

HGTD Patch/Filter Panels

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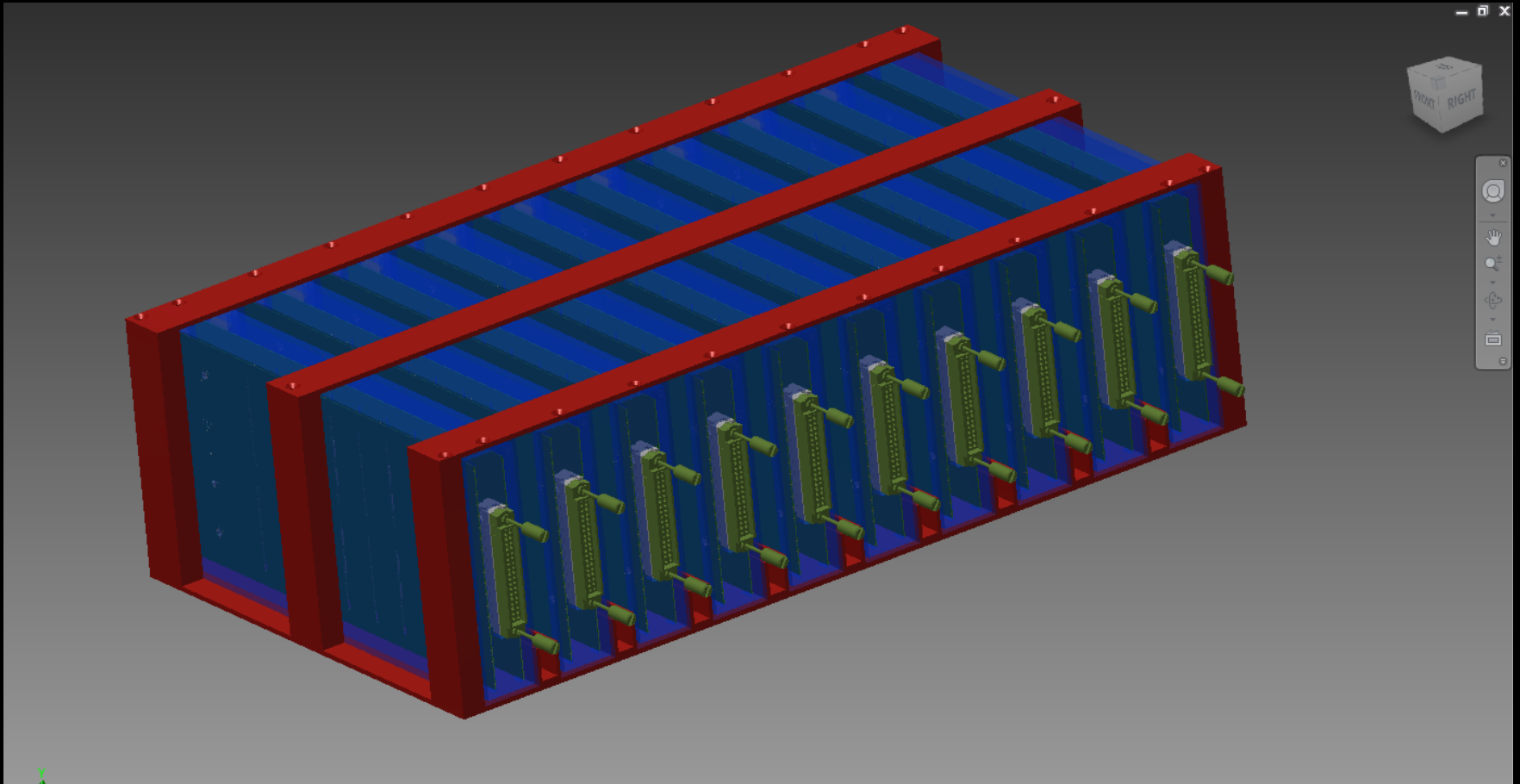
First CAD drawings

