GE1/1 Plan and Services for LS1

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On behalf of CMS GEMs Collaboration

Outline

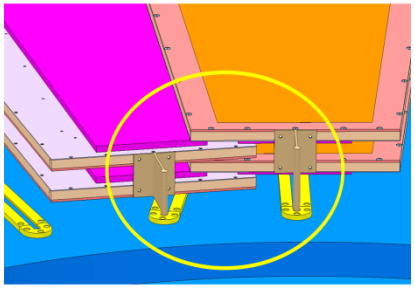
- Introduction
- Mechanics
- Services
  - HV
  - LV
  - Fibers
  - Gas
  - Cooling
- Cable routing strategy
- Conclusions

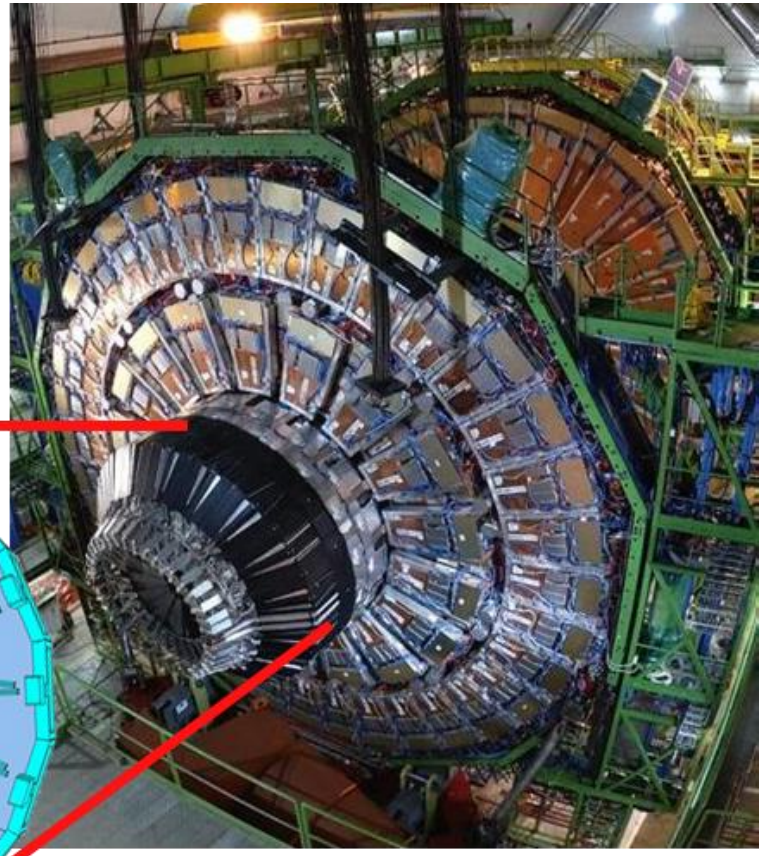
Introduction

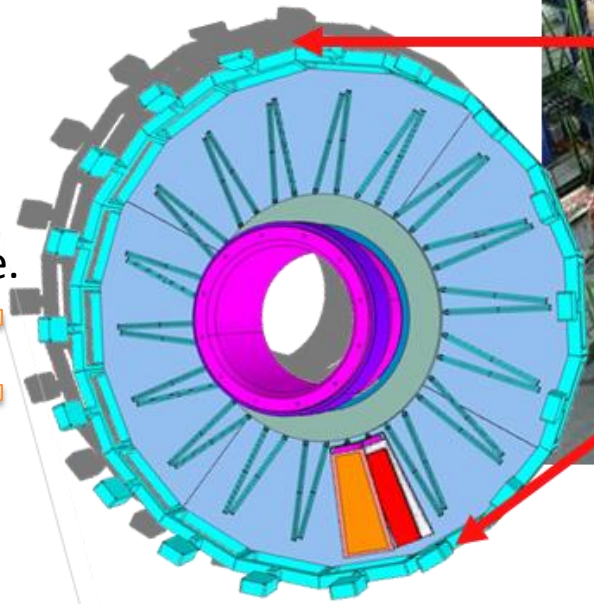
•Installation in LS2 requires information and foreseeing possible showstoppers for Integration and services

•GE1/1 super chamber consists two GE1/1 single detectors

• Two GE1/1 super chambers are planned to be installed during LS1 period to gain experience.

