Test Beam 2020/03: Preparation Meeting
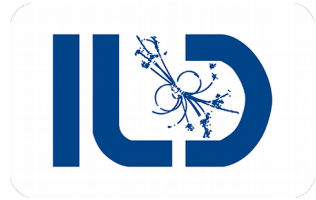
IJCLab-CNRS/IN2P3
SiW-ECAL CALICE

Outline

- Status of the SLBoard v2 and DAQ

- Status of the FEV10/11 integration into the SLBoard system.

- Wafer gluing and chip encapsulating

- Status of the FEV13 integration on the new system.

- Status of the Mechanical structure.

- Status of the cabling + patch panels.

- Status of the Commissioning procedure.

- Transport

- Attendance

- Discussions

Twiki page (under construction)

https://twiki.cern.ch/twiki/bin/view/CALICE/SiWDESY202003

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SLBoard v2

> Non exhaustive list of modifications

- Useless circuitry has been removed

- Repositioning of components → better access for cable plugging

- Improved selection of input plugs.

- Kapton length increased (from 40 to 60 mm)

- A switch for slot number encoding.

- DAC for Skiroc ADC calibration. The FPGA produces pulses for autonomous functional calibration of both gain.

- Flash EPROM for permanent information storage.

> Production status: 4 cabled Slboard + 18 waiting for the debugging results

> **Most new features have been tested (all with satisfactory results)**

- DAC for Skiroc ADC calibration has been satisfactorily tested but it is under optimization.

- Flash EPROM not yet tested.

- HV is available on the SL_Board but not yet tested.

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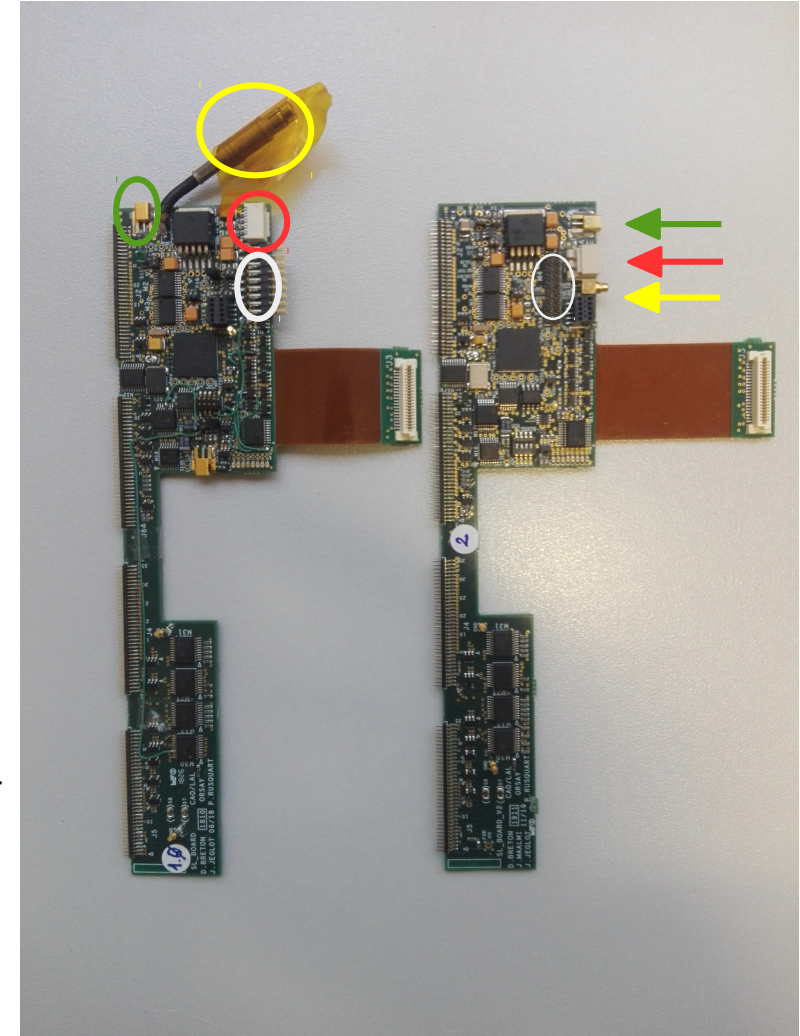
DAQ & FirmWare news

> Post beam test debugging done:

- i.e. Save histogram files when performing online scurves

> Kapton-Core

- All 15 slots are operative.
- Next setp read 15 slabs at the same time.

> SLBoard FW loading possible through the Kapton.

> FW/SW adapations for the new SL-Board features are finalized.


Online scurves
Old plot
(pre-commissioning)
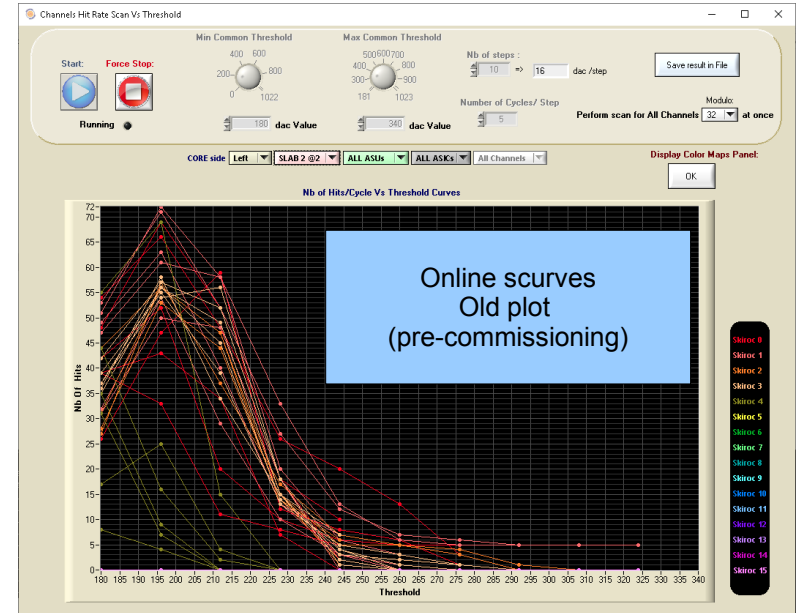
FEV10/11 Integration into the SL-Board system

> 9/10 of the 13-22 slabs are at LAL.

> Kapton connectors have been removed as well as the SMBs for all of them

- SLAB 14 & 16 have been tested with SLBoard (v1)
- The rest are being progresively equipped with the female gradcon connectors and being tested.
- Except the slab 15 (FEV 10)

> Remark: we found an incompatibility issue between male & female connectors of the Antelec producer.