- Only a general scheme so far, but ready to move to prototyping and testing as soon as parts are agreed on
- Next steps:
 - Decide on parts:
 - Connectors: used 56-pin CMM 320 series from Nikomatic (from initial discussion with Sergei)
 - SMD R and C components: need specs to procure
 - Acquire components for a small prototype
 - Assemble test boards and perform electrical tests

Modular box

Dimensions: 360 x 195 x 104 mm³

Weight: 7.5 kg (final around 10 kg)

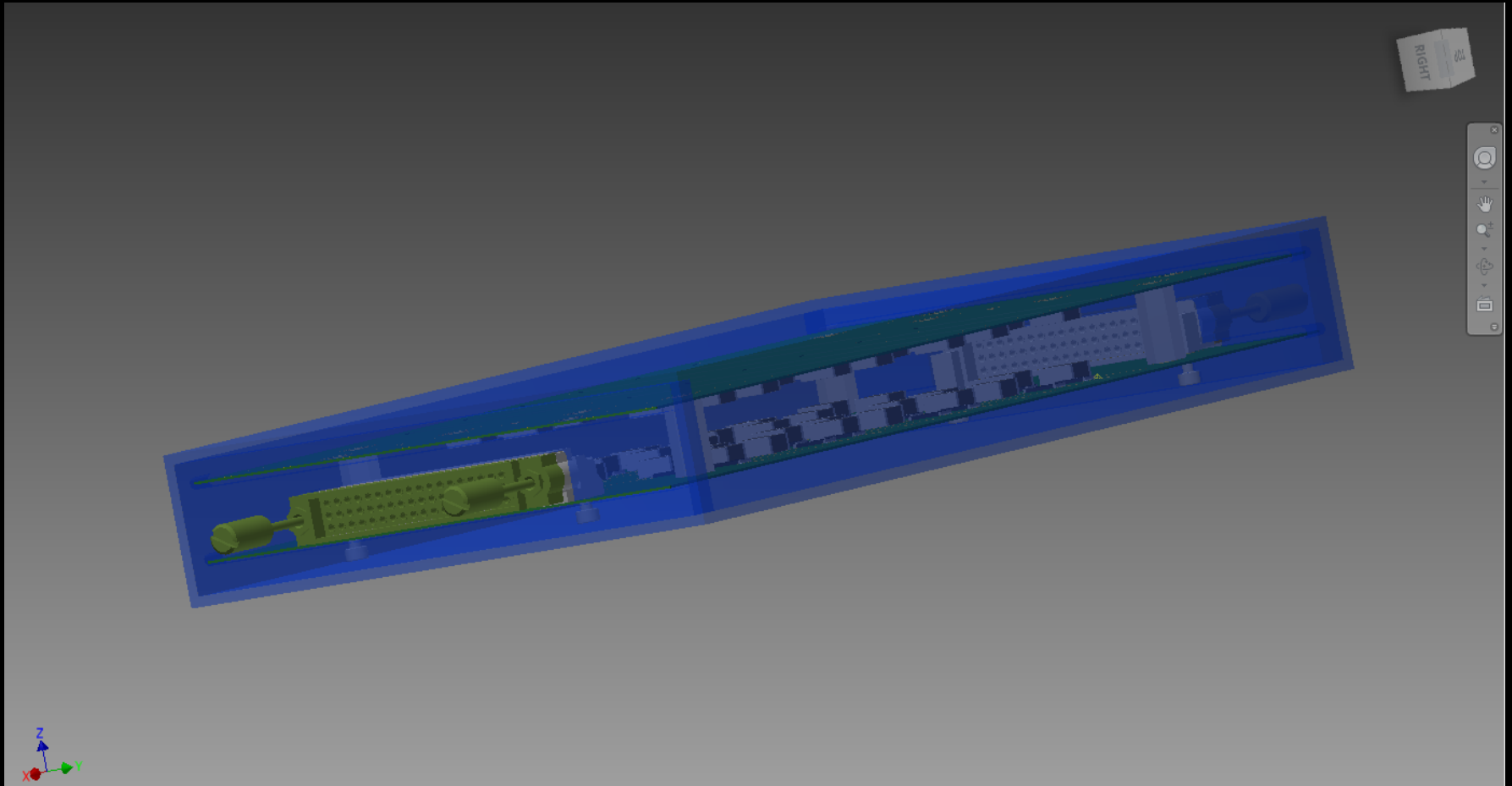


56 wires in (28 pairs)