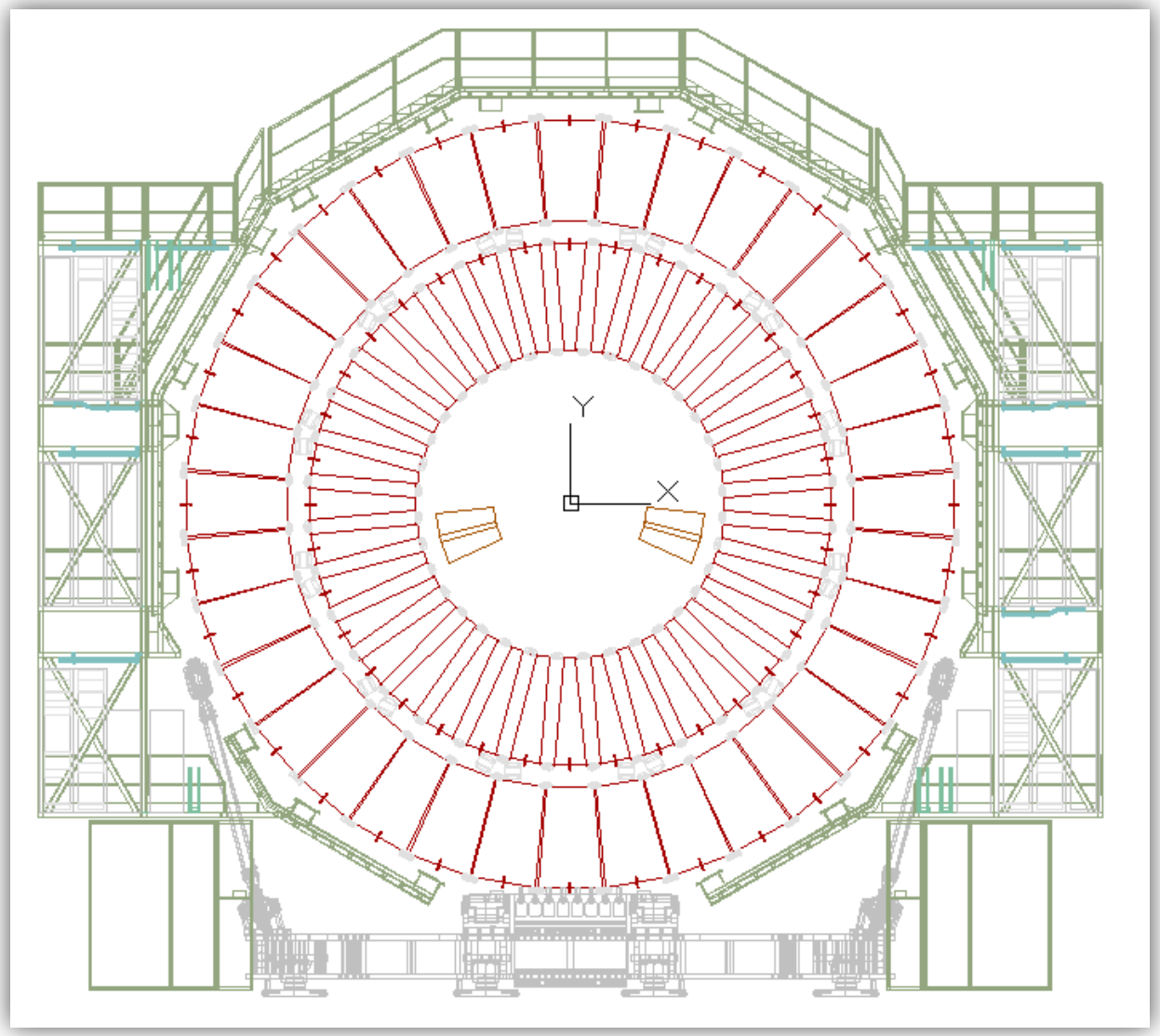






2016 Slice Test

Install 2-4 GE1/1 Super-Chambers During the 2016 YETC

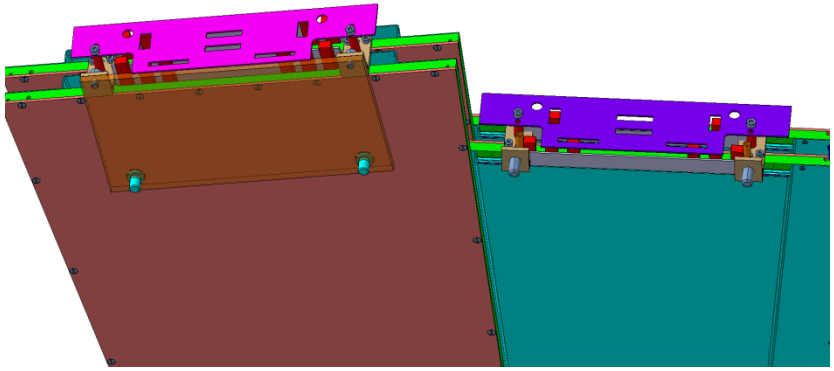


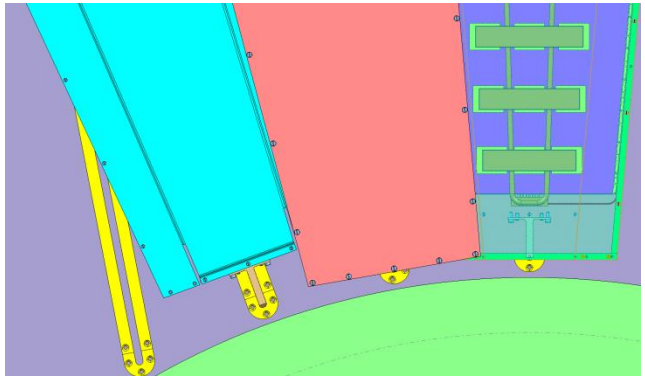
Far

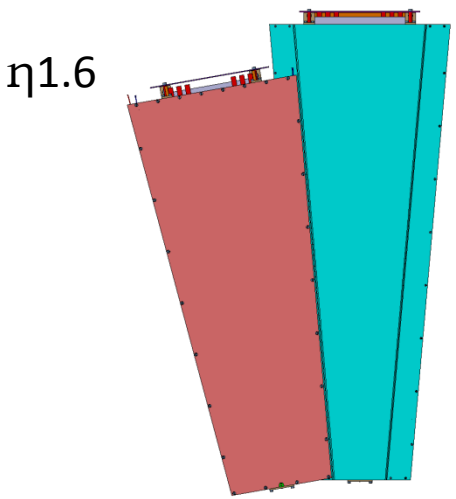
Near

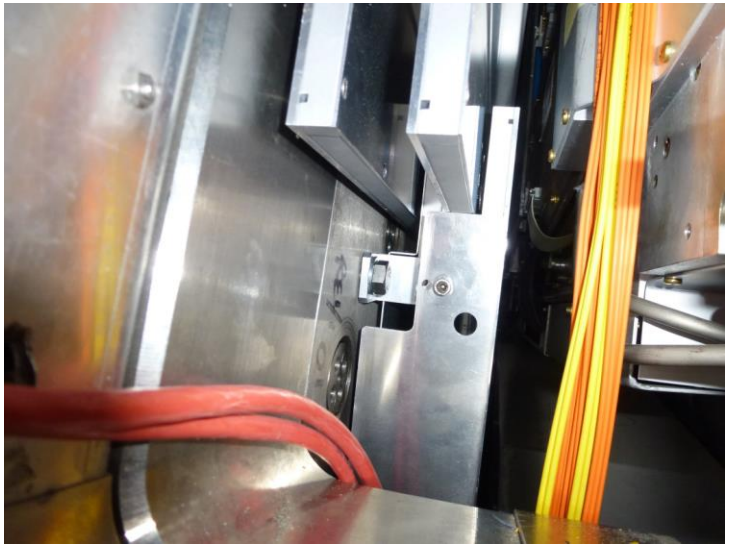
Mechanics

- Eta coverage region is increased from 2.2 to 1.6,

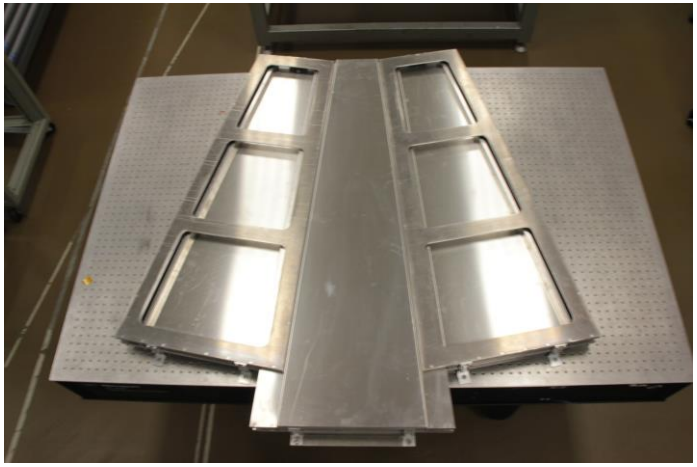




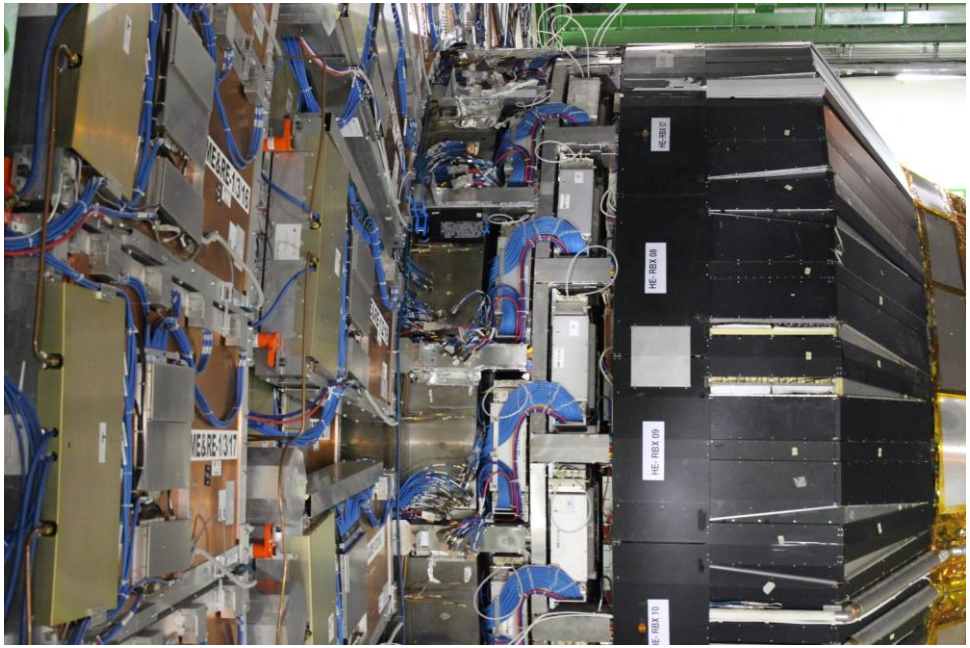




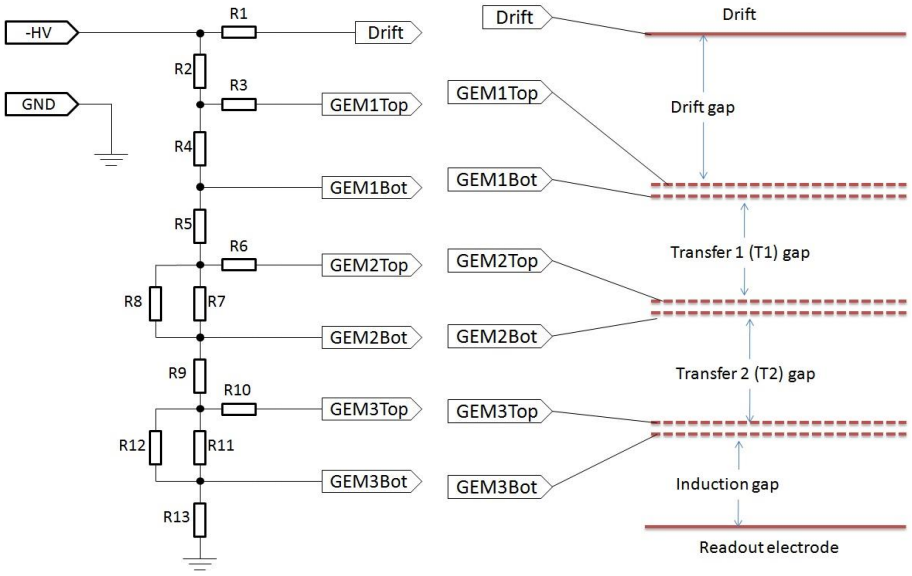
GE1/1 Mechanical mock-ups



- The “Installation” in TIF is done on the optical table.
  - Alignment trials are foreseen, Zoltan and team is informed.
  - Will be used for the new GEB and Strips boards development in order to validate the mechanics
- Installation at P5 will take place after middle of March
  - Validation of the mechanics.
  - Validation of the services paths
  - Commissioning of the gas lines with Ar.