- No compatibility issue between Gradcon & Antelec.
- We found out after several FEV11 were already equipped with Antelecs → a couple of days days delay
- Issue being discussed with Antelec.

> "New" FEV10 from LPNHE fully equipped with 320 um wafers but never equipped with the SMB

- to be equipped with SL-Boards?

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FEV10/11 status

| SLAB	DESY 2017 status	DESY 2017 calibrated cells	CERN 2018 status	CERN 2018 calibrated cells	Comments
13	🟥	0%	🟥	0%	Glue spilled in the SMBv. **Recoverable for 2020**
14	🟥	0%	🟥	0%	Error in the SR retour → **fixed for 2020**
15	🟥	0%	🟥	0%	Stopped working during the 2017 commissioning. **Recoverable for 2020 ?**
16	🟩	92%	🟨	?	At CERN : low performance on the corners of the ASU and SMB interface
17	🟩	93%	🟩	95%	
18	🟩	94%	🟨	?	At CERN : a pattern of lower MIP values is seen in the center of the ASU
19	🟩	93%	🟩	93%	
20	🟩	94%	🟩	96%	
21	🟨	54%	🟥	0%	Stopped working at DESY 2018
22	🟩	84%	🟩	87%	
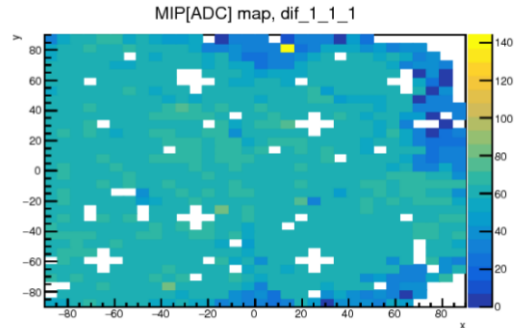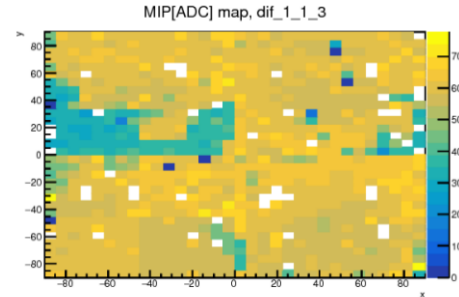
Slab 16

Slab 18

SLAB 14: recovered for data taking

- Slab not tested at DESY 2017 due to a problem of the Signal/Slow Control Return lines that blocked the readout.

- First slab used to test the "disassembly procedure" (November 2019)

- Satisfactory DAQ tests done by bypassing 4 chips.

- Status: slab fully recovered and commissioned → similar performance than the other FEV11 had during 2017
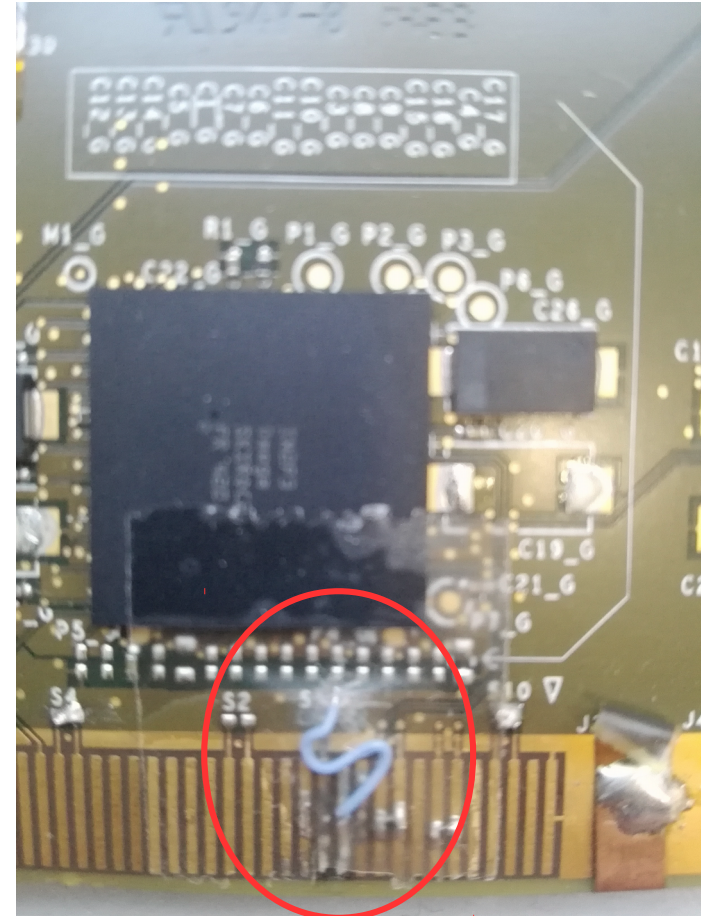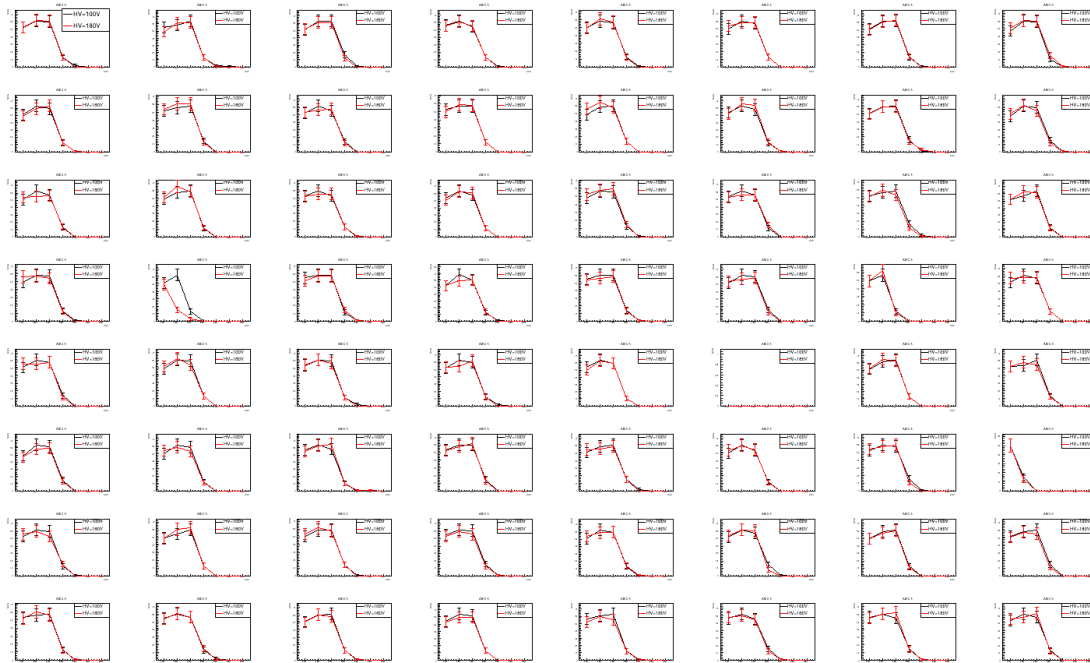