For insulation: male pins on USA15 side; female plugs on sensor side

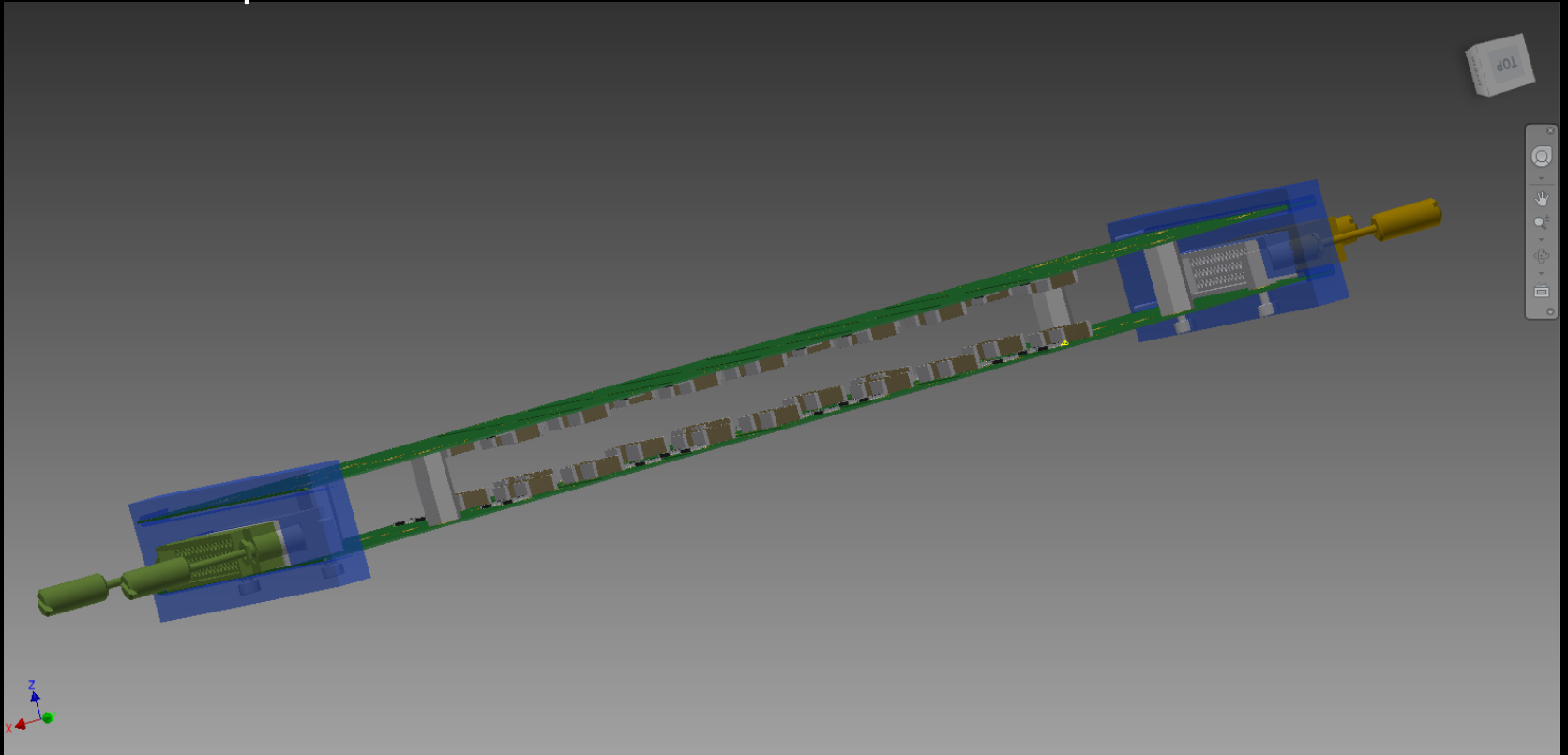
Filter module

Mechanically independent and insulated modules



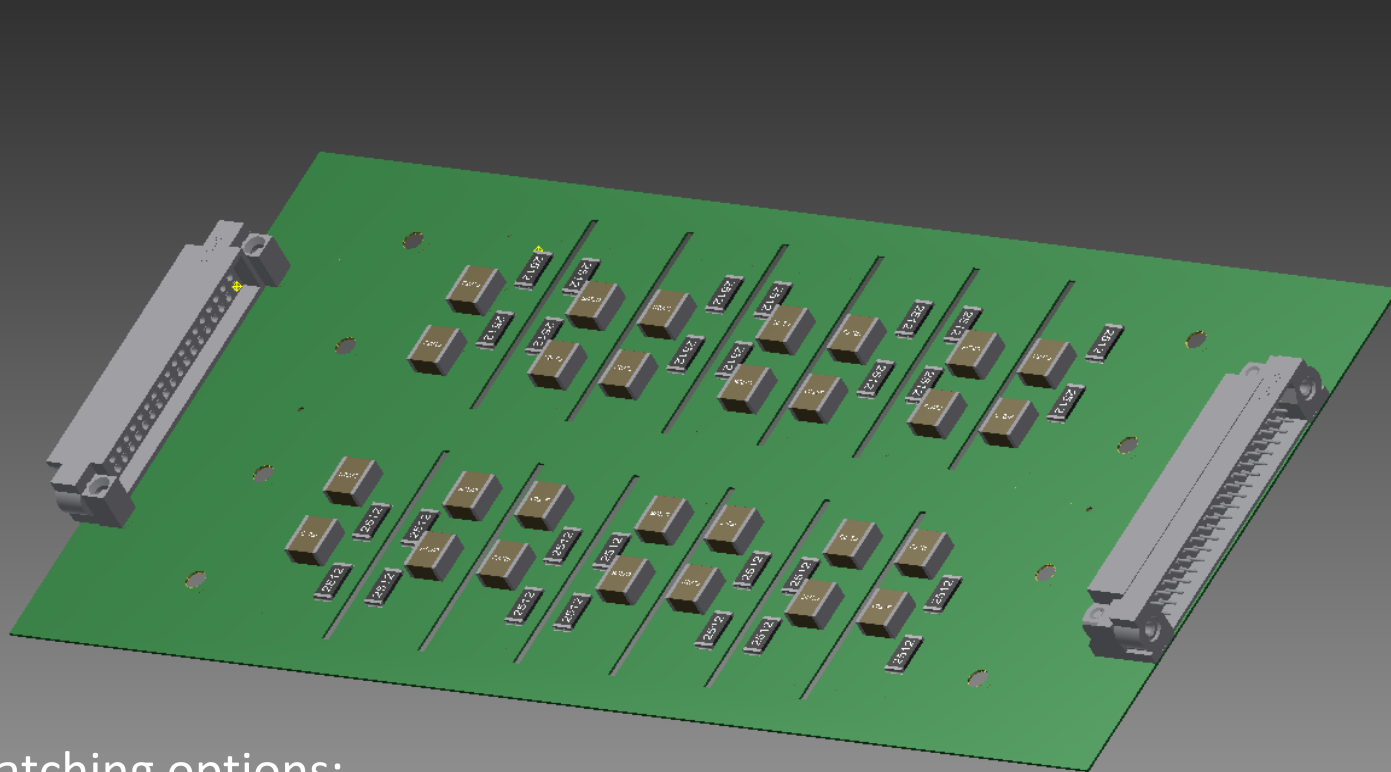
Filter module

Two PCBs per module with filters



PCB with filters

14 RC-RC filters per PCB – 28 per module / Wire routing from connector to filter



Patching options:

56 wires in (28 pairs) – 56 wires out (28 pairs)

48 wires in (24 pairs) – 56 wires out (28 pairs)