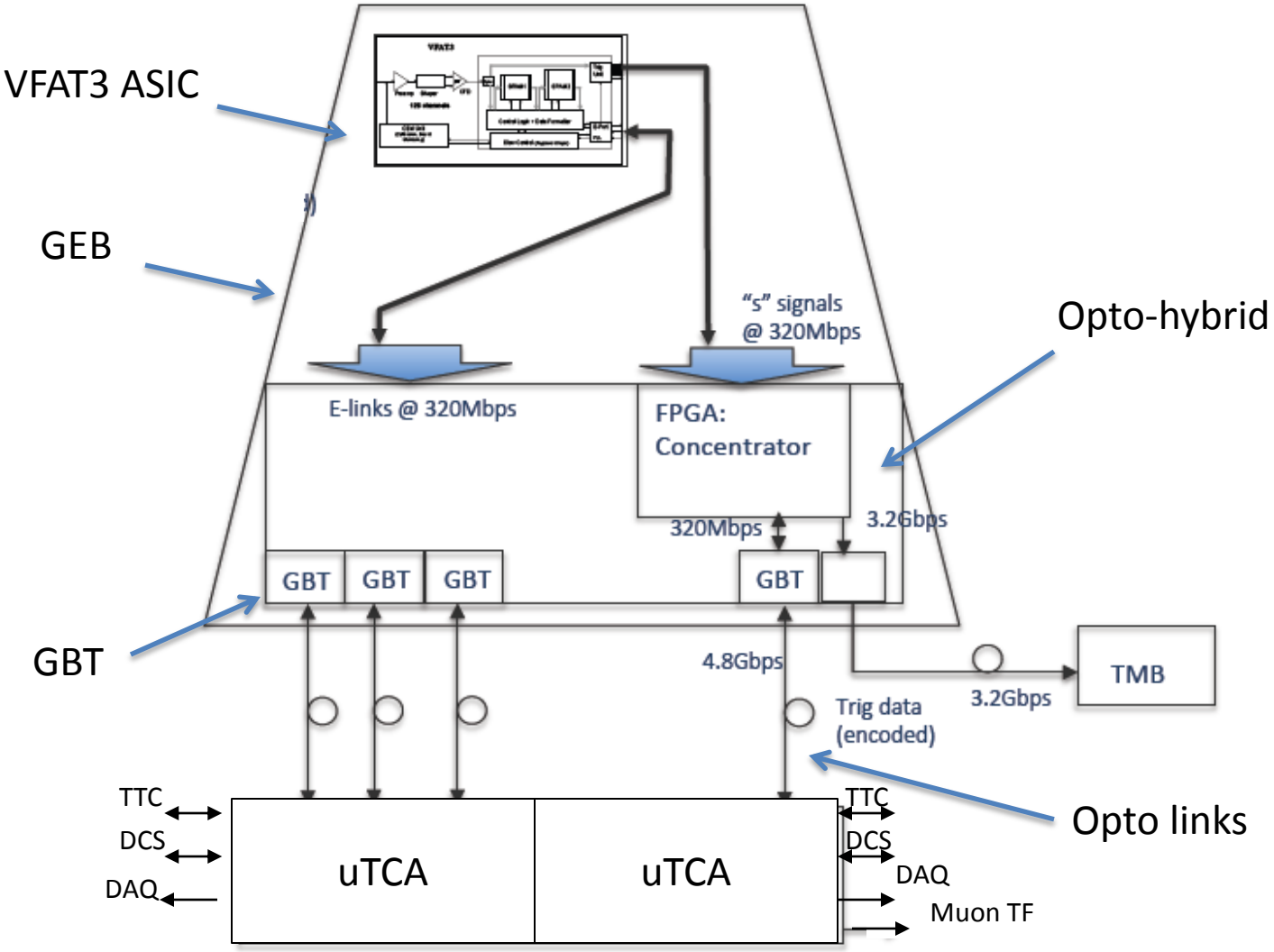
Services - HV



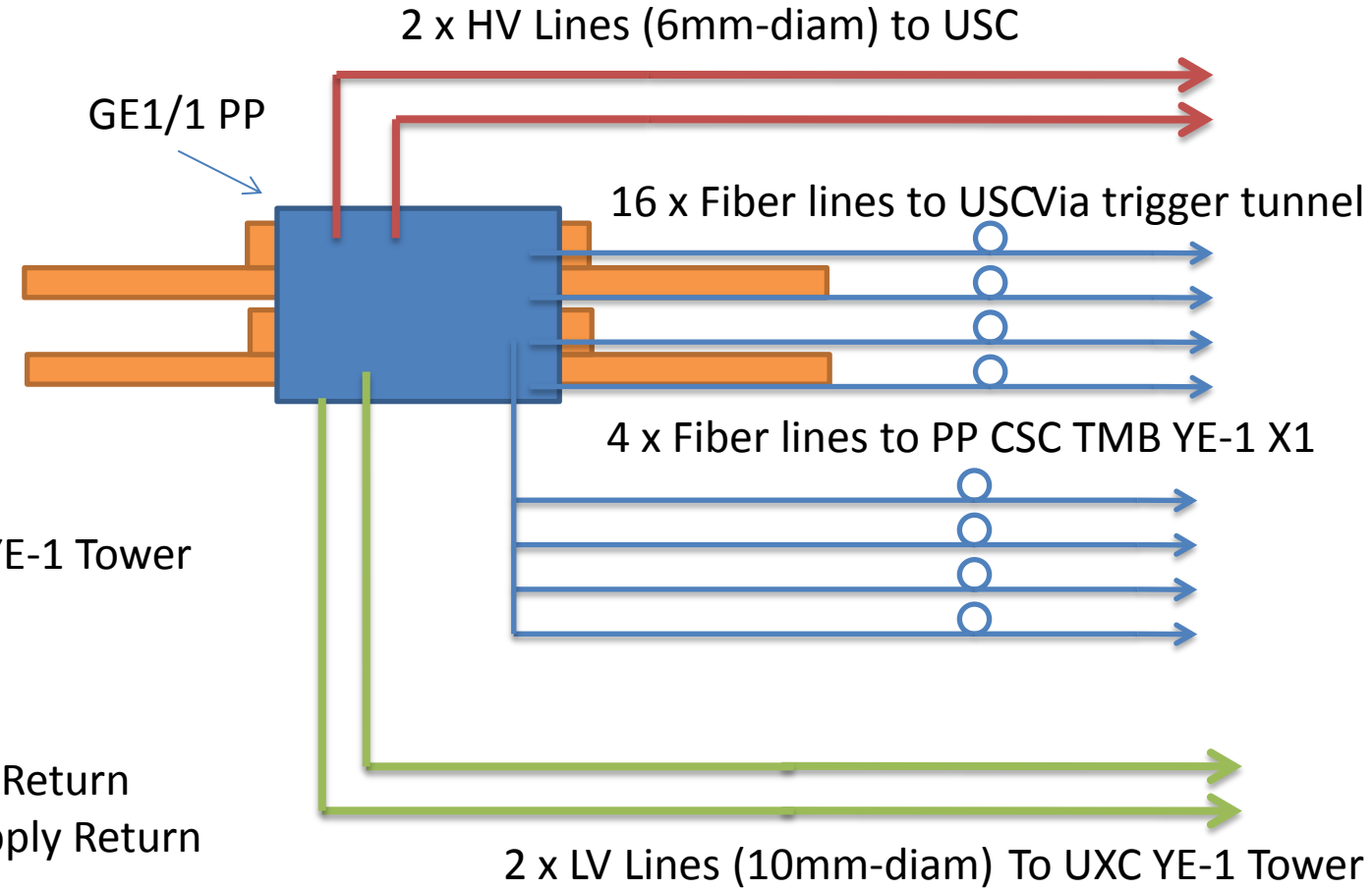
In All cases HV multicore cables from USC to UXC has to be placed