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SLAB 14: HV 100 V vs HV 180 V

> This board has large leakage currents (since the first time that I have tested in 2017)

- HV100V → ~ 15-18 uA;   HV180V → ~ 30 uA

- No differences in performance have been observed (s-curves and cosmic runs)

- Constant results for several runs over more than 2 weeks.
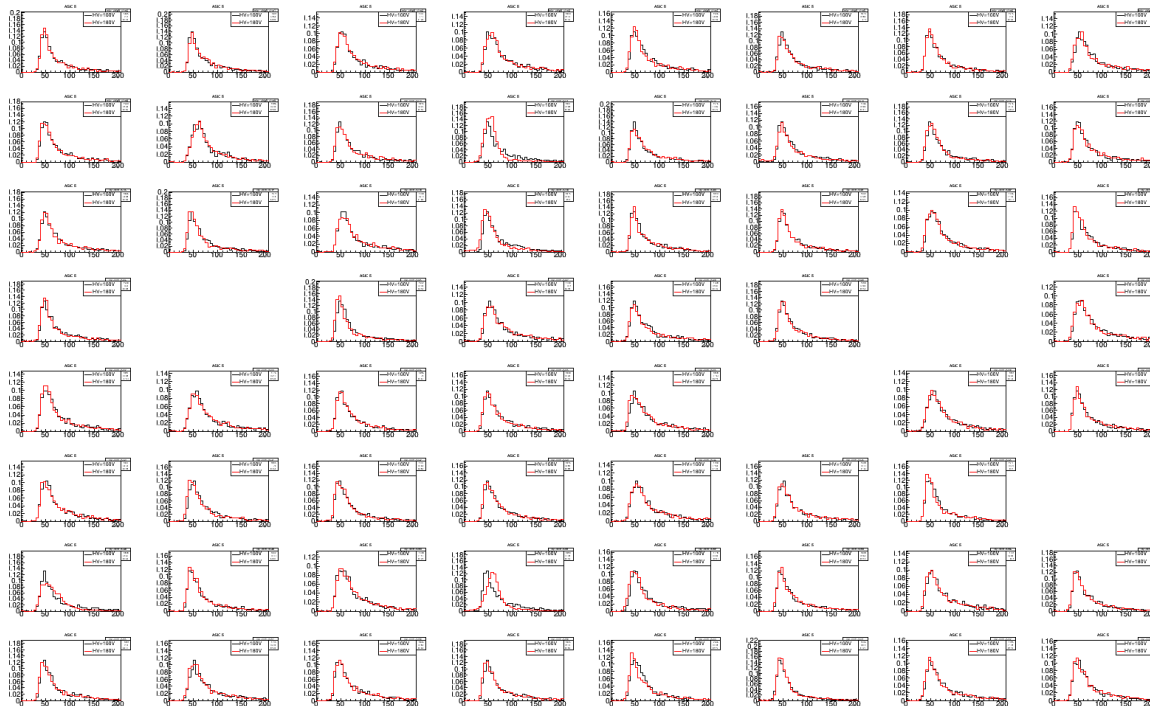

> s-curves on ASIC 5

- Red = HV180 V

- Black = HV100 V

SLAB 14: HV 100 V vs HV 180 V

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- Constant results for several runs over more than 2 weeks.

➤ MIP distributions on ASIC 5

- Red = HV180 V

- Black = HV100 V

SLAB 14: HV 100 V vs HV 180 V

Conclusions:

➤ We recovered a "lost" slab

- Similar attempts ongoing for slab 13 and 21
- What about 15? It is a FEV10… not a priority.

➤ We don't see differences in performance operating the SLAB at 180V or 100V.

- We foresee to use 2 different HV PS in the beam test
- But in case that we don't do it, it will not cause major issues.

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FEV 12 *"threshold issue" isolved*

- We solved the problem with the "thresholds" observed in the Test beam.

- Test beam diagnosis: threshold value inversion

- Good diagnosis: baseline reference shift for the DAC due to a wrong cabling of the FEV

  - SK2: an extra resistance in the PCB was needed to fix the development mistake that made the threshold dynamic range to small.

  - Not needed in SK2a.

- All the resistances have been removed and the FEV12 have been re-tested satisfactorily

Plans for wafer gluing at LPNHE: FEV12

- 7 more 500 um wafers are available at LPNHE (from LLR)

- FEV12 -1

  - Is at LPNHE right now being prepared for the gluing of 3 more wafers.

- FEV12-2 is at LAL (for DAQ tests)

  - Will travel to LPNHE by the beginning of February (?) for the gluing of 3 more wafers.

- LAL/LPNHE are working on special mask to facilitate the gluing of the wafers into the FEV12 without removing the connectors.

  - This was already last year done for the COB

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CHIP encapsulation FEV11_COB

> COBs are now at Hybrid (for encapsulation)

- COB-a (1 real wafer plus a fake wafer) to be used as test for encapsulation
- COB-c to be fully equipped with 3 more wafers.
- COB-d to be fully equipped with 4 wafers.

> To be recovered the 27January.