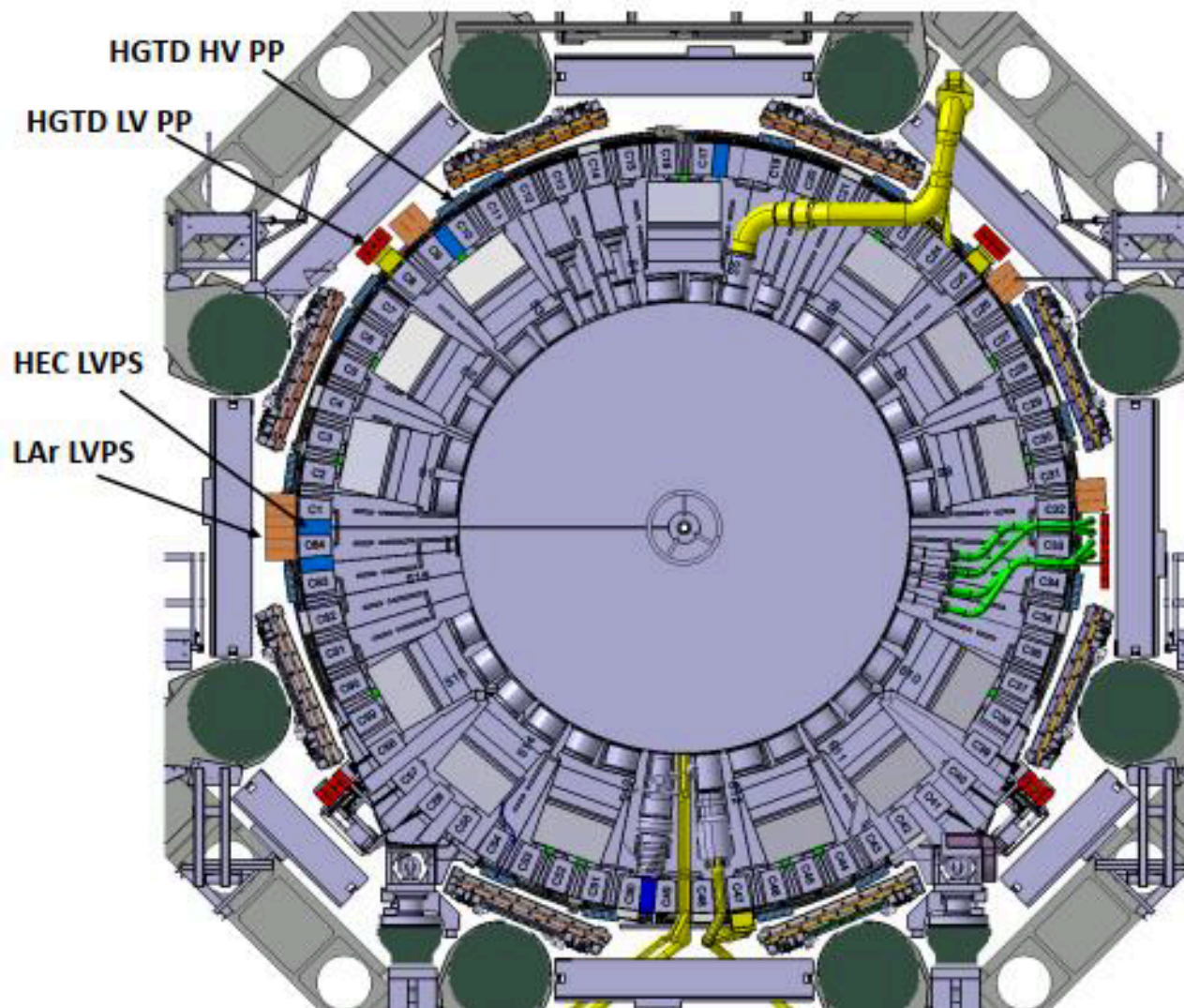


Backup

Outlook

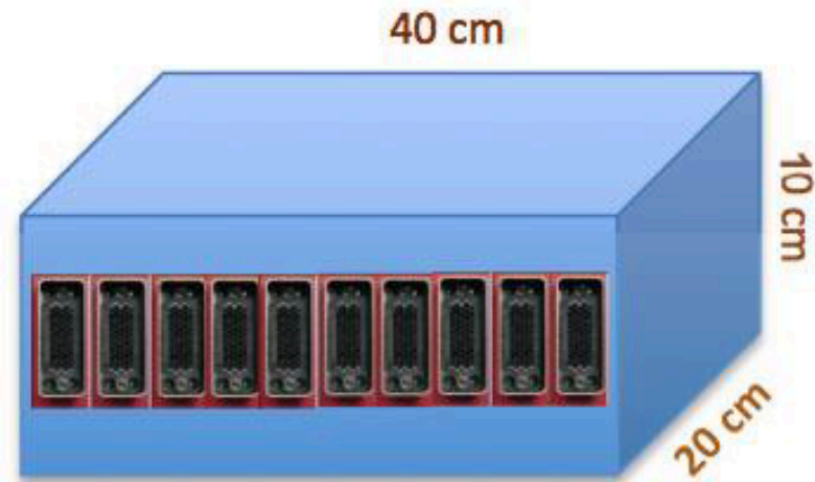
- LIP interested in producing HV patch/filter panels
- First meeting with Bengt Lund-Jensen, Sergey Malykov, Ana Henriques, João Guimarães (thanks!)
- First idea now formed, but we need more information to continue

Overview of locations on the calorimeter perimeter



Current understanding