HV Divider – Single HV channel to the GE1/1 detector	Multichannel option, No HV Divider.
The RE1/1 HV cables are placed in the YE1/1 nose. They can be used on 100%	We need to install extra multichannel HV cables
We don't have flexibility to change much the potentials	We can have the option to tune any of the potentials inside the GE1/1 Detector
We Cannot switch off any of the GEM HV sectors	We can switch off part of the HV GEM sectors.
We can monitor only the global current trough the divider.	We can record every of the GEM foil sectors currents. Can monitor for eventual problems.
Price estimate is easy from commercial suppliers	Price estimate ongoing

Readout Electronics - Current baseline



LS1 GE1/1 Super Chamber – Summary

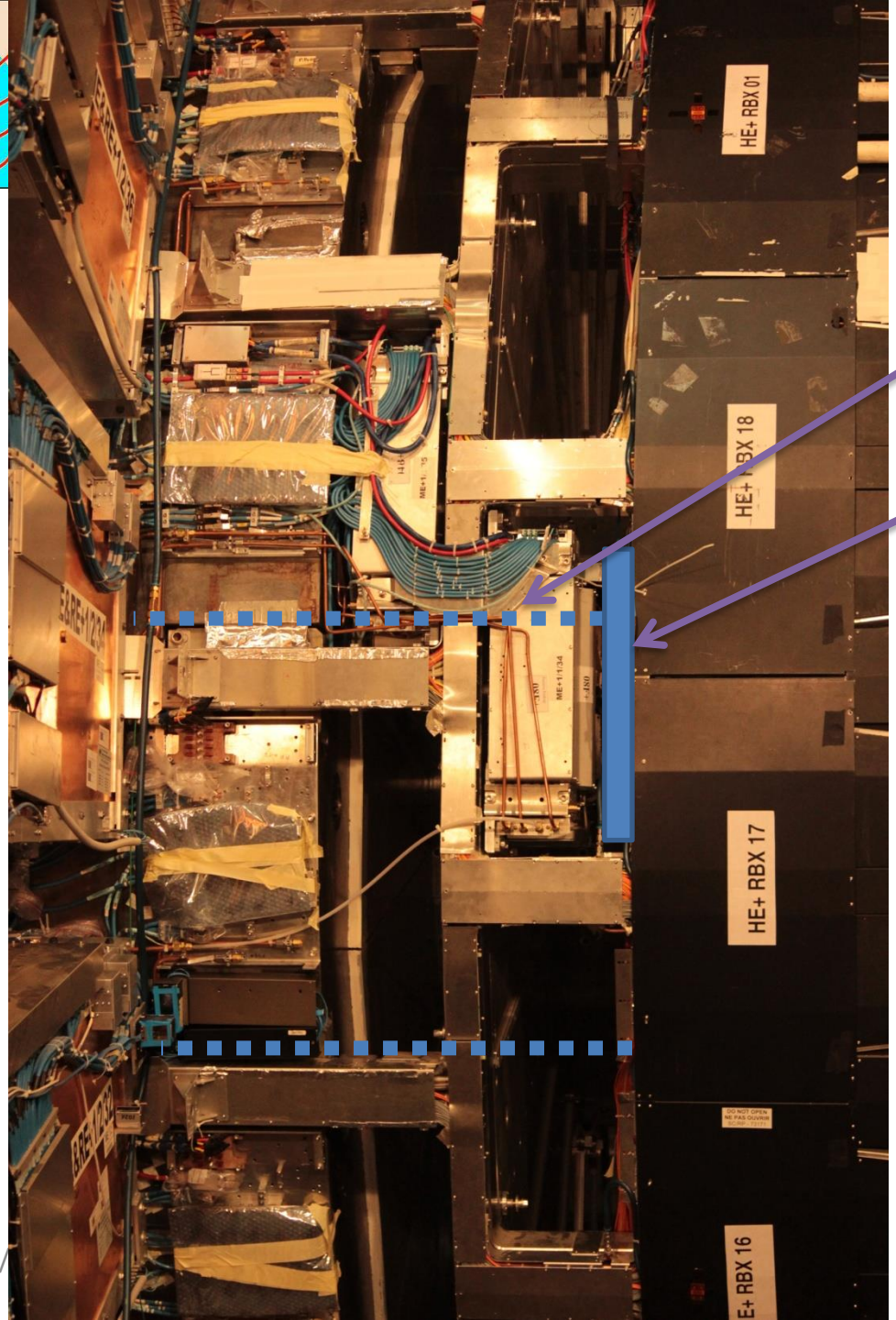


- 2 HV Lines to USC
- 2 LV Lines to UXC YE-1 Tower
- 16 lines to USC
- 4 lines to CSC TMB

- 1Gas Loop Supply, Return
- 1 Cooling Loop supply Return

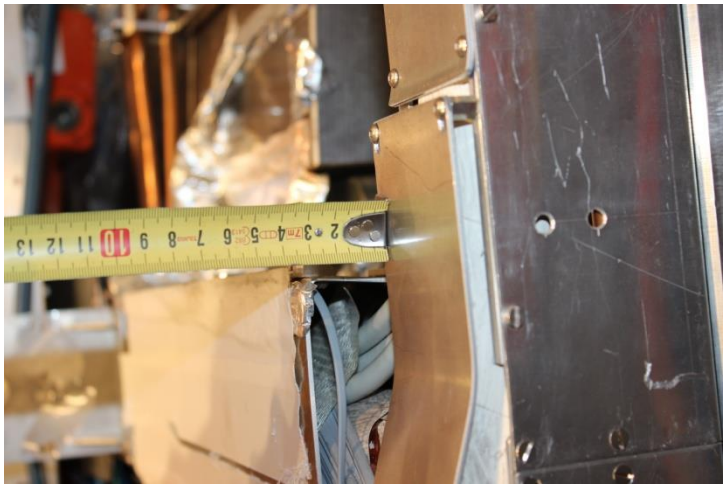
Cable Routing - Alternative Option

- **Follow the CSC ME1/1 Cooling pipes.**
  - All GE1/1 Cables should be packed inside a a flexible cable duct.
  - Mockup of the cable package must to be produced very soon in order to try the difficult points in this scenario.
  - It needs endorsement from the CMS technical coordinators.



