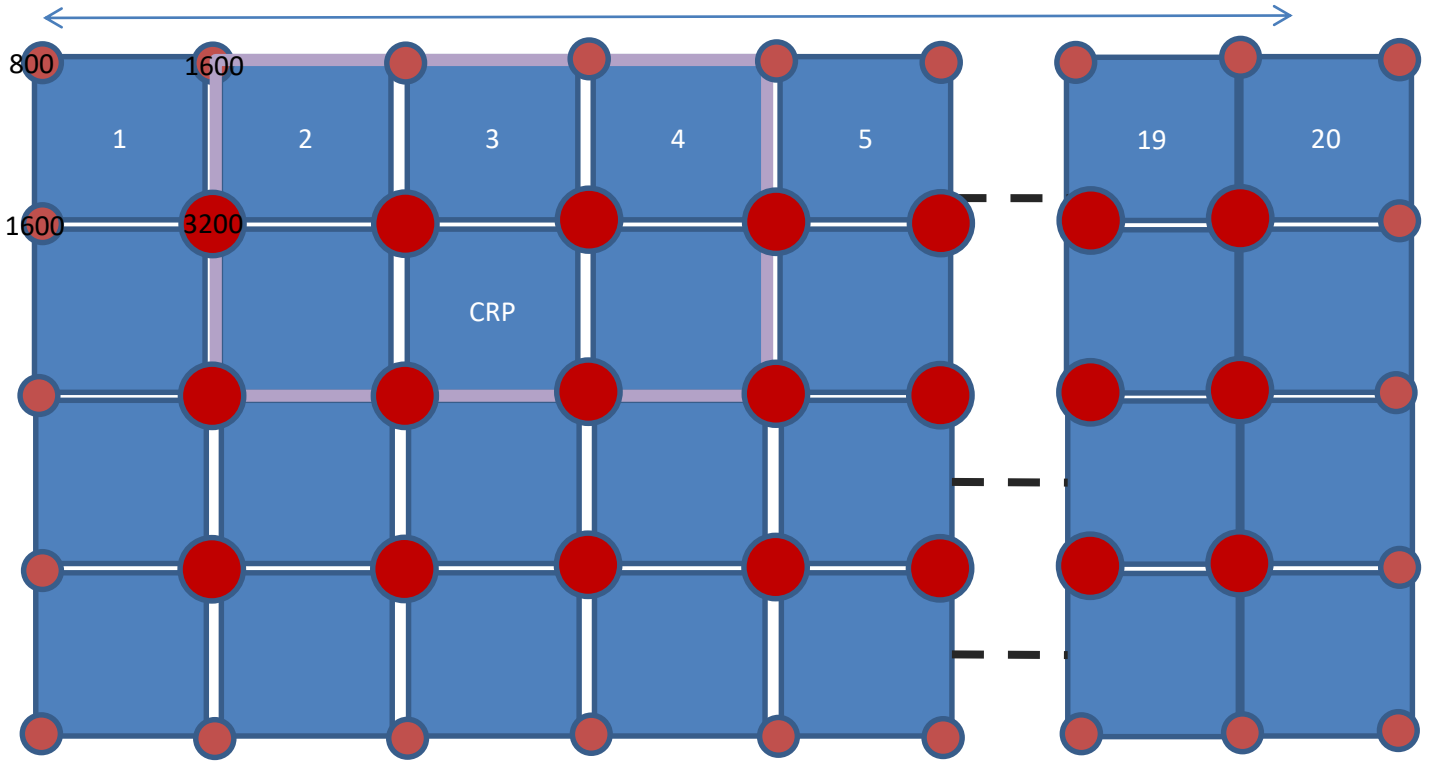
Top chimney topology: chimneys located at CRP corners => 1 chimney is shared among 2 or 4 CRPs

- Total 105 feedthroughs
- The peripheral ones can be of smaller radius because of lesser number of channels but under discussion