> Note: Hybrid will try to recover the ASIC #8 of COB-a which is misworking.
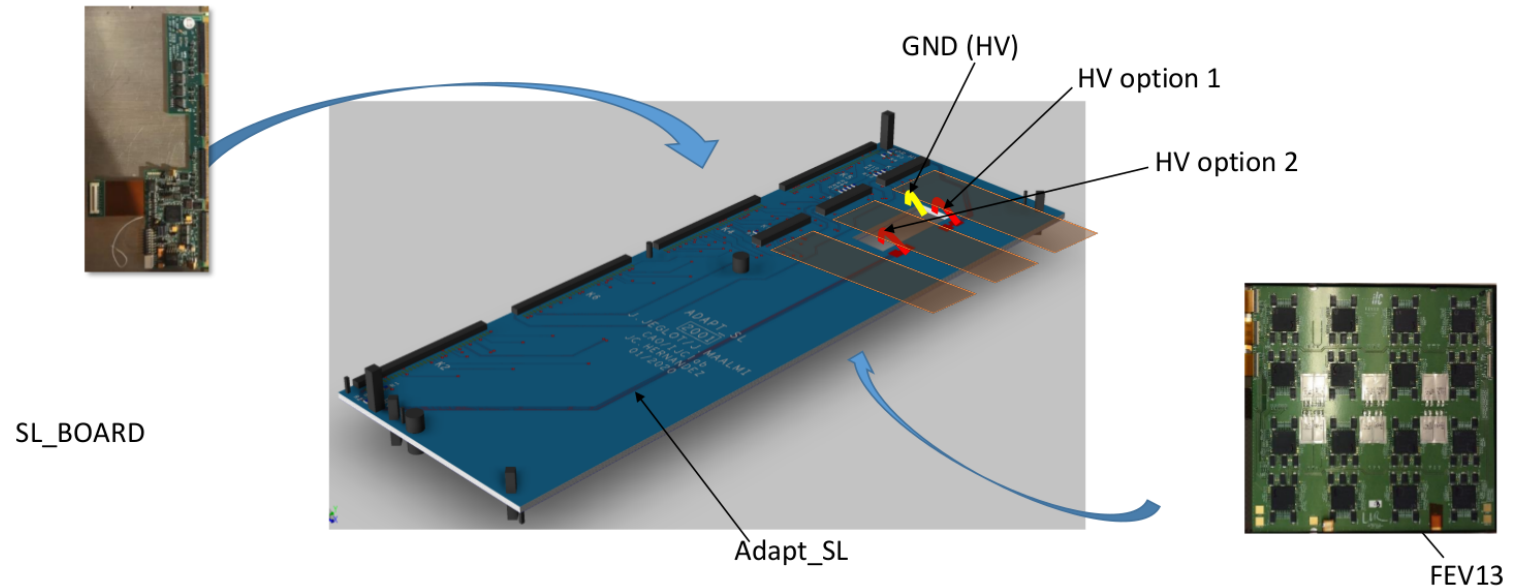
- By fixing broken wires
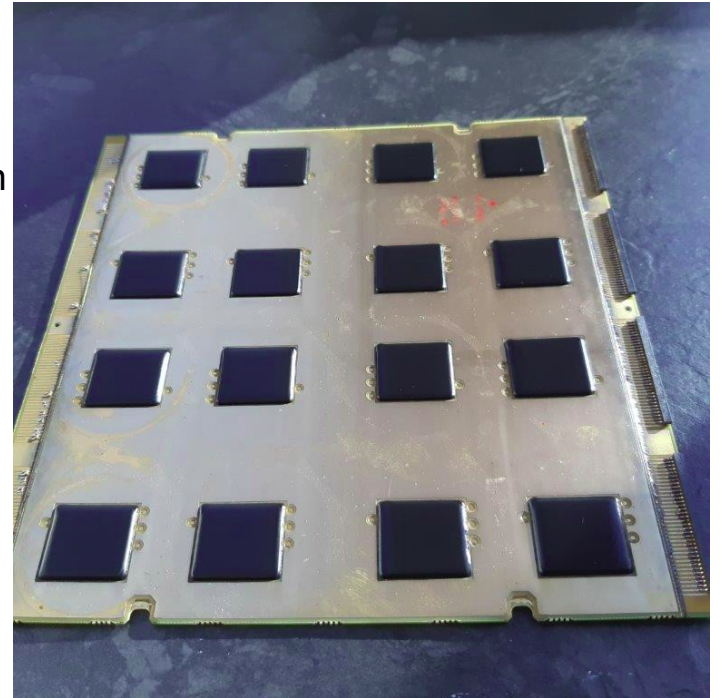
Plans for wafer gluing at LPNHE: FEV11_COB

> Plan to fully equip with wafers the COB-c and COB-d

- Mid february (?)

FEV 13 integration with th SLBoard system

> Design finished.

> FW modifications done.

> Production to be started soon.
  - XX to be produced
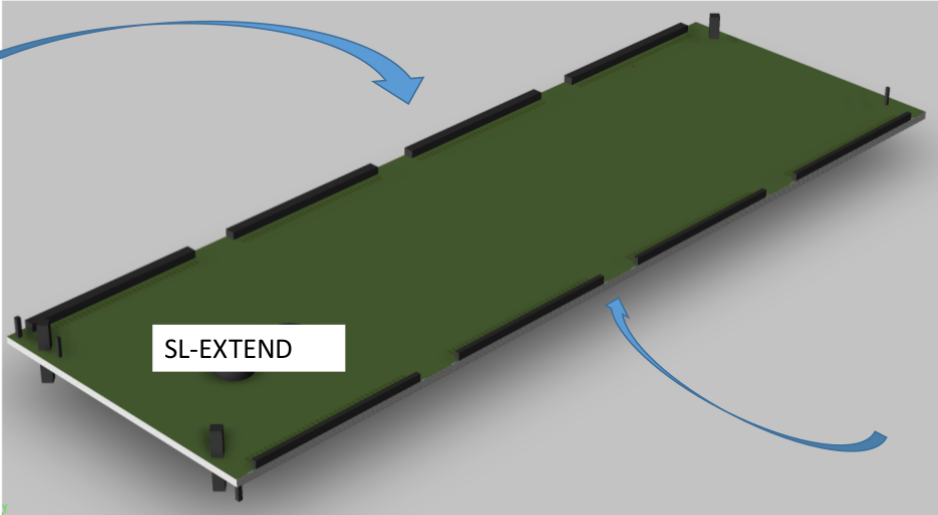 - XX to be equipped

SL-ADAPT for FEV13

GND (HV)

HV option 1

HV option 2

SL_BOARD

Adapt_SL

FEV13

> ADAPT SL:
  > 4 GRADCONN mâle
  > 3 connectors AYF414035A + USL00-40 l-x (40 pins 11 gnd)