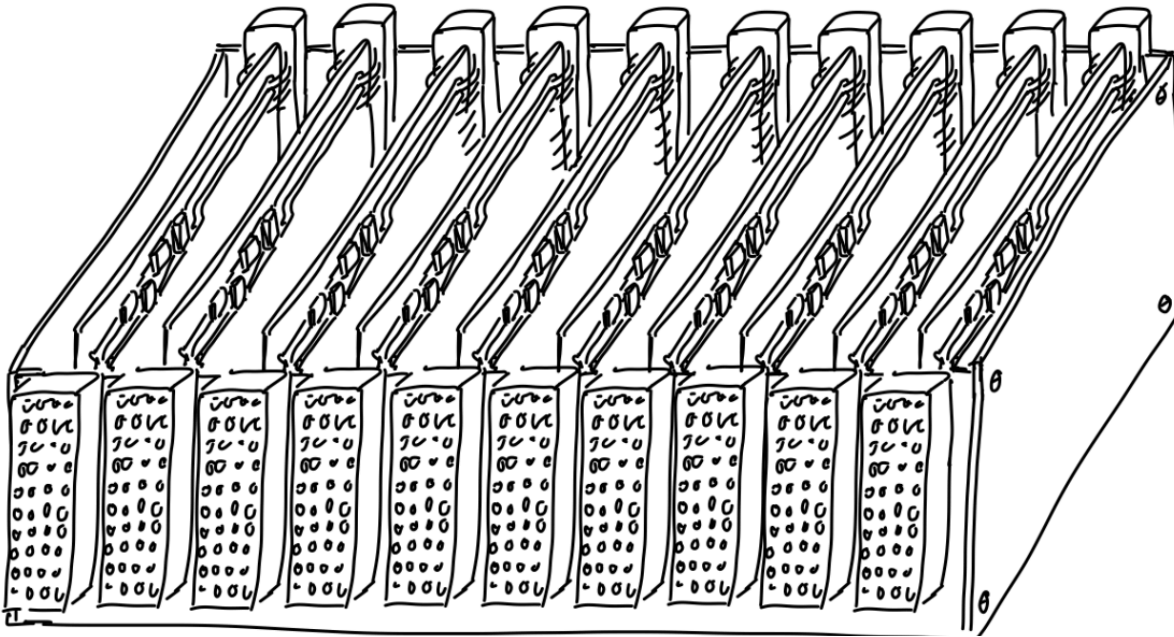
- Originally: patch panels map 11 cables (x48 wires) to 10 cables and filter HV
- BUT current thinking is: filter boxes near detector and separate HV patch panels in USA15
 - Probably easier design and better accessibility to each channel
- Filter boxes:
 - 16 boxes / endcap
 - In & out: 10/11 cables of 24 pairs (48 wires) each
 - Means 240/264 filters / box
 - Low-pass filters (RC-RC)



