FASER YETS Work

Jamie Boyd (CERN)

6/12/24

(Apoligies I cant attend the meeting due to a clash)

Summary of YETS work

YETS scheduled from 25/11/24 – 13/3/25 (19 weeks beam-to-beam), but with some periods when access to FASER not possible.

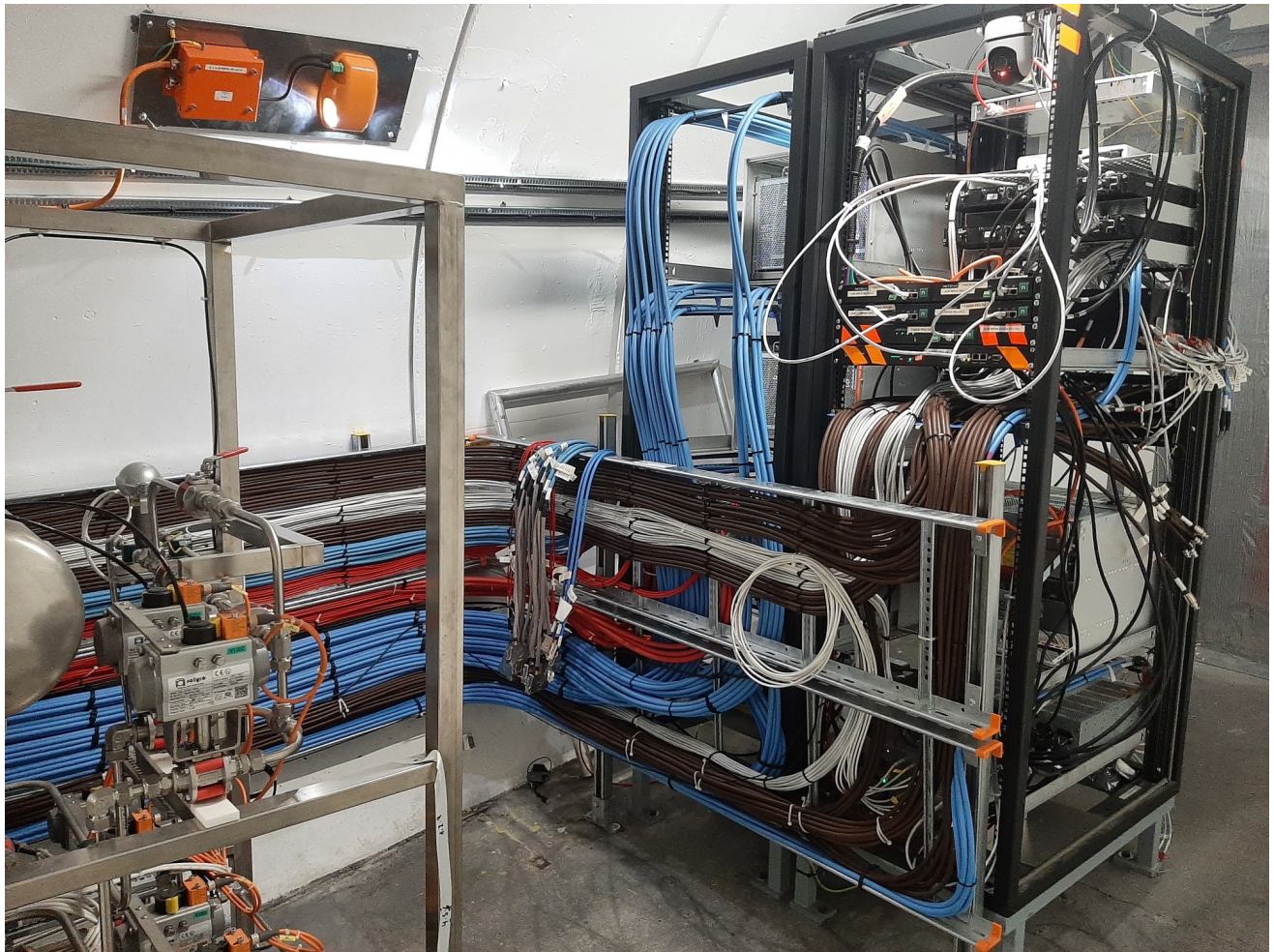
FASER work for YETS:

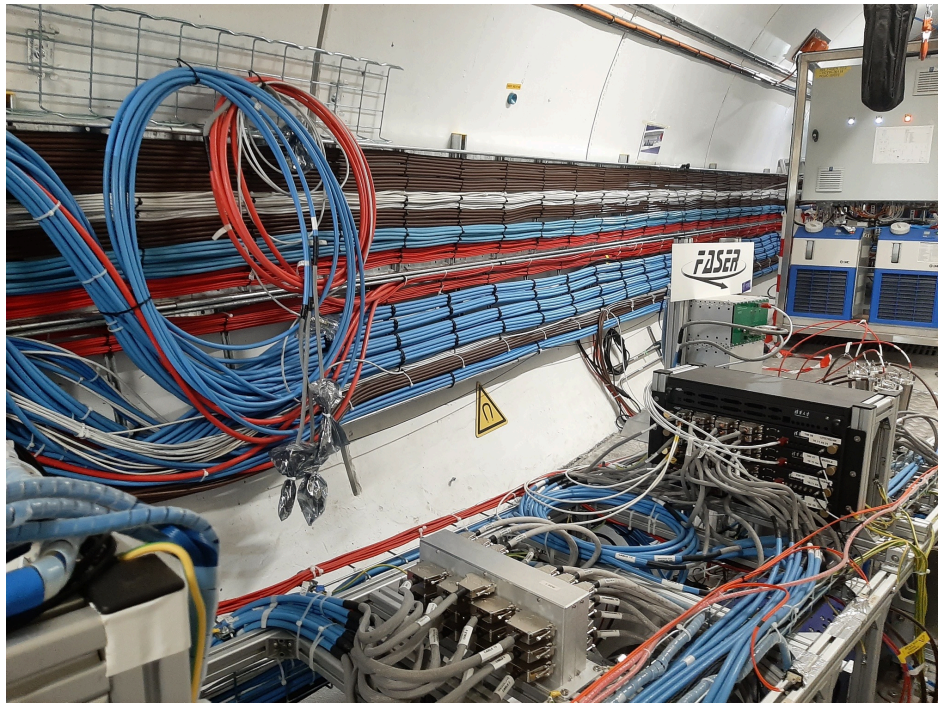
- Move detector to follow crossing angle
- Installation of preshower and associated infrastructure
  - Cabling
  - Electronics updates (PSs etc…)
  - Remove existing preshower / install new preshower
  - Commissioning…..