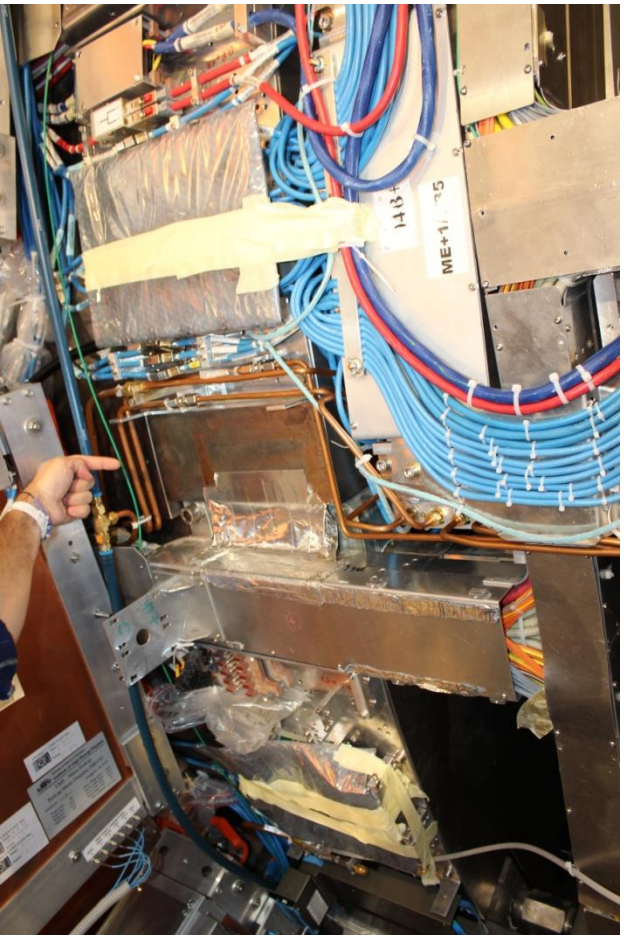
GE1/1 Super-Chamber cable path

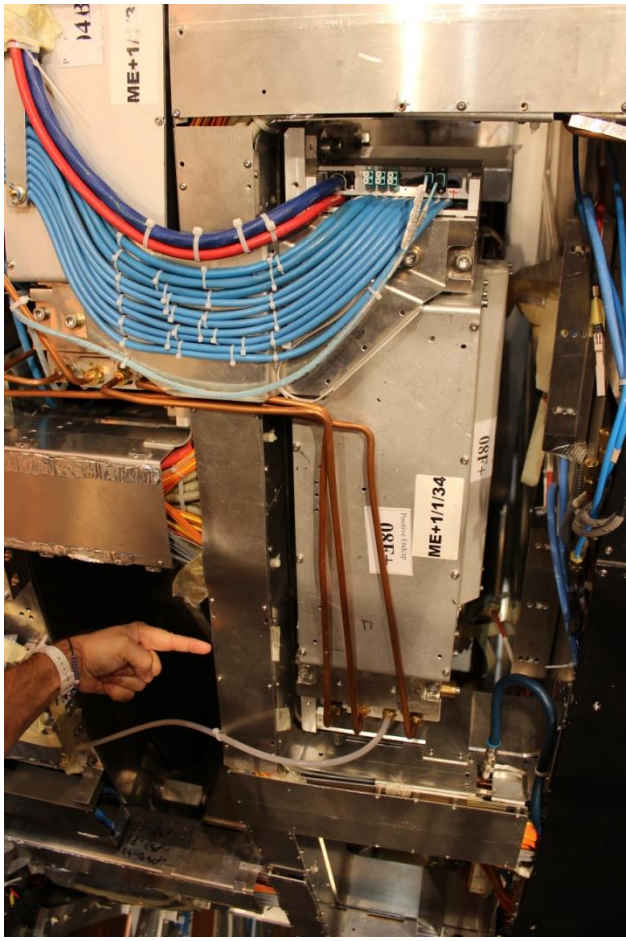
GE1/1 Super-Chambers slot



We have ~ 20 mm clearance in height

Avoiding the YE1 Cable Nose Cable Trays





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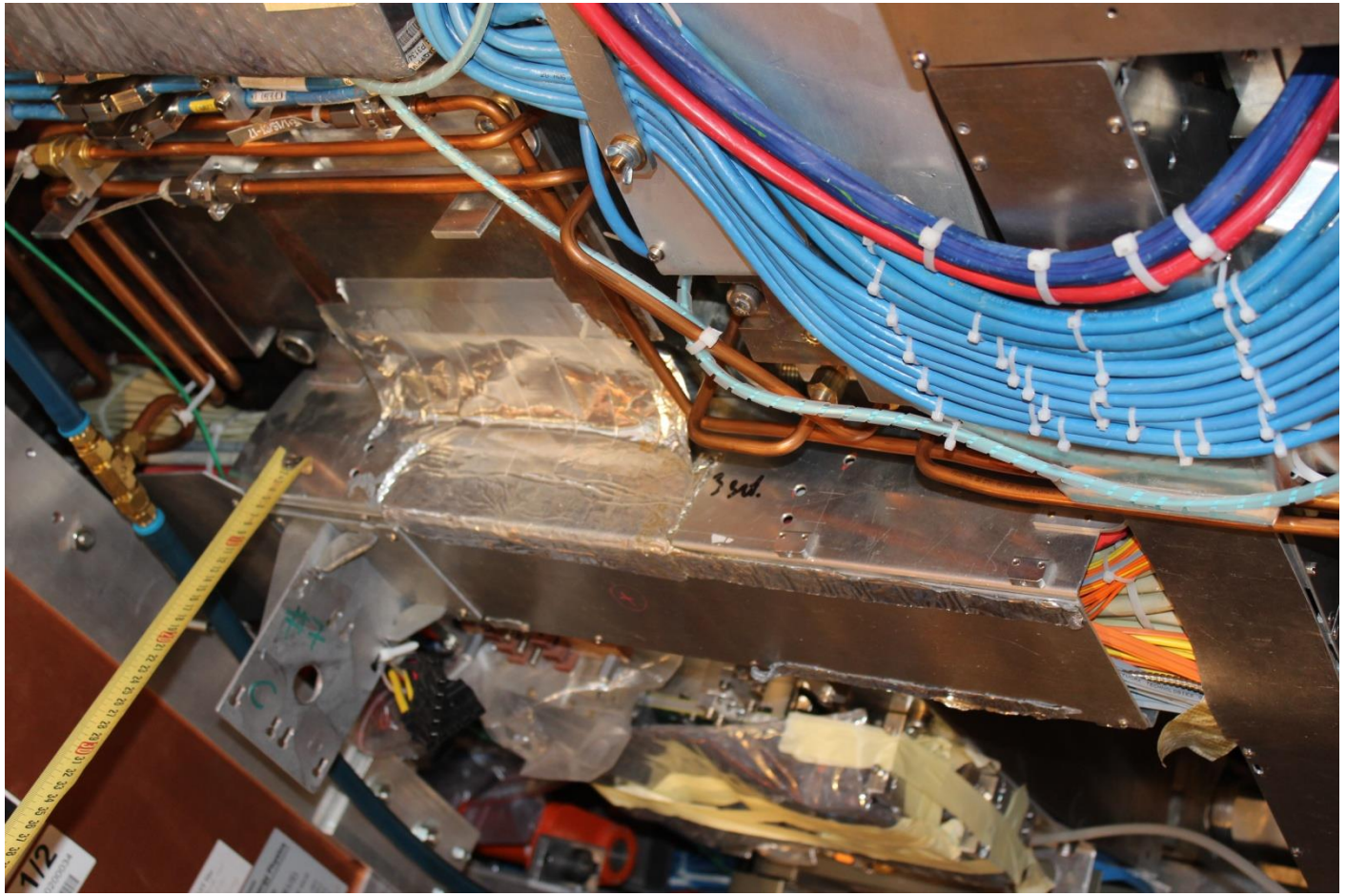
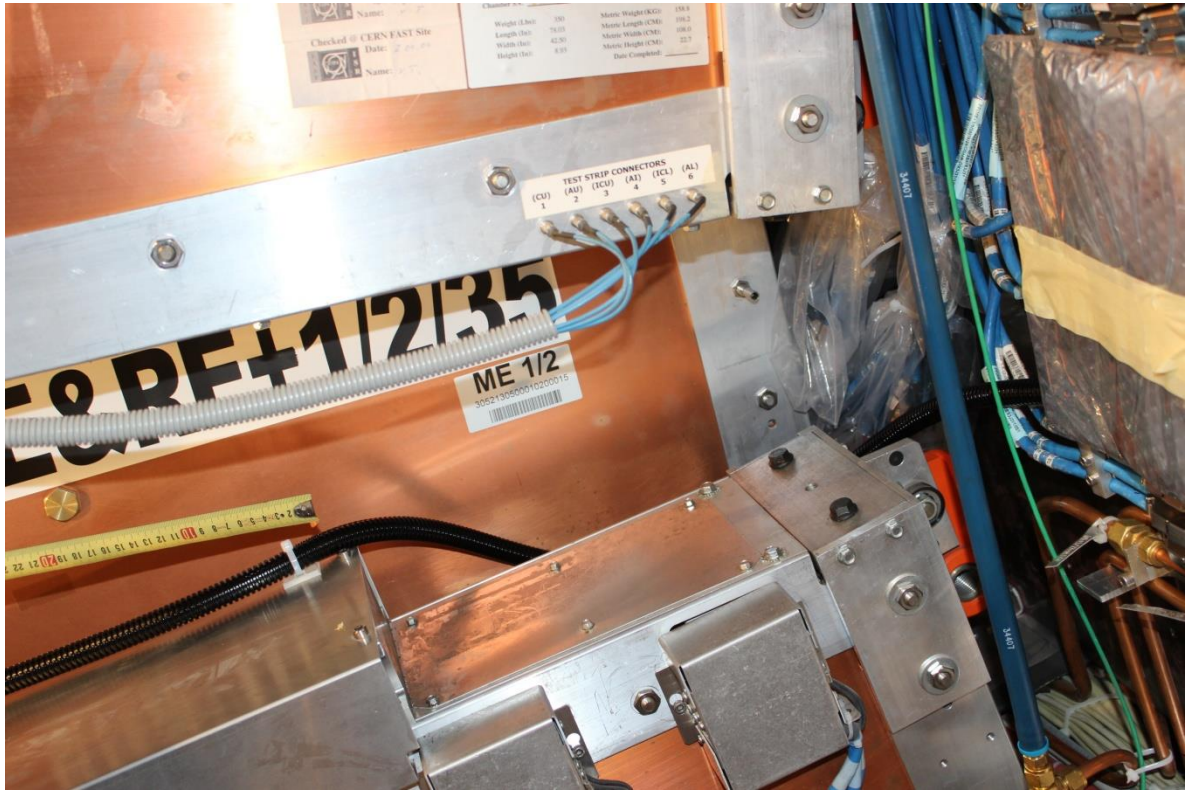