Pipe internal diameter : 48 cm



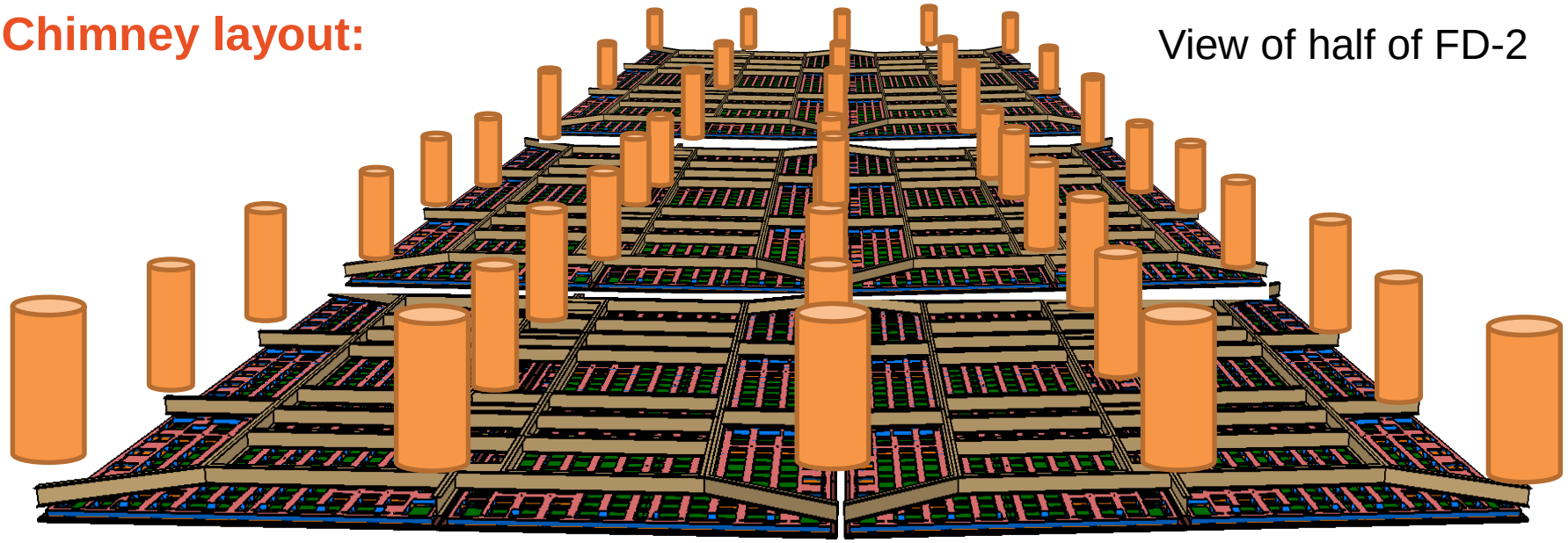
Up to 50 connectors



This drawing is too ideal: position depends on cryostat structure

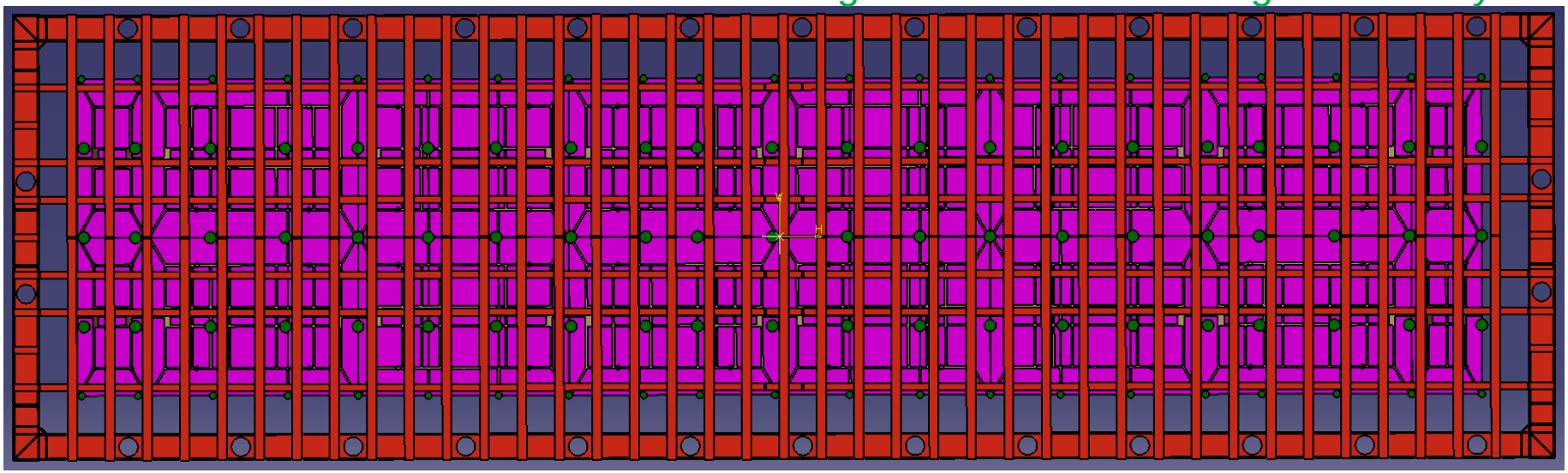
Chimney layout:

View of half of FD-2



The position of the signal feedthroughs have been defined to avoid interference with the cryostat structure

All green circles are the signal chimneys



Cables and connectors:

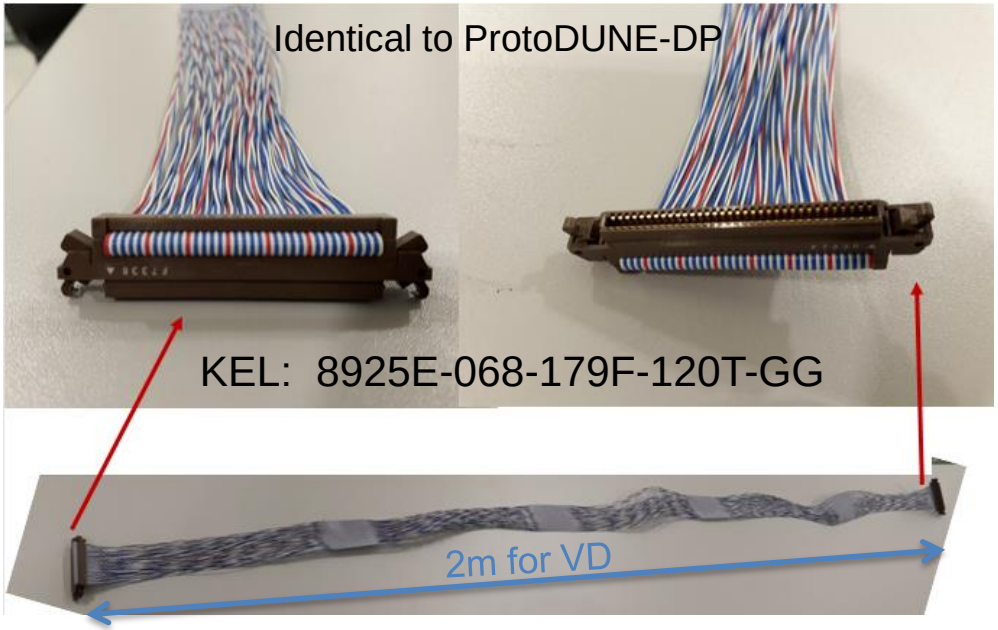
For the whole top CRP plane:

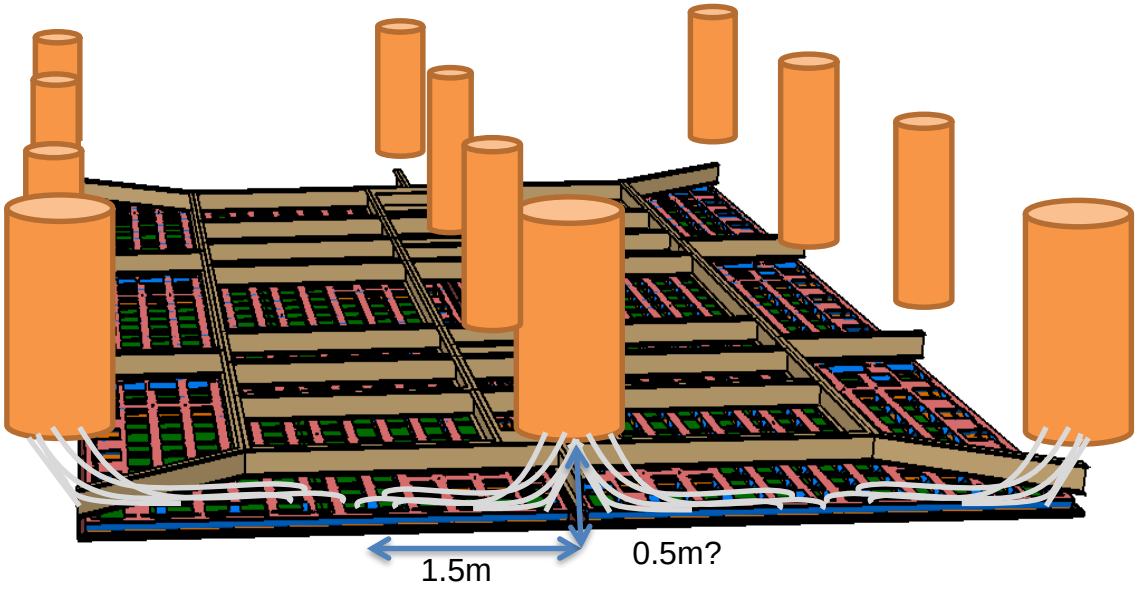
- 8000 cables for 80 CRPs

- Length of the cable: 2m for most of the chimneys

- The cables will be connected to the adapter boards at the CRP assembly site before being shipped to SD

- The routing on the superstructure prior to the cold flange connection

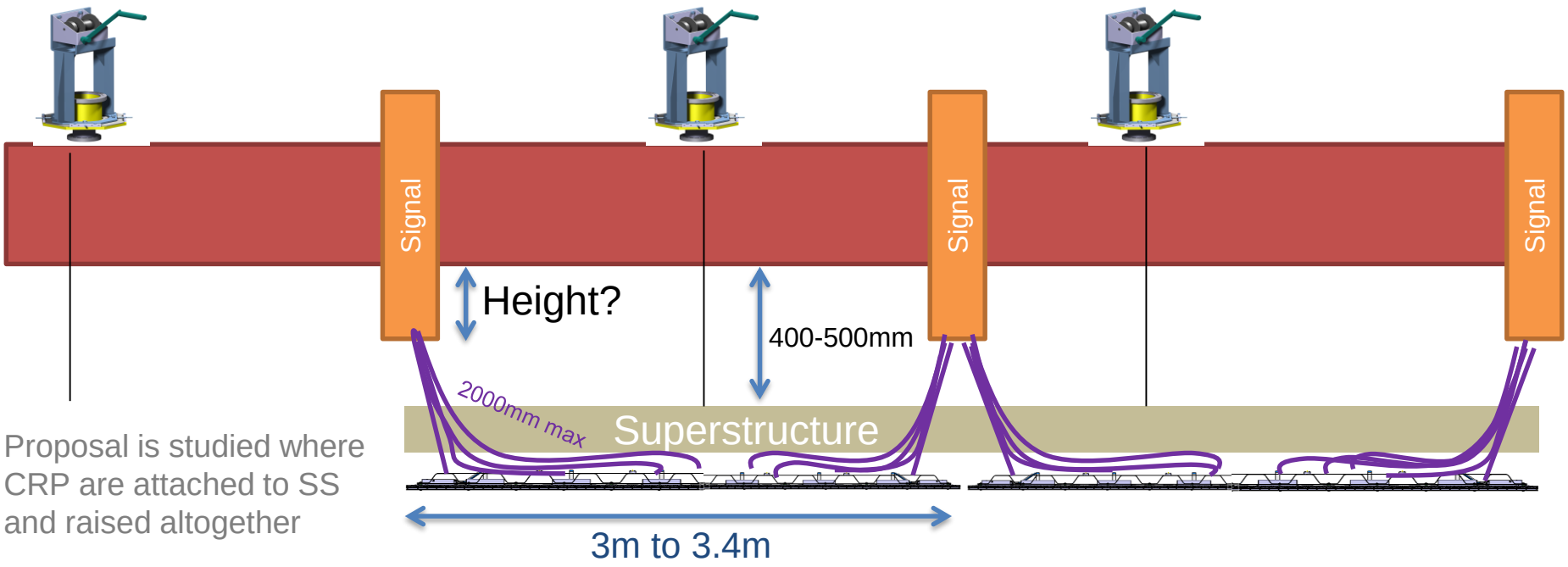




6 CRPs on 1 superstructure => connect to 12 different chimneys

Cabling procedure:

The CRP installation procedure with a full cabling scenario is being developed



Proposal is studied where CRP are attached to SS and raised altogether

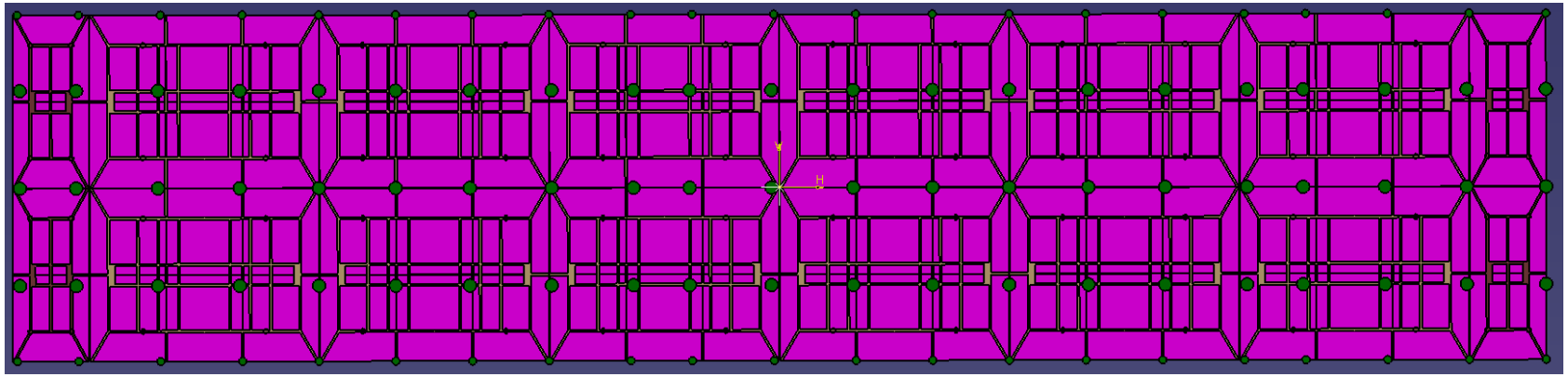
Signal cables are routed on the super-structure for each CRP, and have to be connected manually to chimneys.

Several parameters needed to design the scenario and the routing:

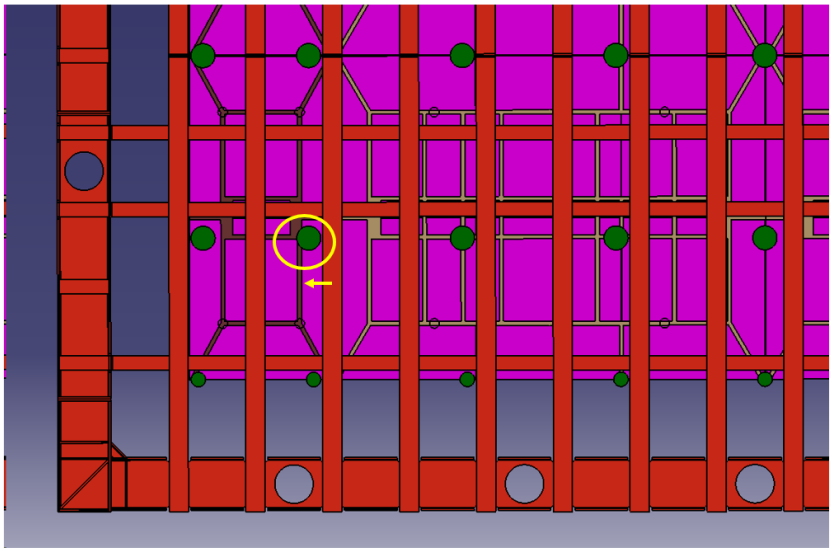
- ❑ The height between the cryostat membrane and the cold flange
- ❑ The nominal distance between the top membrane and the top of the superstructure

Chimney positions and cable length:

A certain number of chimneys have an offset wrt the ideal position above CRP corners (shift can reach up to about 400mm) => half the chimney may need longer cables



The number have to be evaluated:
Could be about 10-20% of the cables which would need additional length of about 0.5m



Summary:

CRP- Top electronic interface

- The interface is well defined
- The components are essentially the cables and connectors => identical to the ones used in ProtoDUNE-DP
- The cabling scenario of the top CRP during installation is being studied
- Experience from DP installation with nearly identical components is important in this process
- Some parameters need to be defined with Top electronic consortium like:
  - The height of the cold flange wrt the cryostat flat membrane
  - The possibility of using external peripheral SGFT for passing the anode biasing voltage.