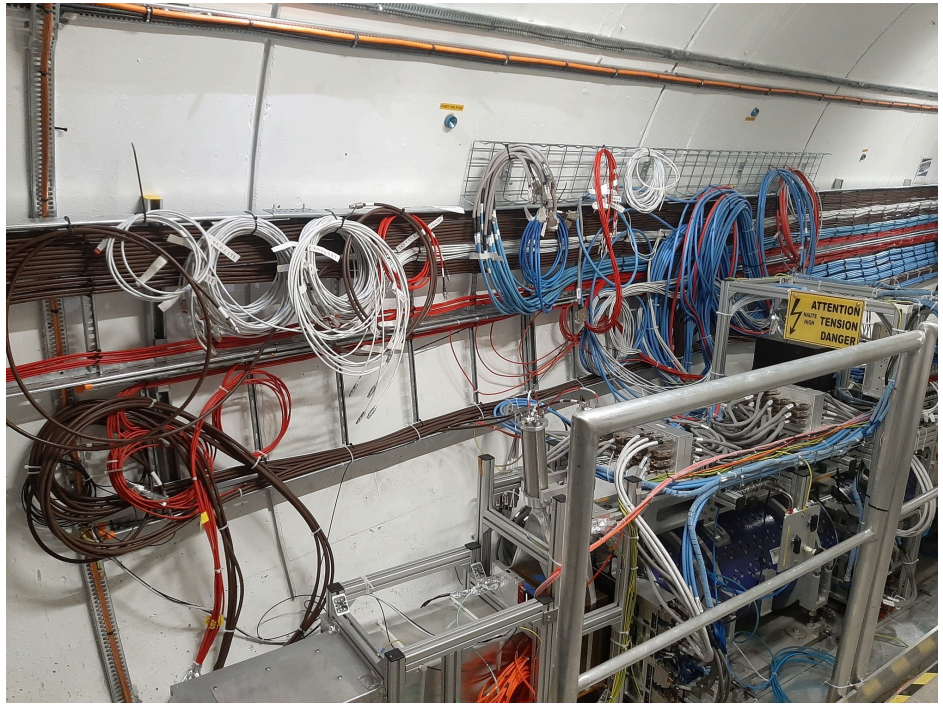
Work carried out so far…

Installation of scaffolding over detector (Tues 26/11) to allow cables to be routed from rack to back of detector.
Installation/removal slightly scary, but seemed to go smoothly.

Cable laying finished Thurs (28/11).
All cables tested except for LV which need a new tool to test, will be done soon.
Scaffolding remove Fri (29/11).
Detector tested with calibrations since to check no issues from this work (all OK).
Many thanks to the BE-EA cabling team for coordinating this.