Cable Routing on the YE1 Disk



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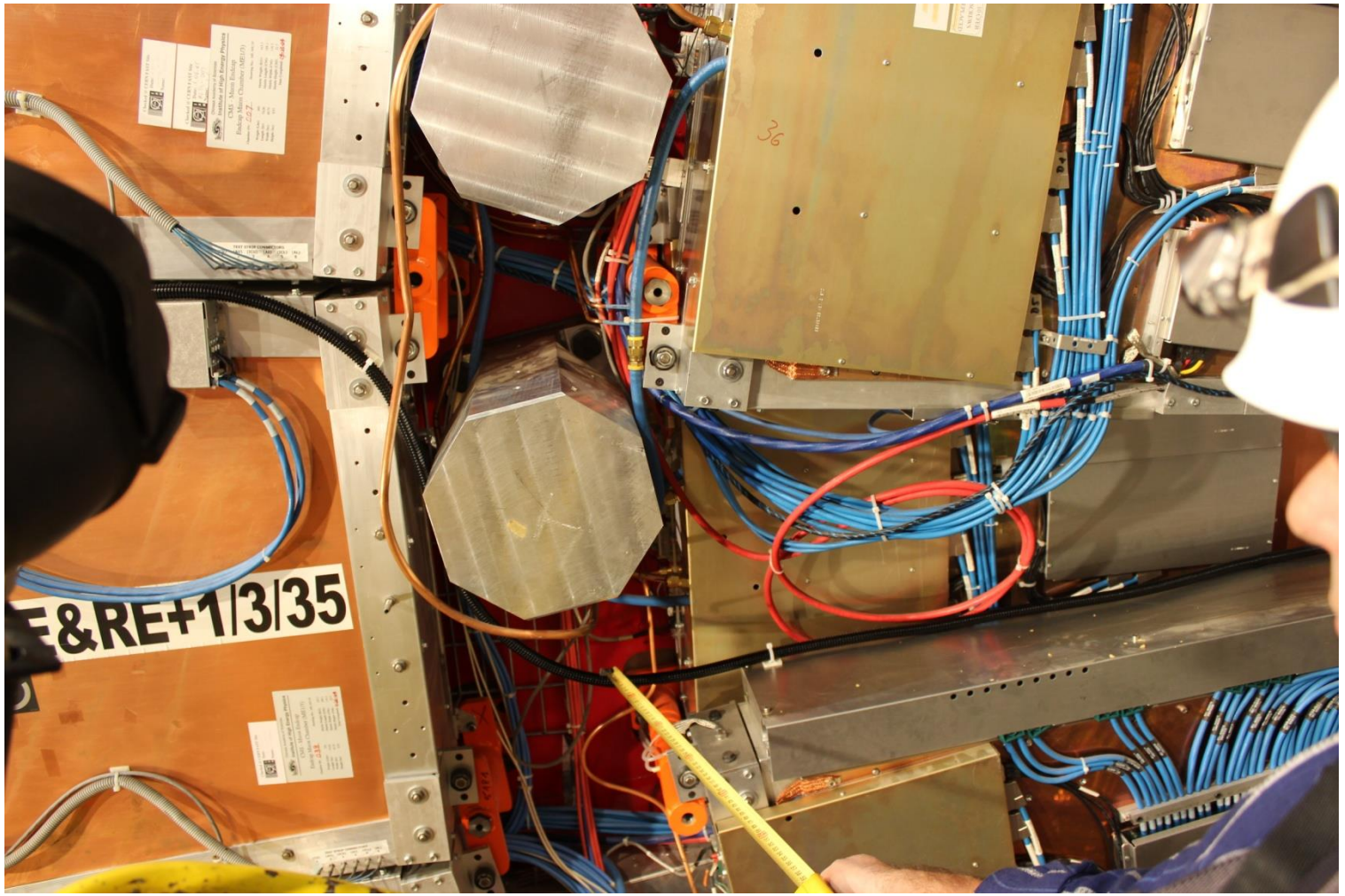
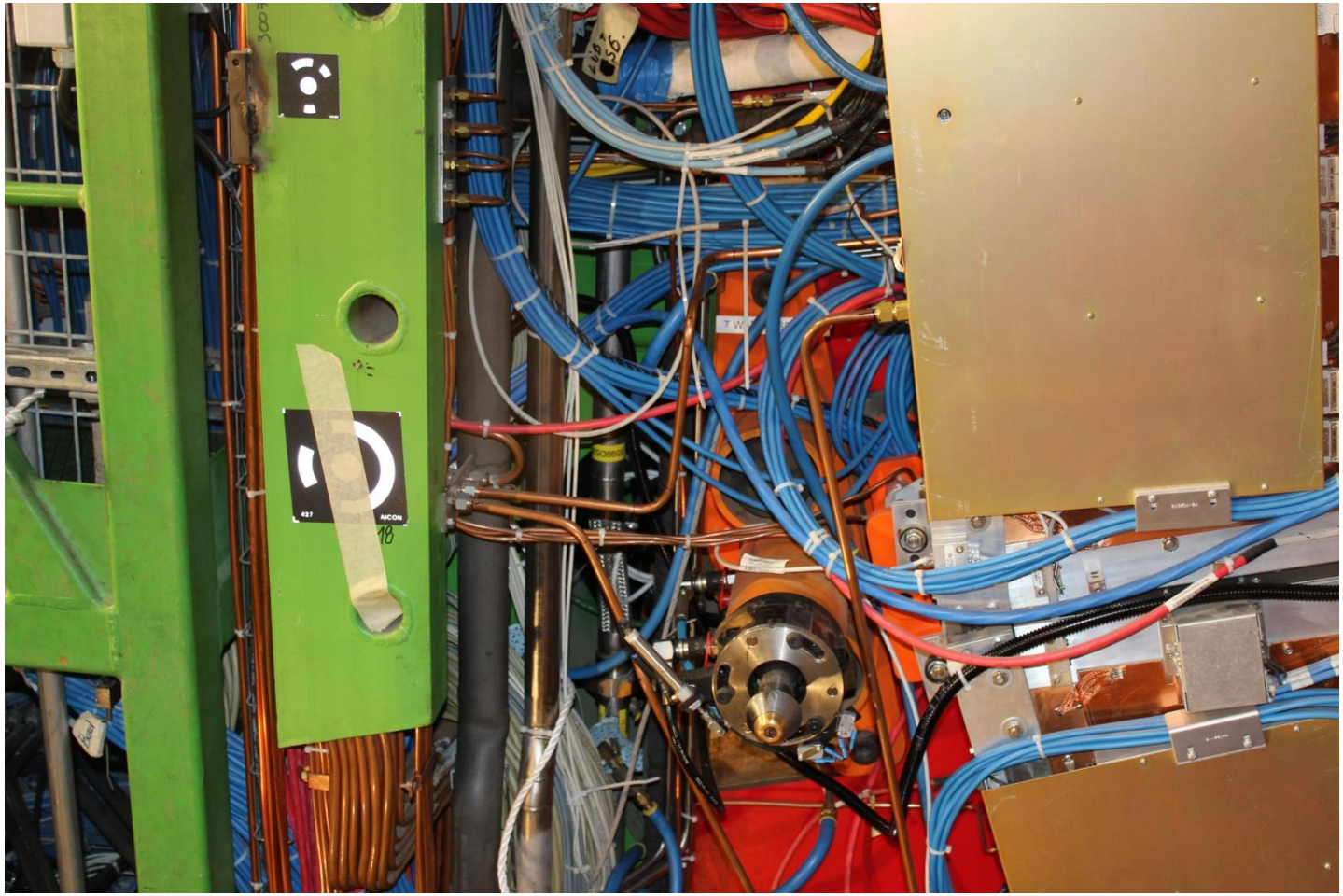