From Sergey's slides

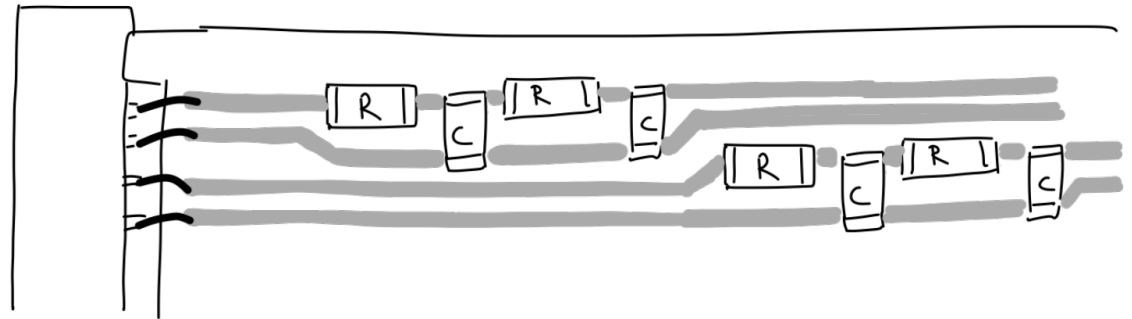
Requirements:

- Magnetic field: must withstand 0.5 T
- Activation: use Aluminium and avoid steel
- Grounding:
 - Floating cable pairs – not connected to box (Faraday cage)
 - Cable shielding connects to power supply floating shield, not filter box
 - Grounding scheme in Bengt's talk 2 weeks ago



Simplest
solution for
filter boxes

1 cable in / 1
cable out (48
pairs/cable)



- Assuming RC-RC filter with discrete SMD components
- 24 channels / board
- Can use both sides of each board if needed

Identified possible connector:

- 52 HV pins
- Insulator : Thermoplastic UL94V0 - halogen free and rad.hard
- Backshell & shroud : Aluminium alloy nickel plated
- Locking device : Stainless steel and nickel plated copper alloy
 - Can probably be replaced
- Contacts : Copper alloy gold over nickel plated.

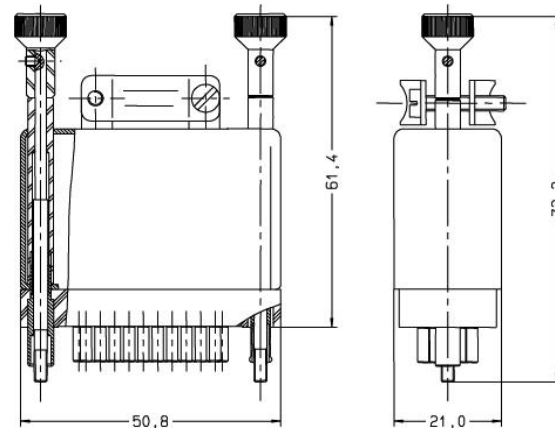
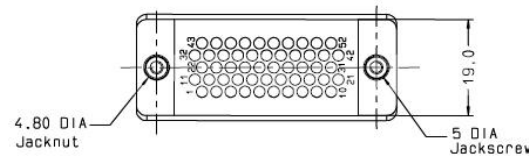
Notes:

- Already used in ATLAS & etc
- Expensive?
- 19mm wide plus margin should be easy for 10/11 in 40cm box – anything we're missing?

<i>Factory Name</i>	Radiall 691 803 004
<i>Description</i>	HV multipin connector
<i>Other features</i>	Mates with Radiall 691 802 002 and CAEN Mod. A996 cable connectors; up to 9 kV supported



The drawing below shows the dimensions (mm) of the plug for cable and for 52 socket contacts.



Questions:

Need more information to proceed:

- Is this design suitable or do we need other options?
- Filter characteristics?
 - Identified range of SMD components but need to know values of capacitance and resistance
 - What power / current per channel?
 - Is there a list of allowed materials / components?
 - Any limits on cross-talk between channels?
 - Accessibility and ease of maintenance:
 - In case of failure assume whole box is taken to repair? Or best to access individual boards?
- Anything else we're missing?
- Once the above are understood we can make proper design and start testing
 - Would be very useful to decide which connector will be used
 - Would it be possible to obtain one LGAD of the type we'll use?