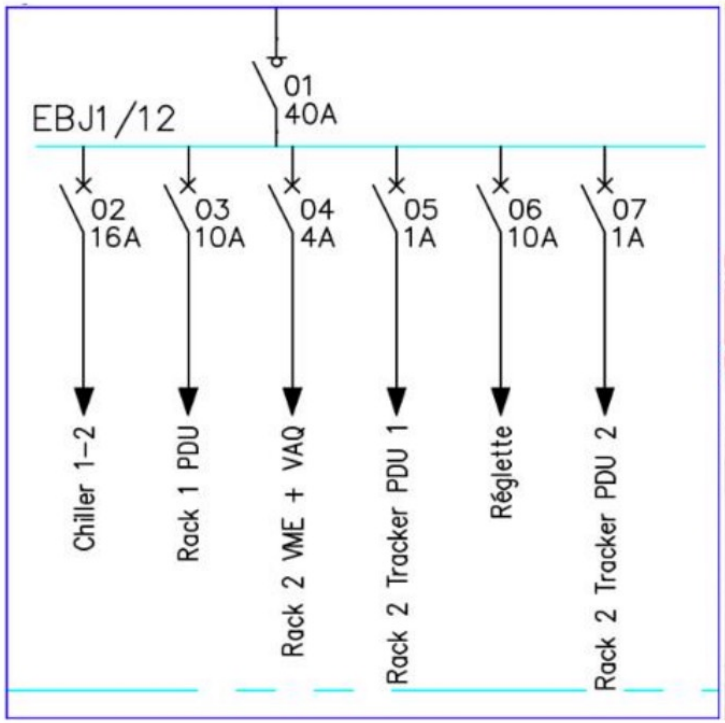


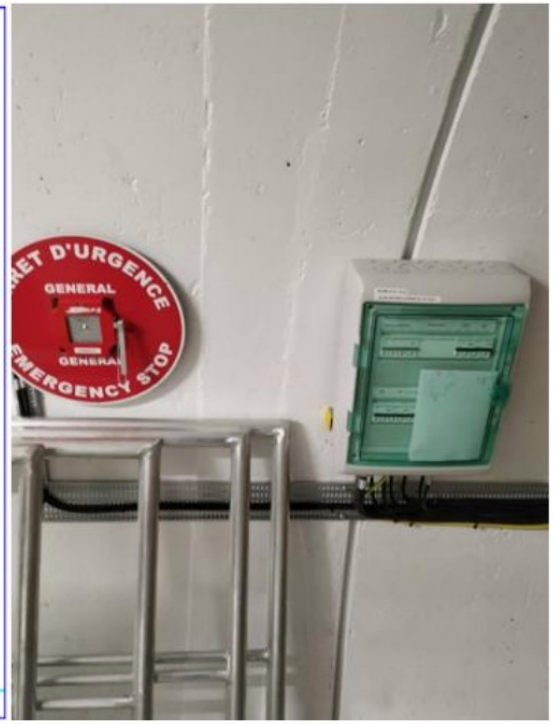


On Thurs (5/12) Yann Maurer (EN-EL) upgraded one of the circuit breaker ratings in our switchboard to allow sufficient current to power the preshower MPOD system. Intervention took 5 minutes and went smoothly.

Many thanks to EN-EL.

Friday **(6/12)** the 2 FASER switches in TI12 were upgraded by IT-CS to allow more connections from the preshower detector. (this was not complete by the time I wrote these slides!)





Work to be done…

Moving detector sideways

As dicussed at previous meetings, the LHC will move to a horizontal crossing angle for 2025 running.
This will push the LOS away from the LHC by ~7.5cm.
In order to best align the detector to the LOS we plan to move the detector side ways ~5cm towards the wall during the YETS.
The detector mechanics was designed for this and this was tested in EHN1.
I have been asked to write a 1 page description/procedure of this work for the EP safety office.

Very old slide from 30/10/20
By Franck

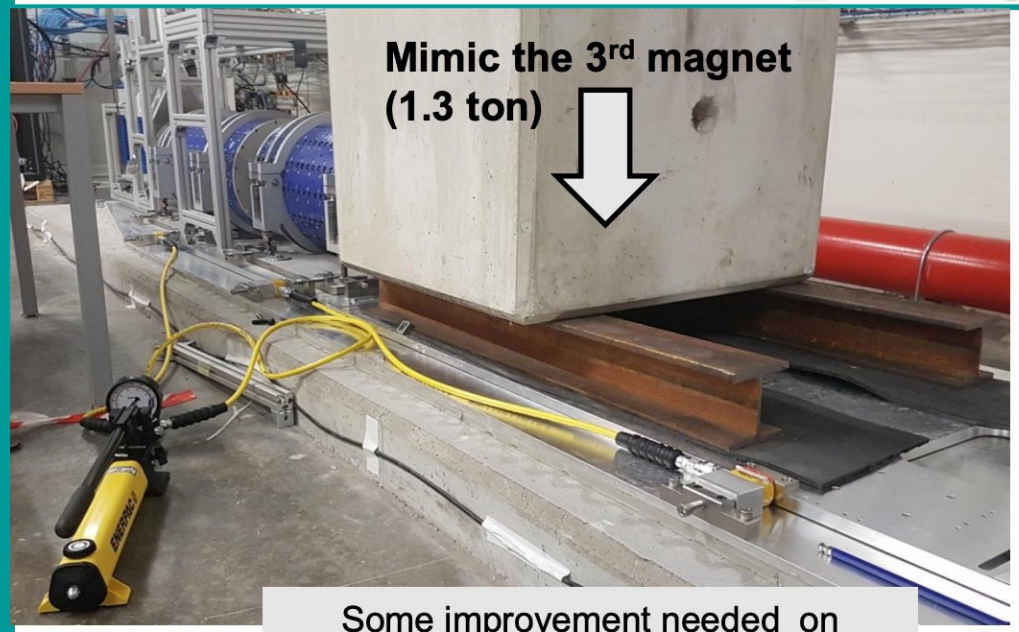
Use a pneumatic pusher to push the detector in 3 places simultaneously. Detector mechancis designed to slide. The pushing system was tested in EHN1 during the FASER construction phase and shown to work well.