From YE1/3 Ring to the Periphery

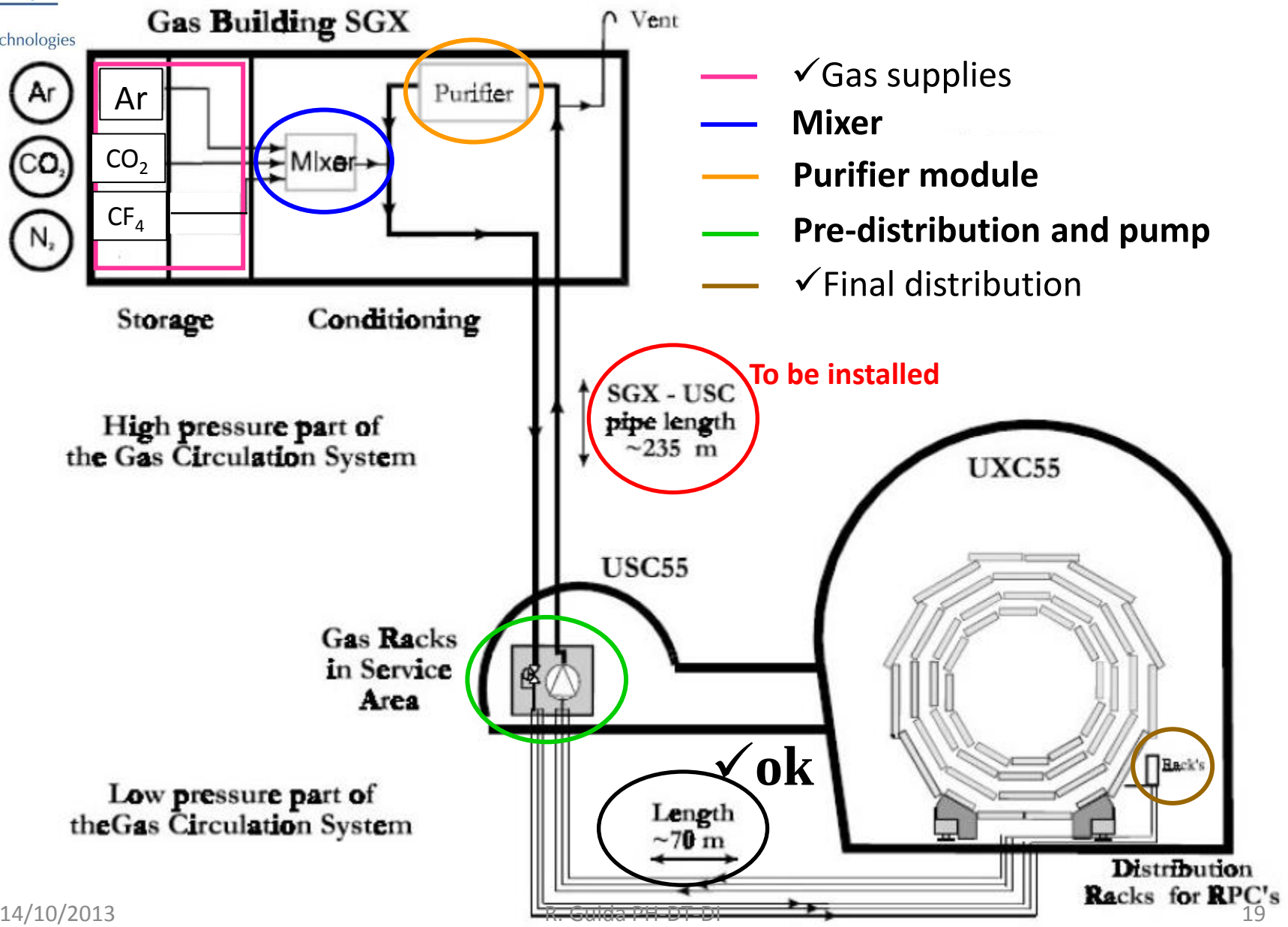


Behind the RE1/3 – may be not a good option?

- RE Cable slacks are fixed on the grids behind.
- It makes routing complicated .

Gas

Gas system layout

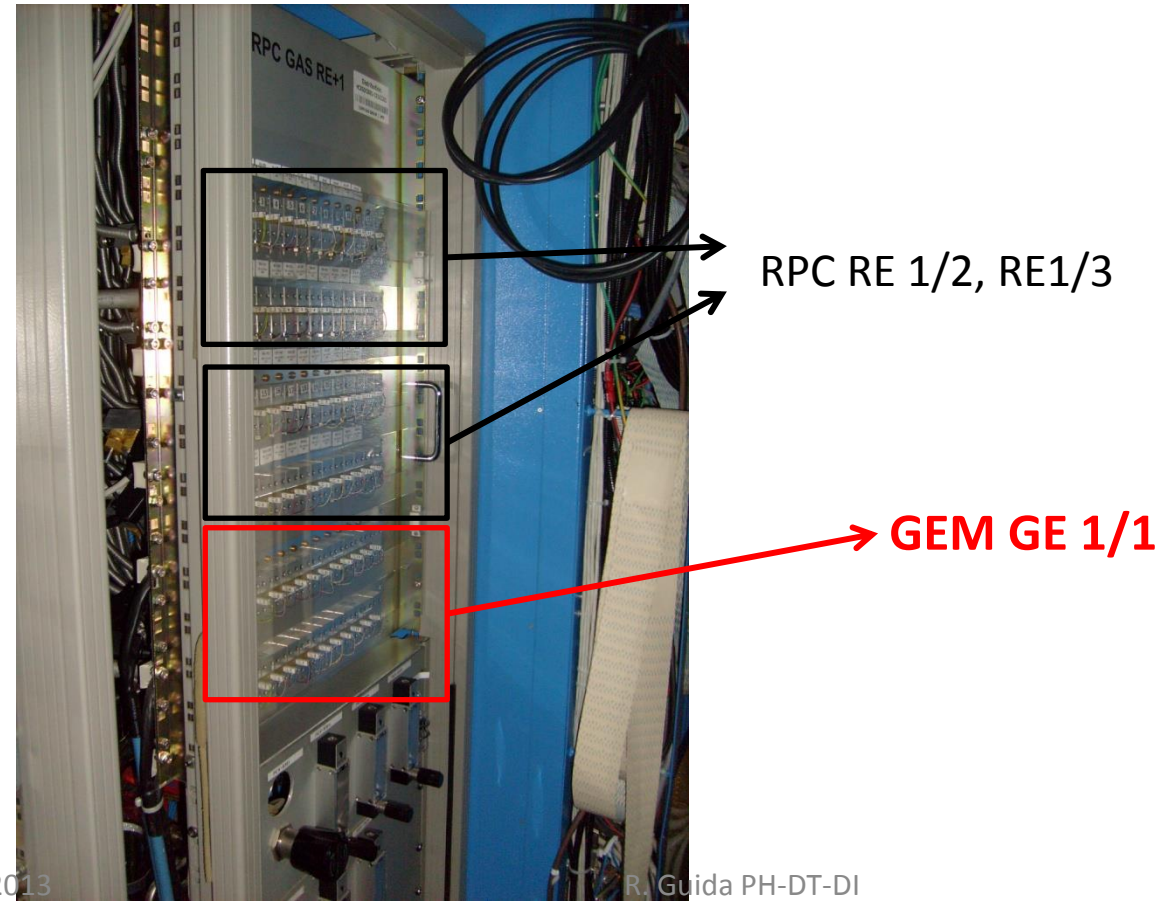


Gas distribution UXC

✓Chamber distribution (UXC)

One manifold (12 supply and return channels) is available in each distribution racks.

