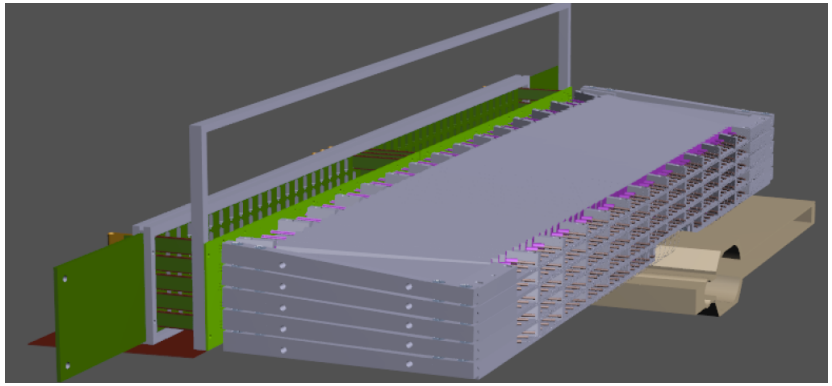
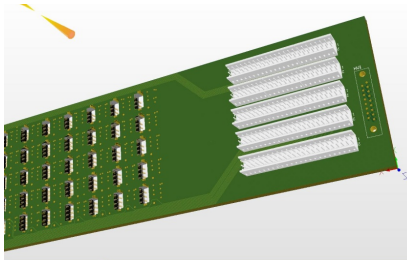
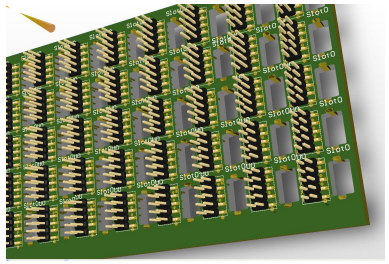
Ecal Mother Boards