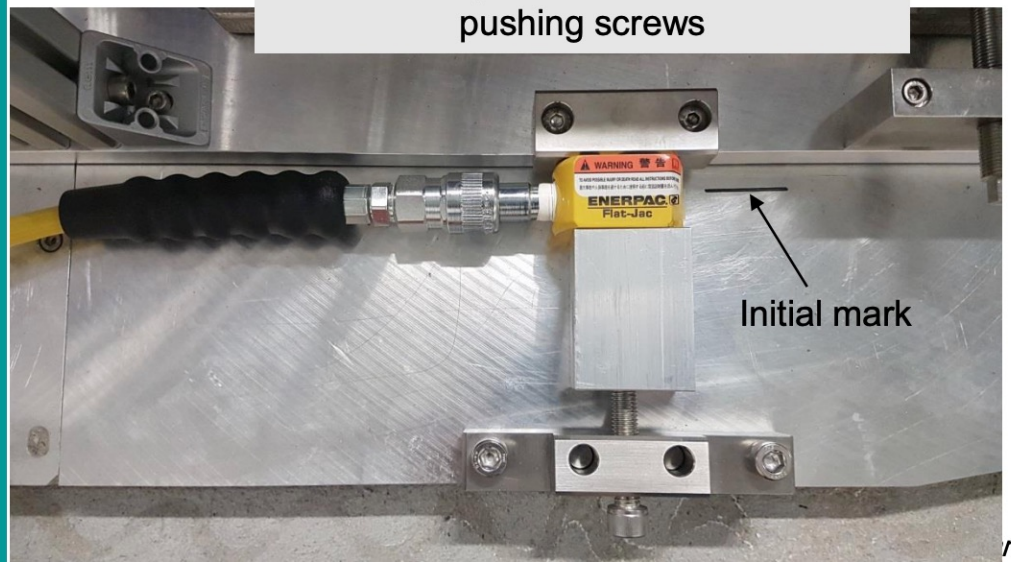
UNIVERSITÉ DE GENÈVE
FACULTÉ DES SCIENCES
Département de physique nucléaire et corpusculaire