Design jeglot/Maalmi
CAO jc. Hernandez
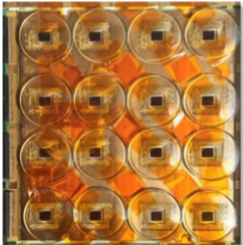
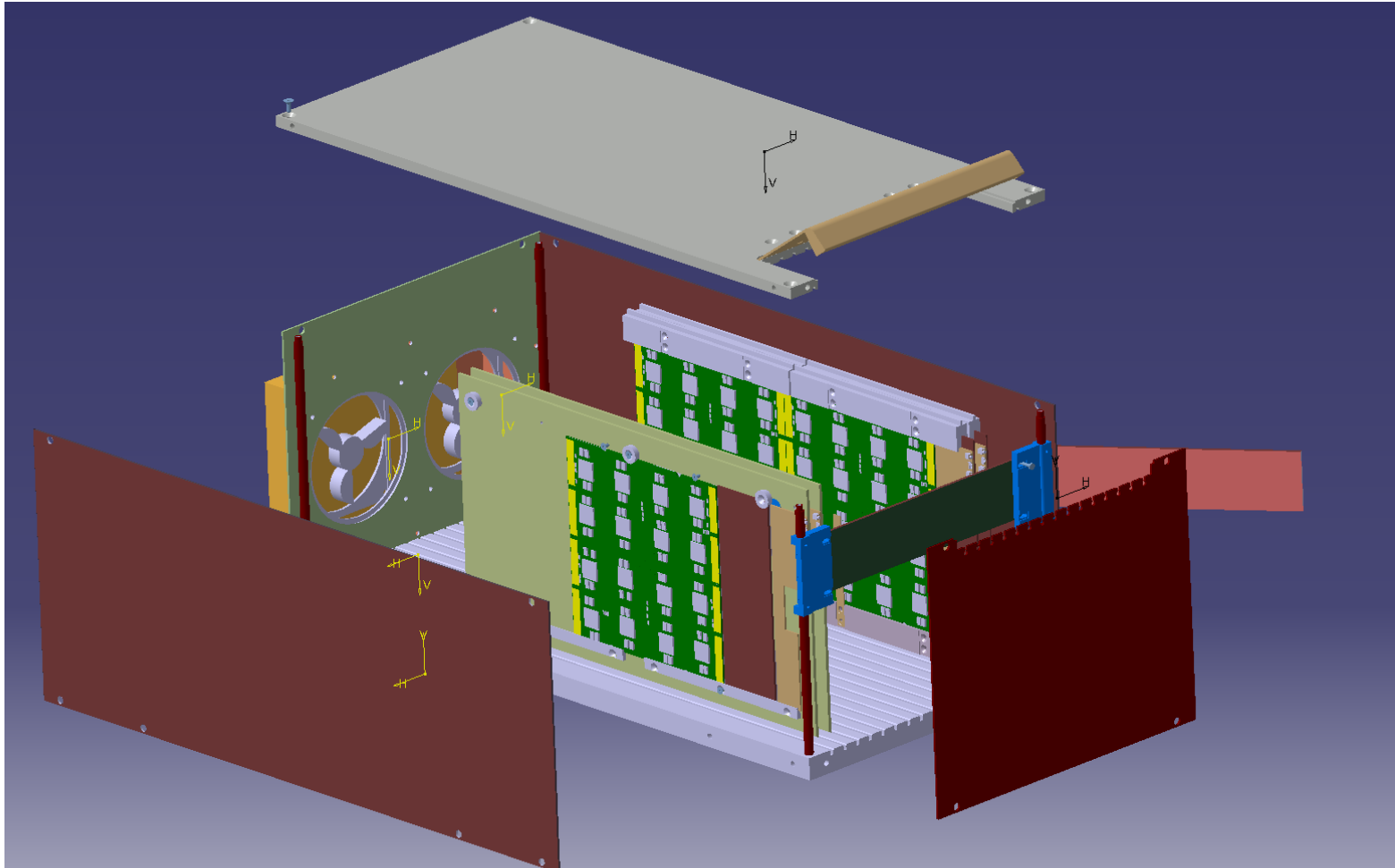*IJC Lab*