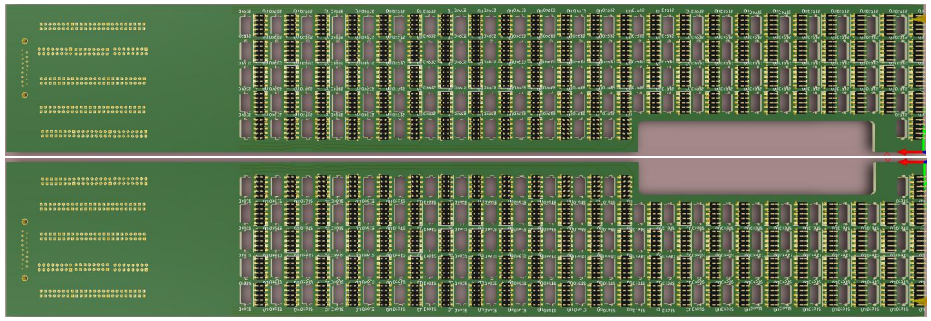
Fabio Pratolongo
INFN-GE
Italy

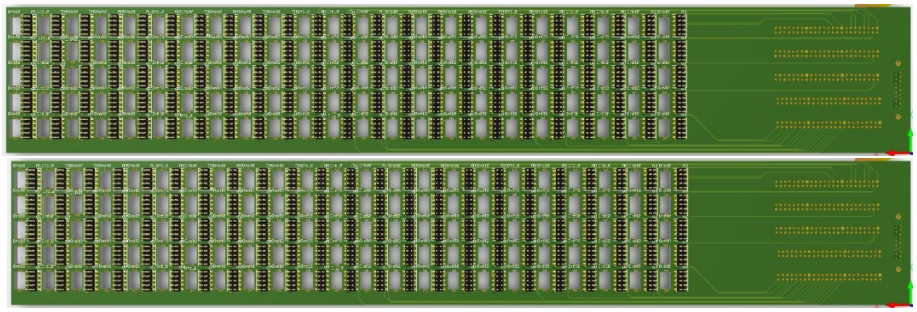
ECal Motherboard





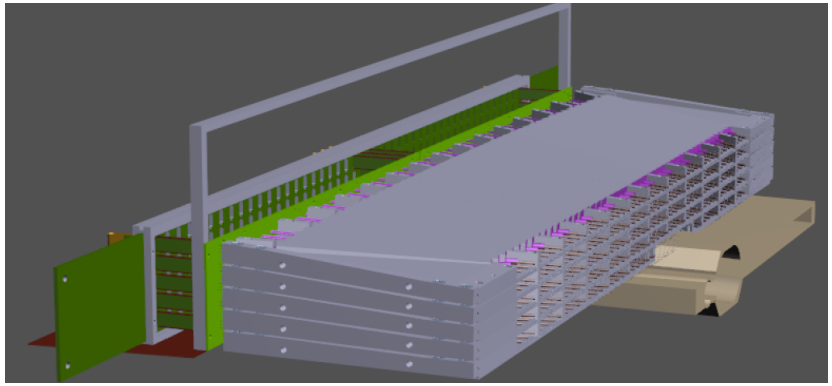


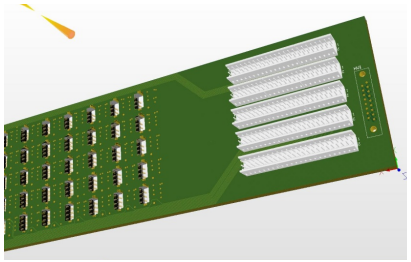


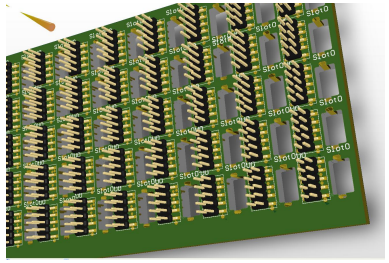


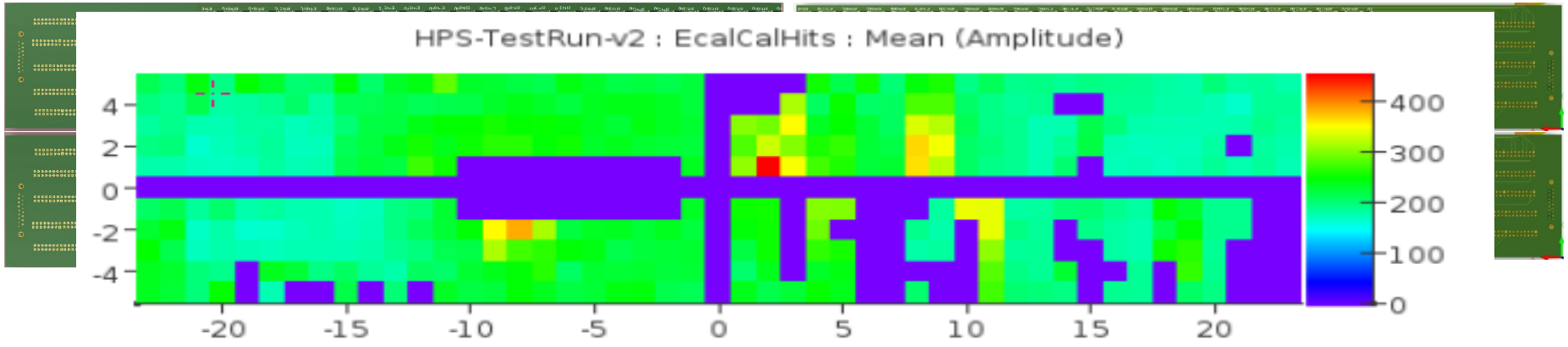
- MB connect preamplifiers and HV from the ECal to crates
- MB extend on Left/Right sides out the vessel to host signal and HV connectors

ECal Motherboard









✳Noise issues with many channels of the motherboards related to design (trace high density) and manufacturing (HV shorts for few channels and LV short for a whole MB)