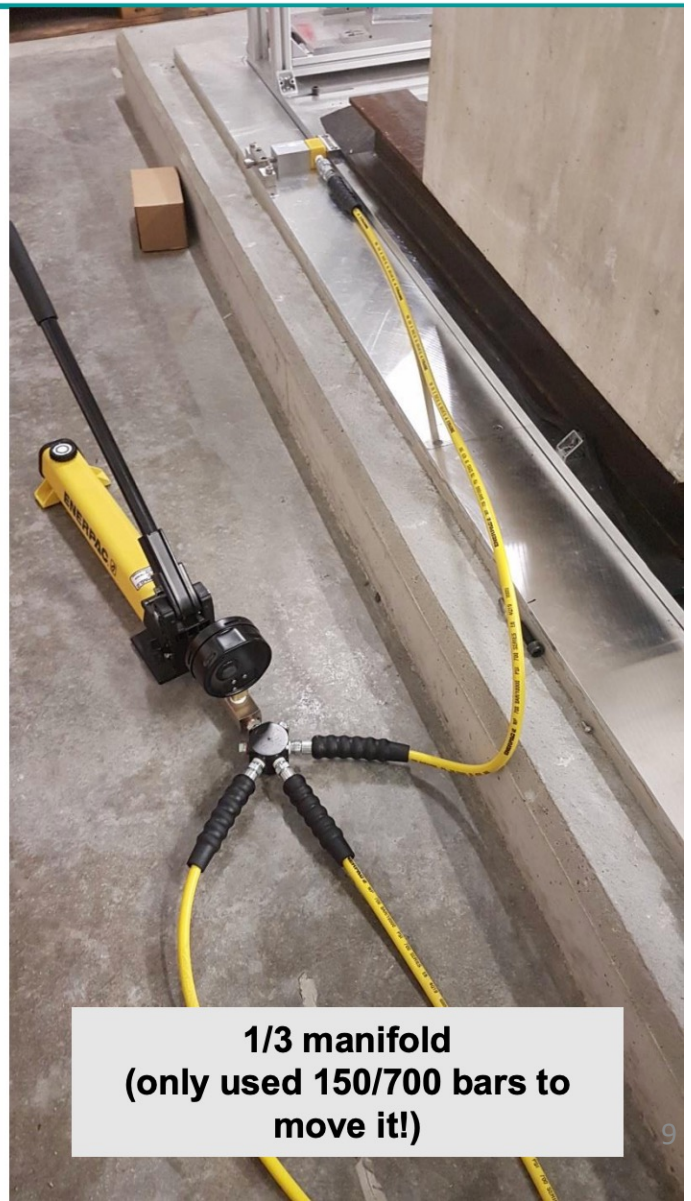
FASER

FASER_SlidingTEST

FASER Tracker

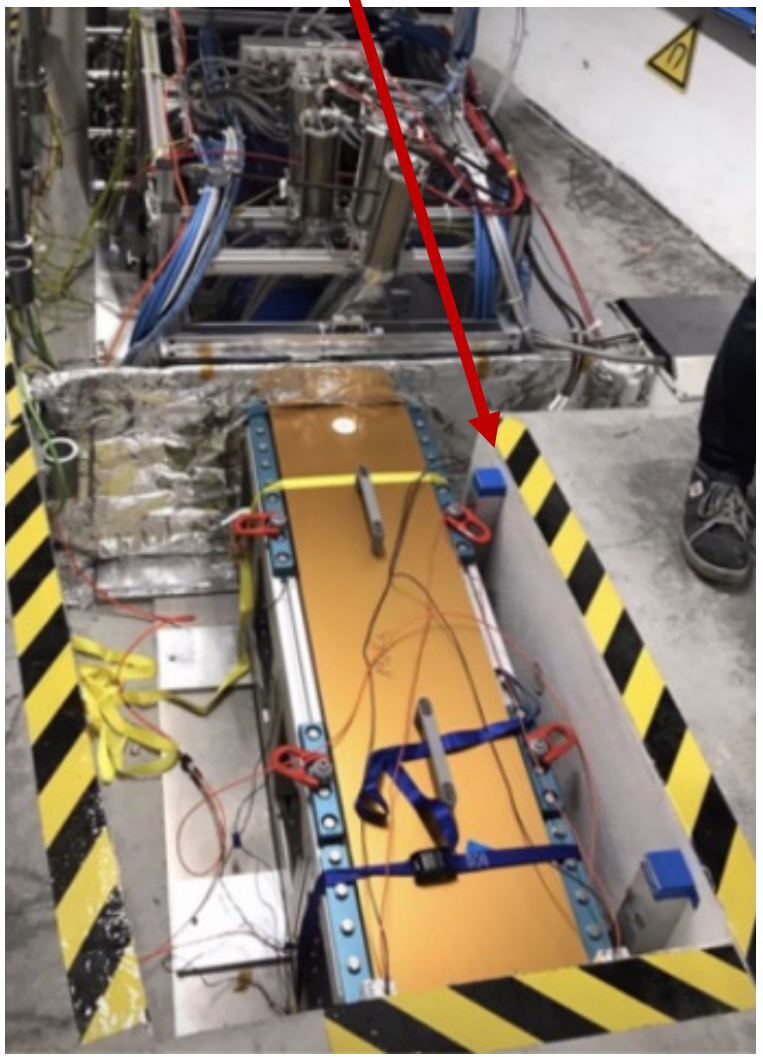






Moving detector sideways

Will also remove these 5cm wide guiding bars in the FASERnu trench, so FASERnu can be aligned with the shifted detector



Not much room to move. – Need to understand constraints from Calorimeter mechanics/cables.
Back patch panel had connector housing removed to free up more space.

Preshower Installation Planning

Detailed planning of preshower detector installation in YETS progressing well:

- ~~Nov 25 (day 1) - re-arrangement of rack~~
- ~~Nov 26-29 (week 1) - cable installation by BE-EA~~
- ~~Dec 5 (TBC) - update of switchboard (EN-EL)~~
- ~~Dec 6 (TBC)Update switch (IT-CS)~~
- Dec / early-Jan (TBC):
  - Remove / modify / re-install power supply box (EP-DT)
  - Remove old preshower
  - Install new preshower scintillators
  - Install new MPOD crate mechanics and crate
  - Install PIM box mechanics
- early-Feb:
  - Preshower installation (EN-HE needed)
  - Survey of preshower (BE-GM)
  - Cabling of preshower
  - Cooling / dry-air connection of preshower (EN-CV)
- mid-Feb
  - PS commissioning...
  - Safety sign-off (EP-SO) (preliminary scheduled for 21/2/25)

ECR on preshower installation approved in the summer

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LHC

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3137960	1.0	RELEASED

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Based on template: EDMS 1271880

Date: 2024-08-29

ENGINEERING CHANGE REQUEST

FASER Pre-shower upgrade installation

BRIEF DESCRIPTION OF THE PROPOSED CHANGE(S):

In order to improve the physics reach of the experiment, FASER will install a high granularity silicon pixel / tungsten preshower during the EYETS 24/25. The preshower detector will fit into the existing detector envelope and most of the changes will be inside the FASER detector. Work from external CERN teams will include the laying of cables from the detector to the racks (to be done by BE-EA), the modification of one of the electrical circuits in the FASER switchboard (EN-EL) and a survey of the installed detector position (BE-GM).

DOCUMENT PREPARED BY:	DOCUMENT CHECKED BY:	DOCUMENT APPROVED BY:
Jamie Boyd (EP-ADE) Brian Petersen (EP-ADT) Stefano Zambito, Didier Ferrere, Franck Cadoux (Geneva Uni)	G. Arduini, M. Barberan, M. Bernardini, A. Bardon, O. Beltramello, M. Brugger, J. Blanc, J. Bernhard, C. Bertone, S-M. Benmehdi, G. Canale, C. Colloca, J. Coupard, O. Crespo Lopez, S. Danzeca, D. Delikaris, J. De Voght, L. Di Giulio, E. Duret Bourgoz, J. Etheridge, J-F. Fuchs, J-M. Fernandez, C. Gaignant, R. Garcia Alia, G. Georgiev, G. Girardot, S. Grillot, A. Infantino, R. Jones, M. Krupa, D. Letant-Delrieux, M. Lazzaroni, Y. Loertscher, S. Pelletier, L. Pereira, H. Mainaud Durand, Y. Maurer, A. Onnela, T. Pauly, S. Roesler, R. Steerenberg, B. Schmidt, C. Tromel, H. Vincke, W. Vandelli, J. Wenninger, C. Vendeuvre, M. Wolf, T. Wengler, M. Yougil.	M. Lamont (on behalf of LMC) Approved at the 492nd LMC meeting on 28th August 2024 F. Sanchez Galan (on behalf of TREX) Discussed at TREX meeting on 19th July 2024 [6] Discussed in CERN-LHCC-2022-006

DOCUMENT SENT FOR INFORMATION TO:

ATS Group Leaders, R2E.

SUMMARY OF THE ACTIONS TO BE UNDERTAKEN:

Installation of a new detector system (the upgraded preshower detector) into the FASER experiment.

Note: When approved, an Engineering Change Request becomes an Engineering Change Order.