FEV 13 integration with th SLBoard system

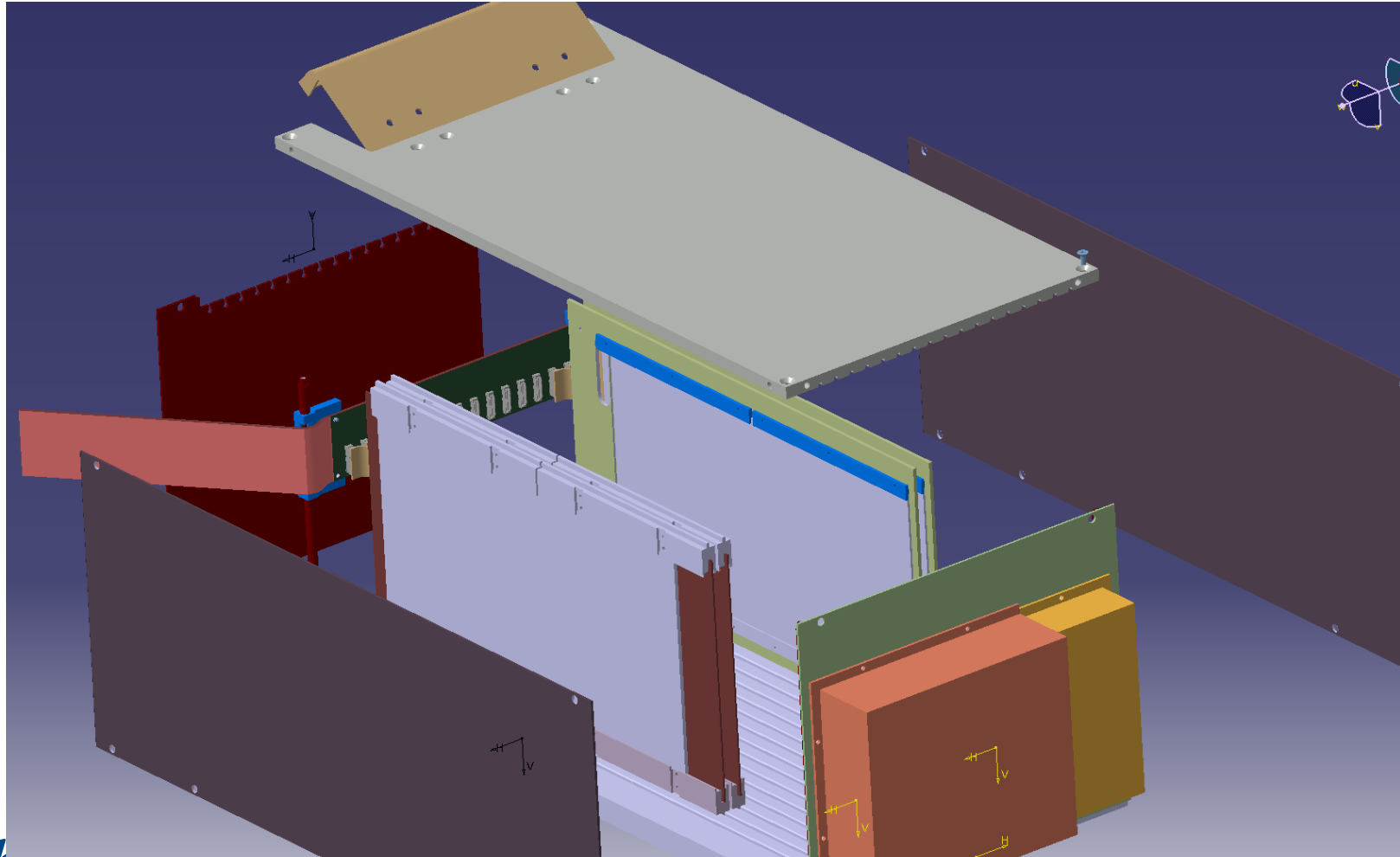

SL_BOARD

SL-EXTEND
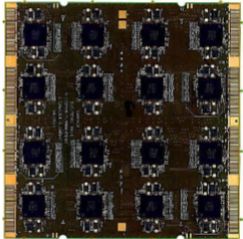
FEV11 or FEV12

COB (Chip On Board)FEV
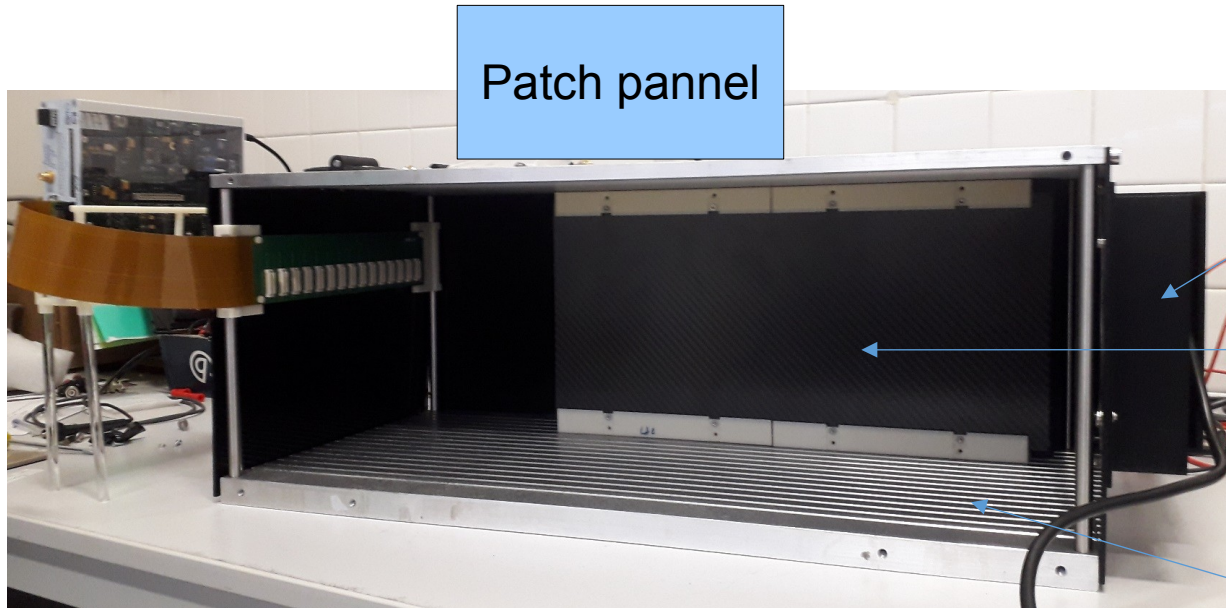
Design jeglot
CAO jc. Hernandez

Status of the mechanical support

Status of the mechanical support

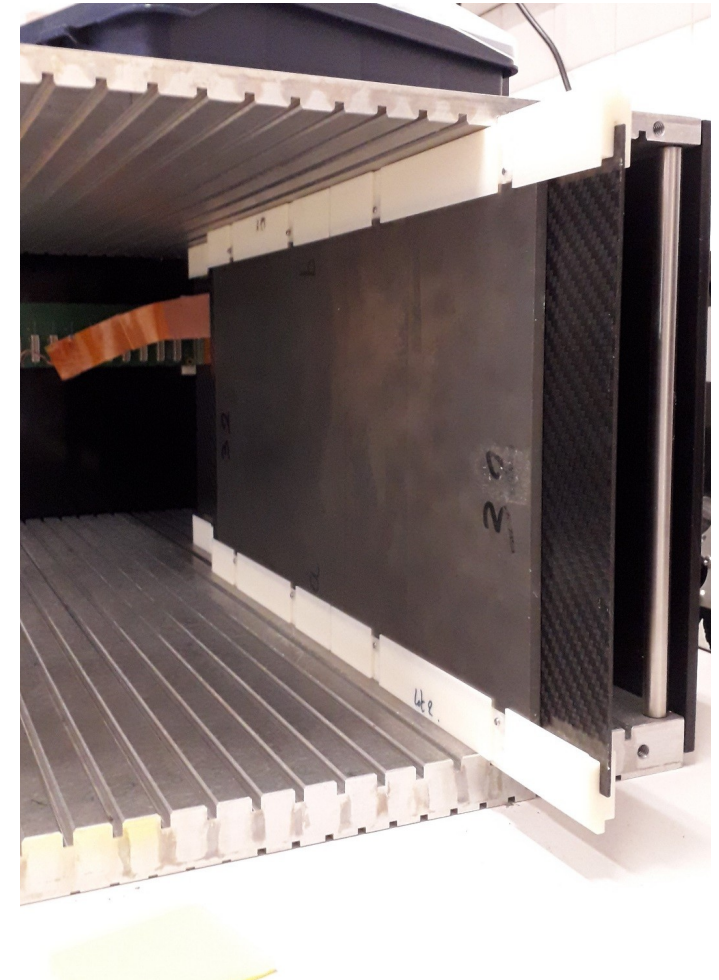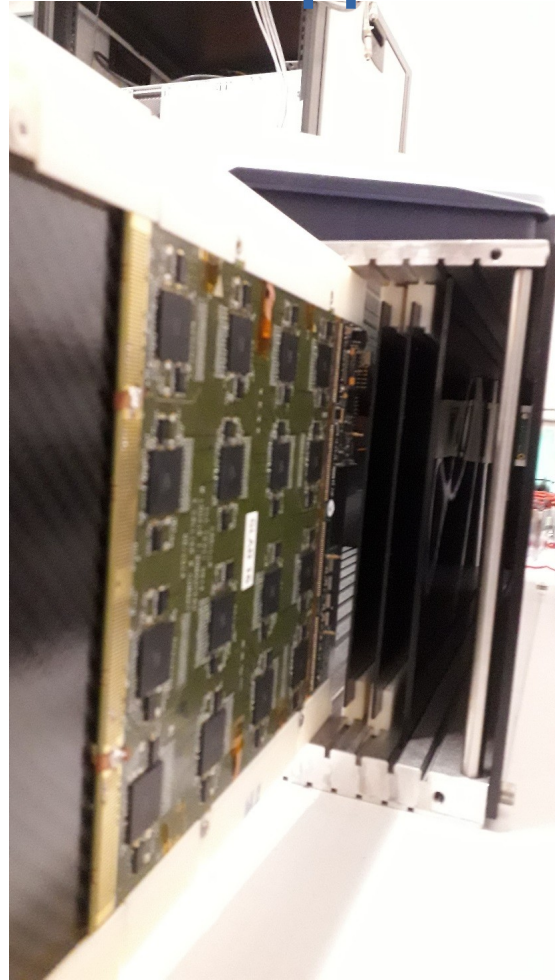# Status of the mechanical support