At the moment the controls are integrated in the RPC gas system. We need to decouple the two systems and re-calibrate the flow-meters.



Gas – LS1

- The Pipes can be commissioned during the GE1/1 Mockup installation, which will take place after middle of March
- Our GE1/1 Gas mixer will be ready at 2016.
  - Confirmed with Roberto and the gas group.
- Installation of the PM45 transfer pipes has to take place

Cooling

Cooling Request for LS1.

- The FEE heating power of the GE1/1 Demonstrator is assumed to be < 250 W in total for the 2 super-chambers.

- It will have a negligible impact on the YE1 cooling system.

Slides from A.Gaddi

Cooling Request for LS2.

- If we assume 240 W per YE1 sector, times 18 sectors, we have:

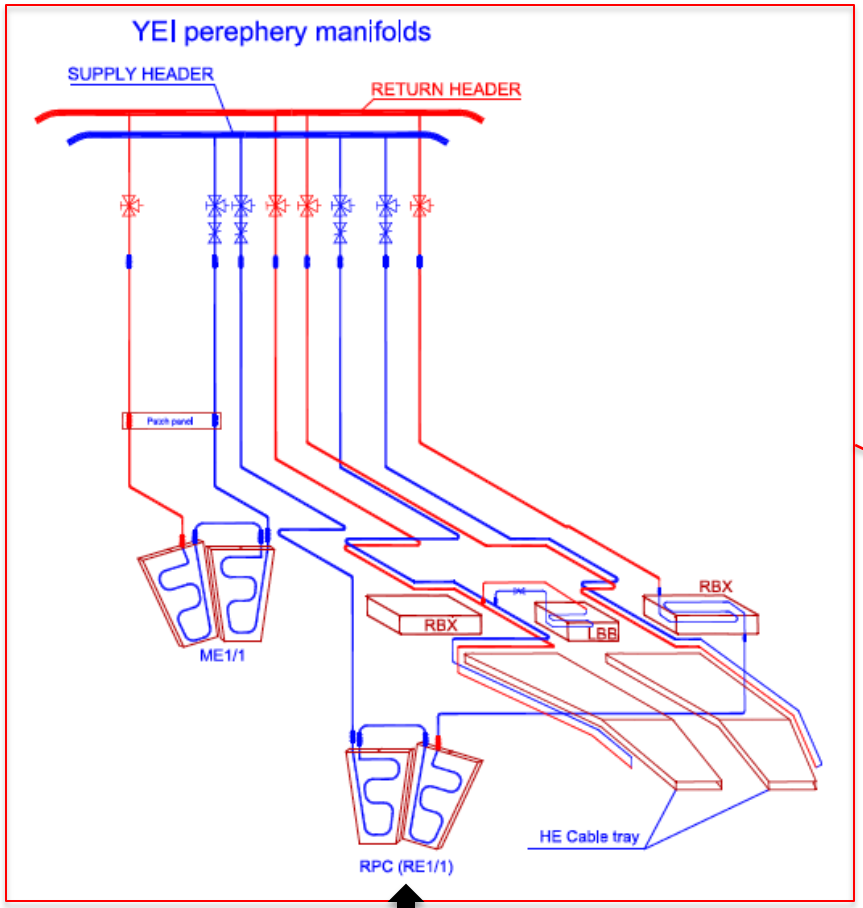
  4,320 W per Endcap for GE1/1 FEE.

The super-chambers are in series with the HE/RBX, that dissipate at present no more than 100 W, but it could increase to 250 W after LS2. The details of the cooling loop are presented in the following picture.

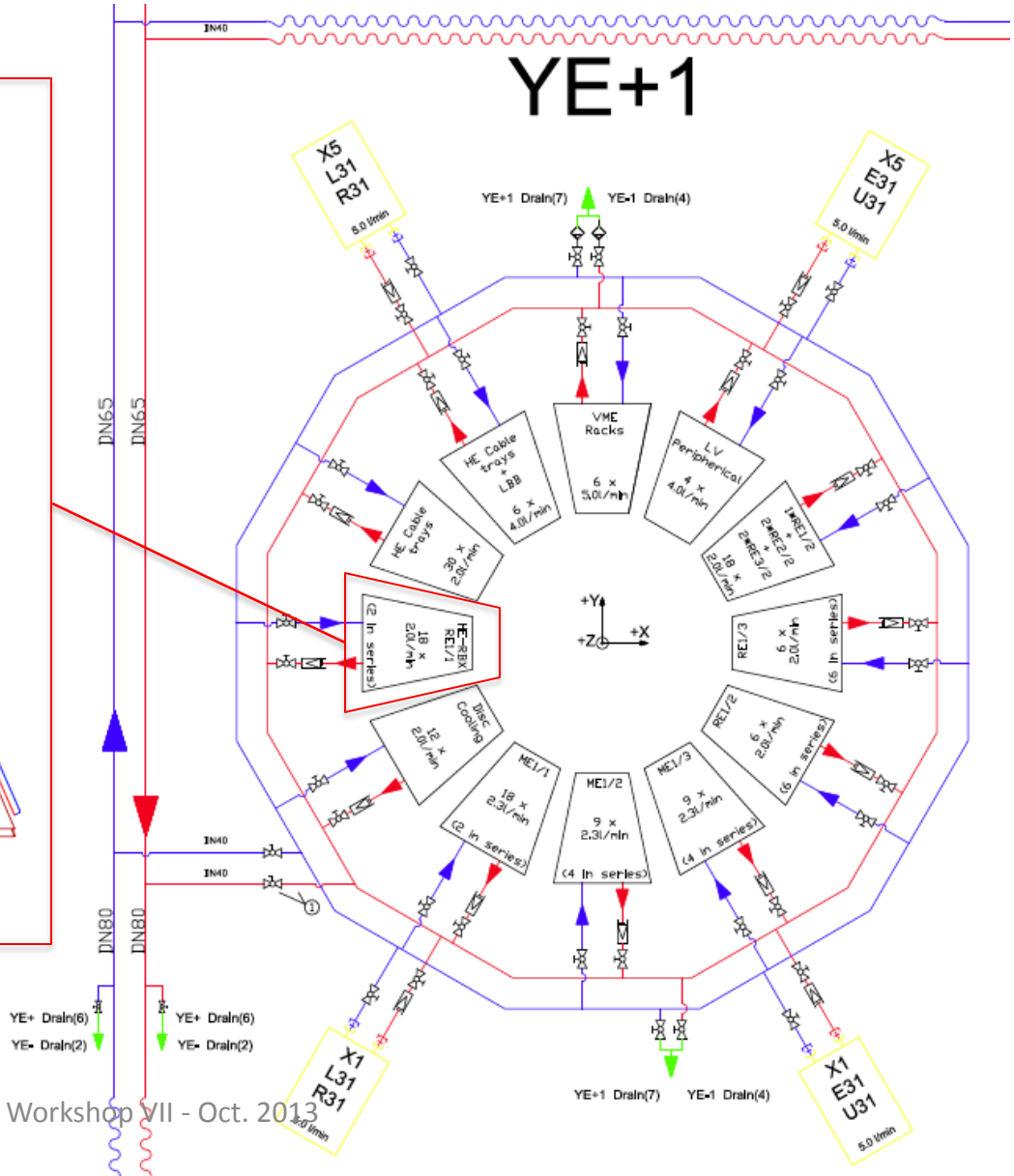
Slides from A.Gaddi

Table from D. Loveless

YE1/1 Cooling Manifold



GE1/1



Slides from A.Gaddi

Conclusions about GE1/1 Cooling

- For LS1 Demonstrator, cooling is available, no impact on neighboring systems.
- For LS2, depending on HCal RBX upgrade, keep the total power dissipated below (or at least not too far from) 500 W per cooling loop.
- Cooling connections needs to be confirmed.

Slides from A.Gaddi

To be done before end of LS1 For the 2016 Slice Test

- HV Mullticore cable USC-UXC – missing on 100%
- Fibers - missing on 90%
- LV Cables UXC-USC - missing on 100%
- Gas Lines check and commissioning – foreseen in March