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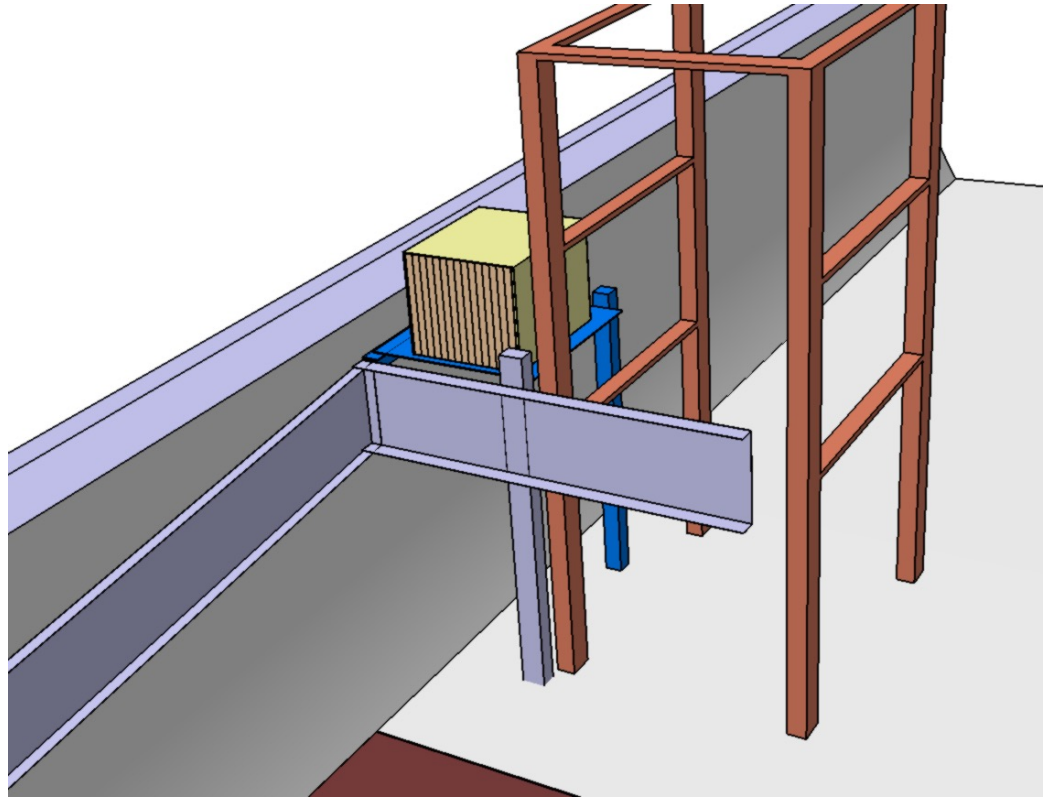
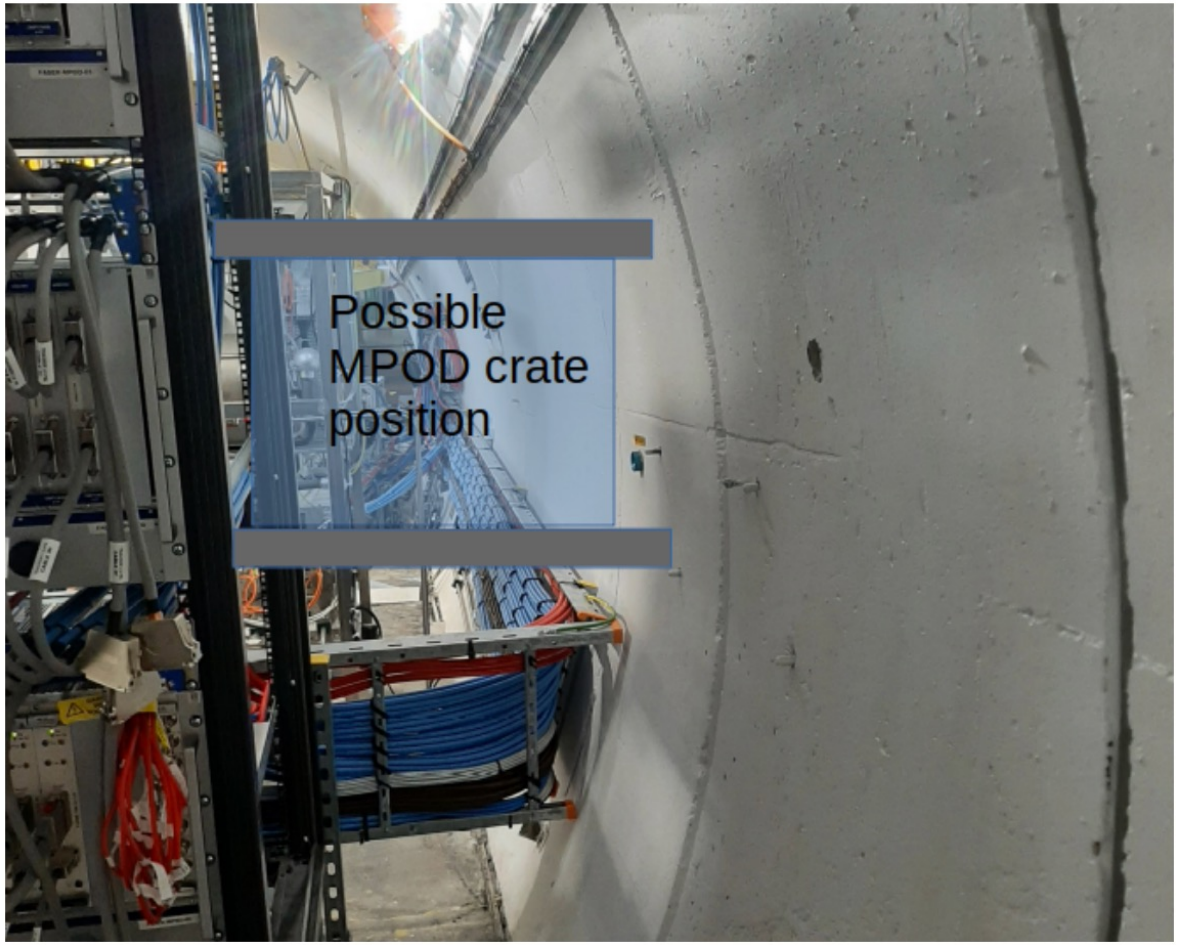
Preshower MPOD