Patch pannel
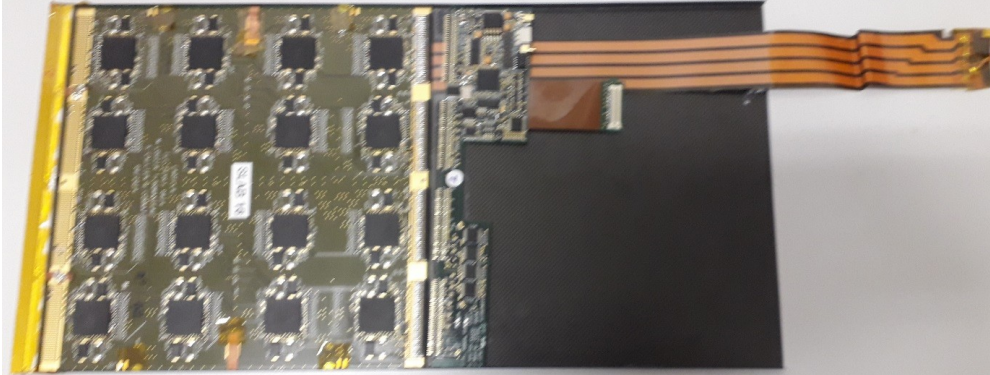
fans

Carbon plate which support ASU and W plate

17 rails to align ASU+ SL board in front of the 15 slots of the « core kapton »

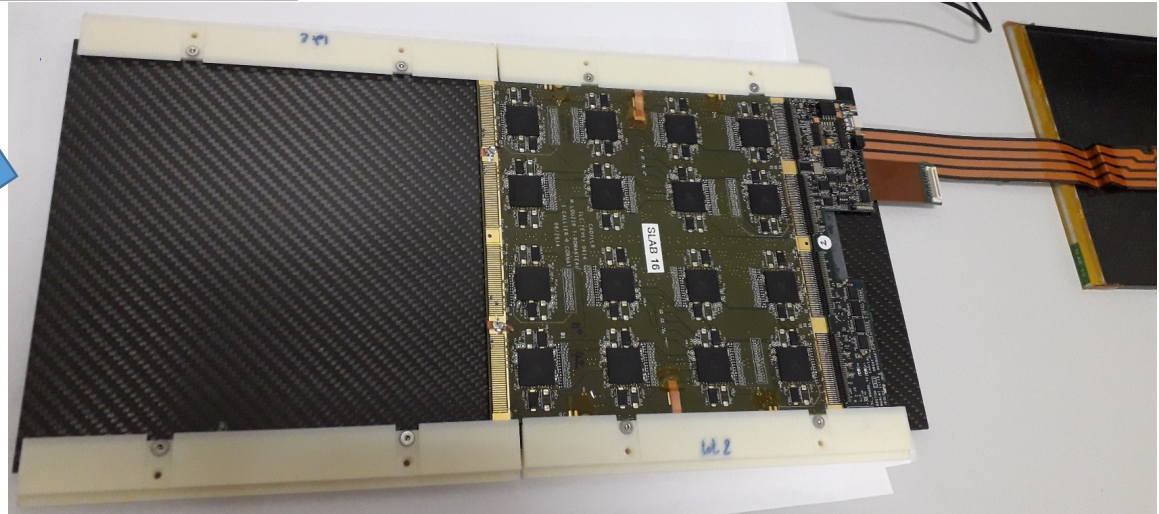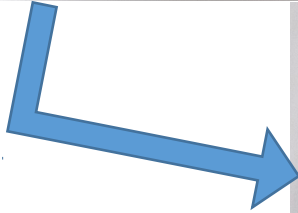# Status of the mechanical support

Carbon plate: support one side the tungsten plate / the other side the SL board + 1 or 2 ASU

Status of the mechanical support

ASU + HV kapton take off the » U carbon shape of the LLR » and fixed on the carbon plate, slide on the rail
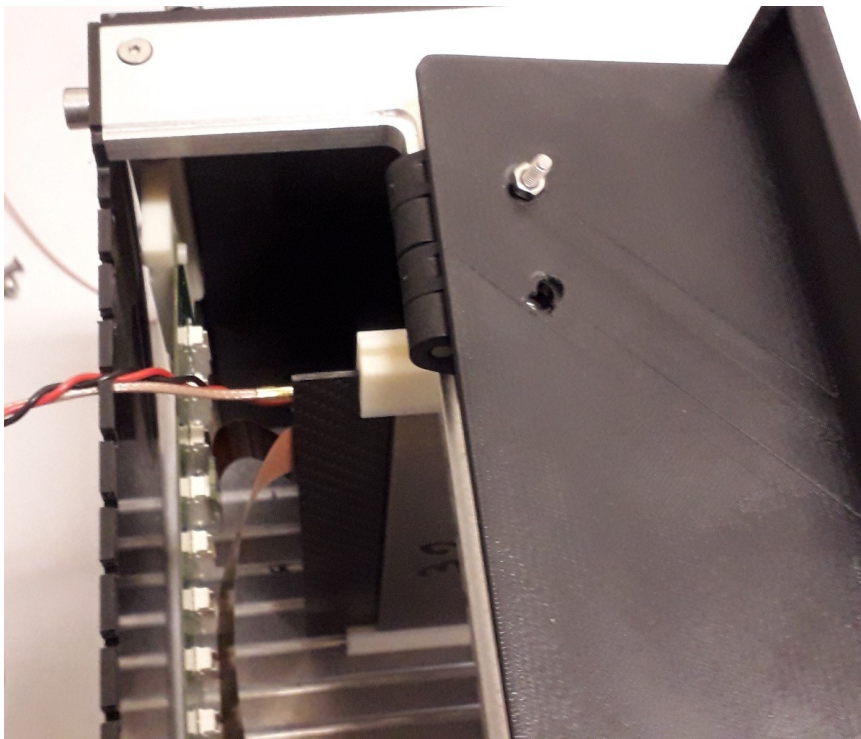
Status of the mechanical support