Reminder: The preshower needs a new MPOD power supply crate.
There is no room in our existing racks for that.
Will install on dedicated mechanics in space between rack and wall.
Franck has designed mechanics for this.
Cables laid to plug directly into this MPOS crate will face the opposite way to other crates.





Preshower Installation

More detailed planning of the installation will develop after the site visit next week.
The exact scheduling depends on the timing of the readiness of the detector, we plan to do as much before this to keep ahead of the schedule as much as psossible).
However the plan is to:

- Install new preshower scintillators first
- Lower new preshower as a single unit using the crane over the detector (total weight ~60kg)
  - Crane not currently validated, will do a quick test with a 250kg block to validate this
  - Need to work on interface between crane and preshower (hook height etc…)
- After this cabling , dry-air/cooling connections , survey/alignment, commissioning…

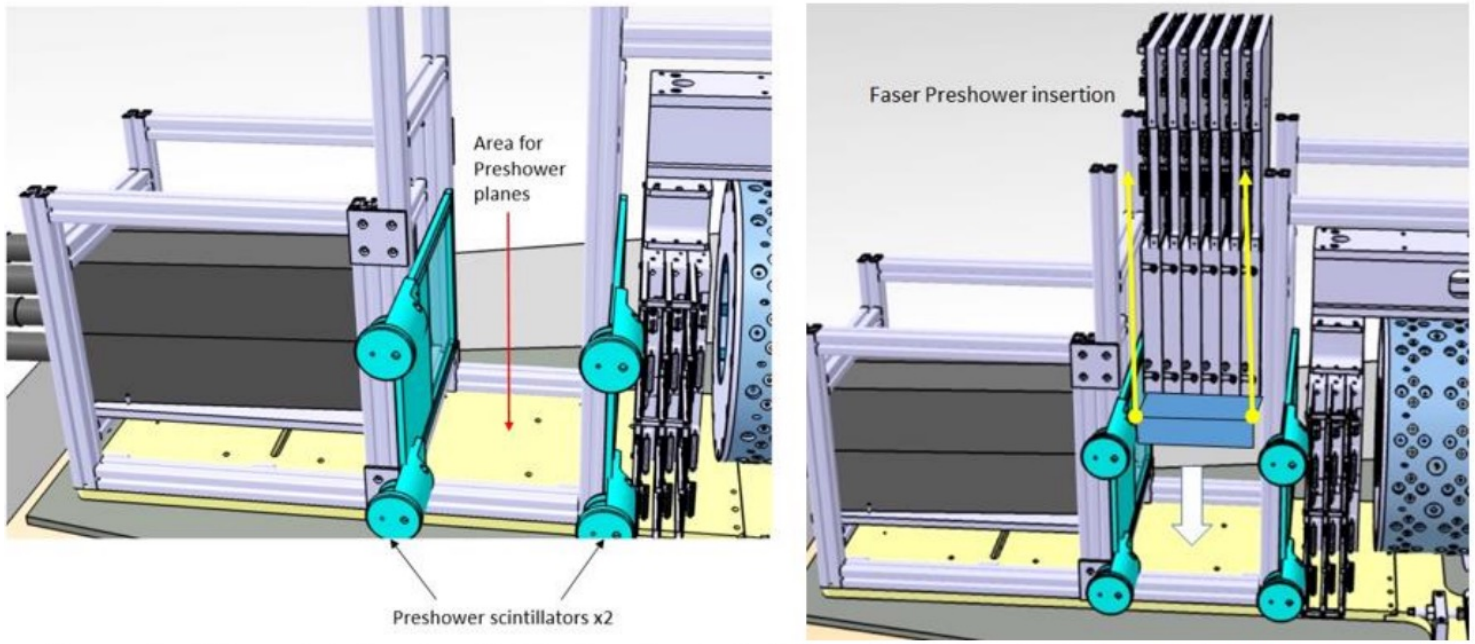


Figure 5 - 3D model showing (left) after the installation of the 2 scintillators, (right) during the installation of the preshower unit.

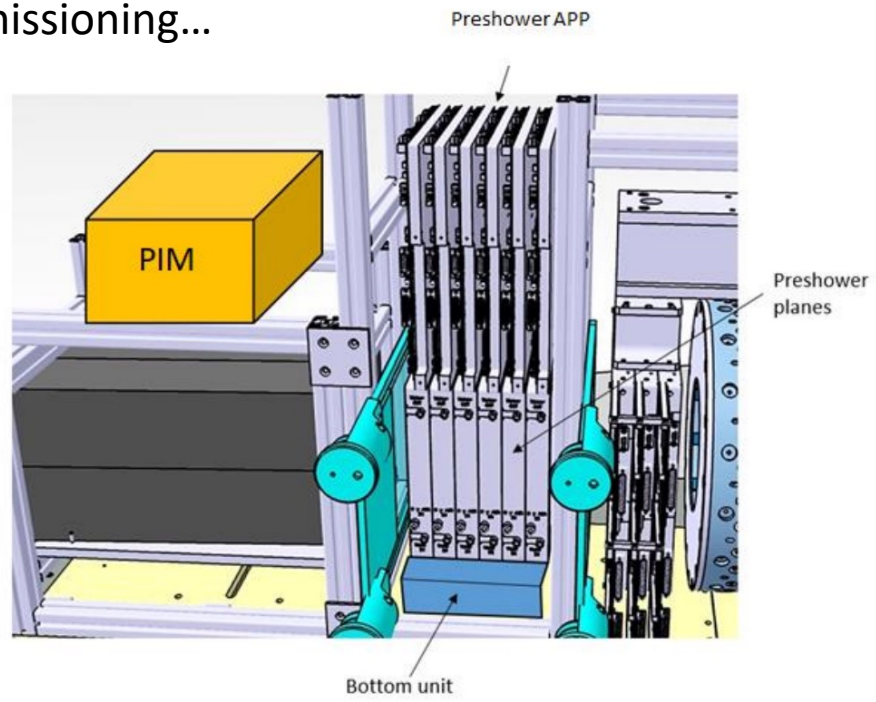
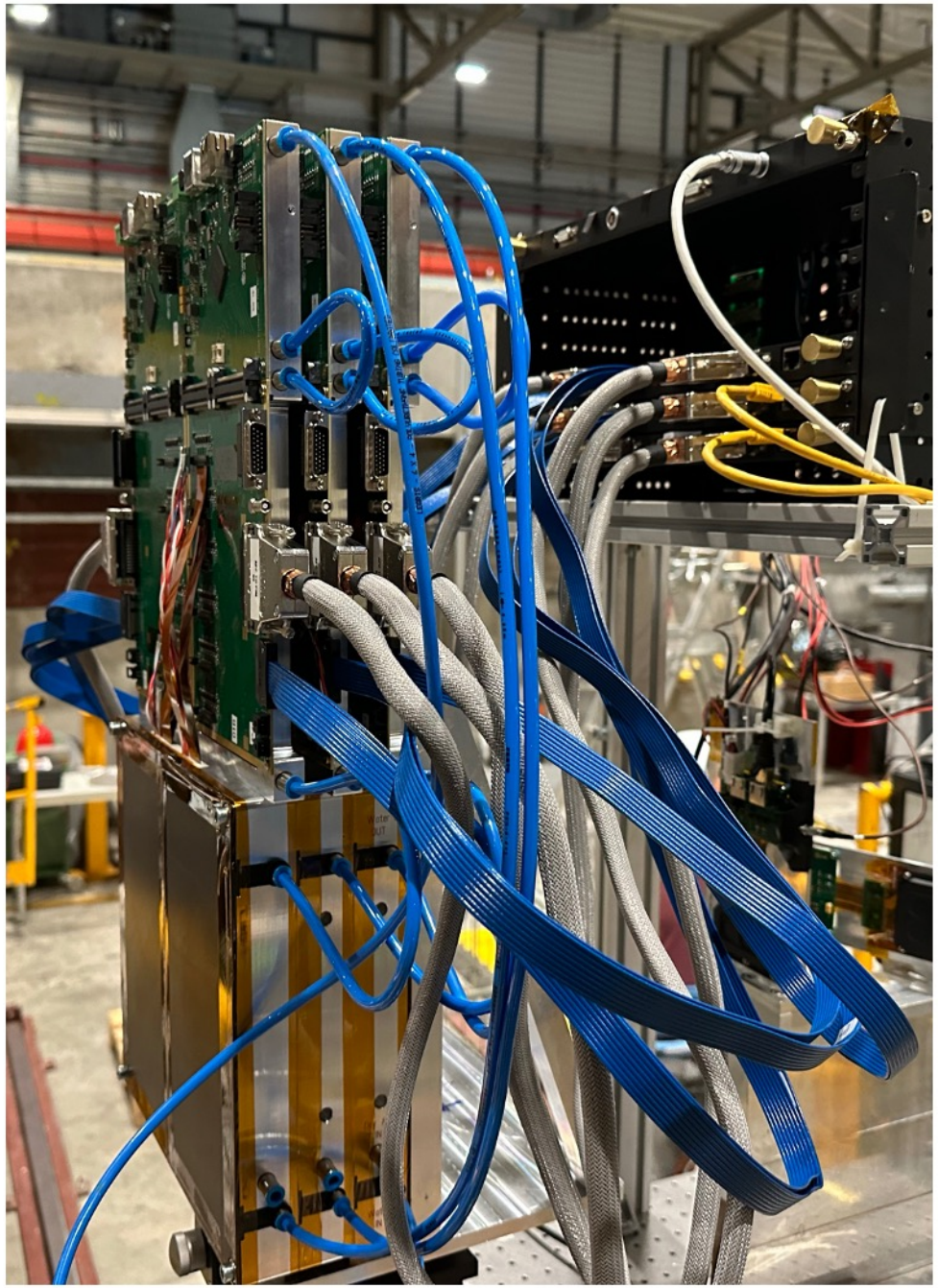


Figure 6 - 3D CAD model of the installed preshower in its final position and showing the PIM electronics box installed (note the no cables or service attachments are done at this stage).



3 plane preshower used in the last testbeam

Need a cover over the APPs for safety reasons