View of 4 support plates adapted to the thickness of the COB and FEV electronic card and the different thickness of the W plates.

Right side : old plastic support which can align ASU with other thickness like « Japanese slab: ASU + their carbon protection »

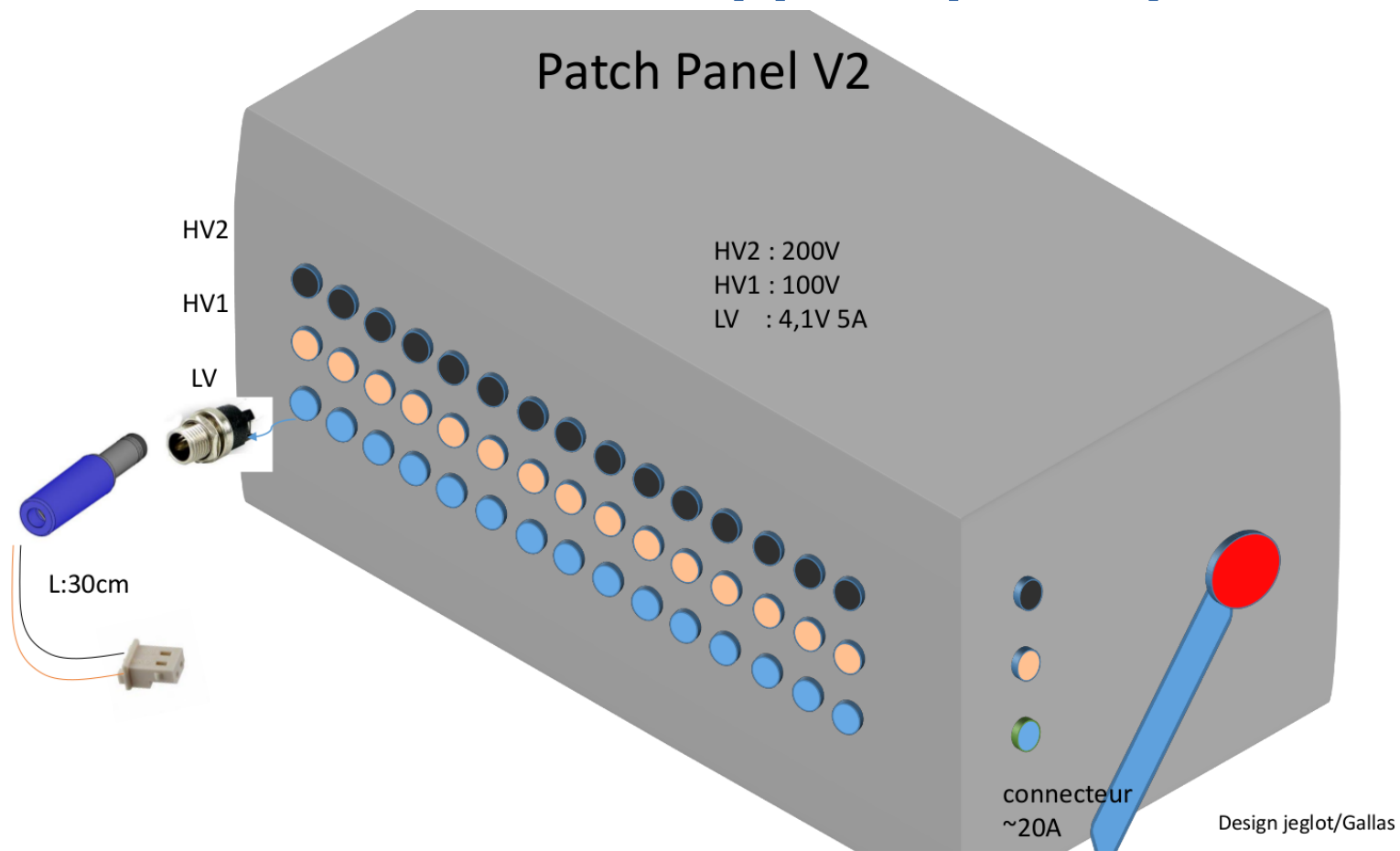# Status of the mechanical support

Connections in/out
the box per slab:
 - flexible kapton +
plug
- -1 LV red/black
    cable
- - 2 HV cables

Status of the mechanical support: patch pannel

Patch Panel V2

HV2 : 200V
HV1 : 100V
LV   : 4,1V 5A

HV2
HV1
LV

L:30cm

connecteur
~20A

Design jeglot/Gallas

Commissioning procedure

> Slow warm up of the automatization of the procedure with the new DAQ

> Manually done for SLAB14 and the COBs → very similar results compared with 2017, but less masking of channels if we use SK2a.

- For a "trained" user, the manual process does not take much more than the automatized one (for one or two slabs)

> Do we want to use the TDC?

- What are the physics motivations to use it at DESY?
- What are the proper settings?
- Proposal for DESY: use forced High Gain and TDC.
- All this needs some readaptations of the DAQ software. Not in the top of the list of priorities.

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Transportation & Attendance

- ➤ LAL van

  - ~20 March (Roman + ?)

- ➤ Attendance

  - Doodle to be created
  - LAL: 3 physicists, 4 engineers, 2 master students
  - LLR: (?)
  - Omega: (?)
  - Kyushu (?)
  - Tokyo U (?)
  - CERN: (?)
  - SKKU: 1 PhD student (or postdoc)
  - CIEMAT: 1 PhD student