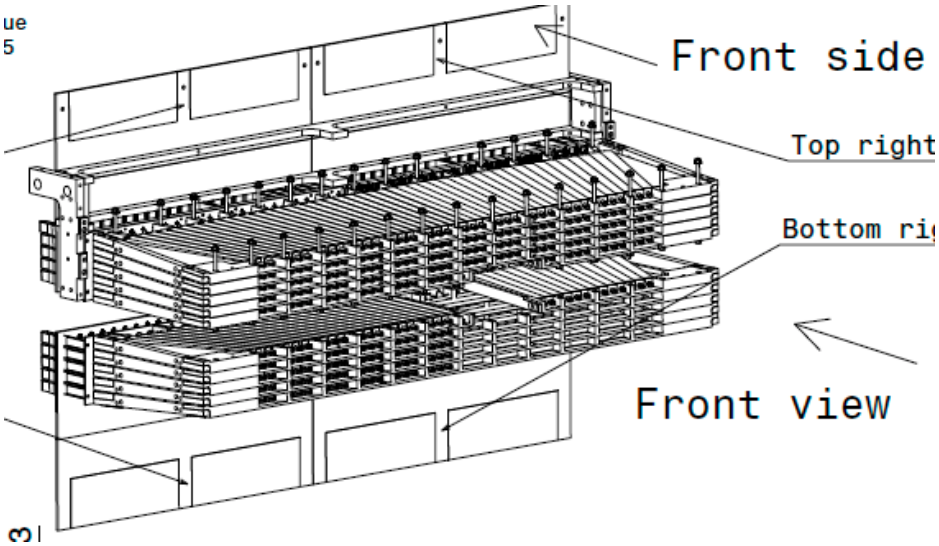
✳ No time to debug and fix problems

✳ New simplified design, keeping the trace density and length as short as possible manufactured well in advance and fully tested

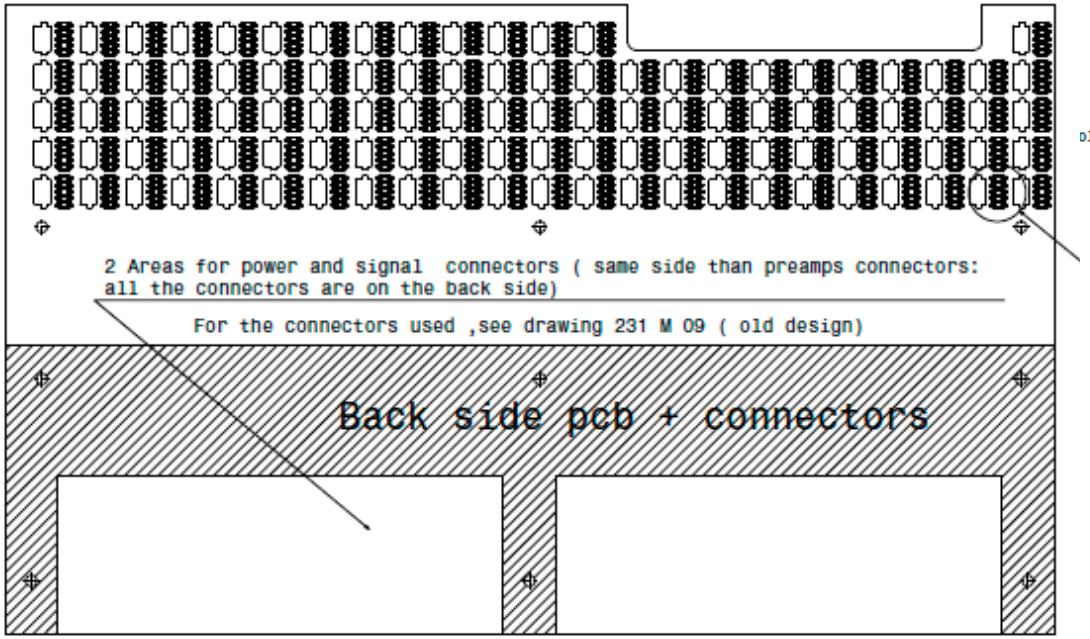
✳ Short vertical motherboards with connectors (power and signal) on top/bottom

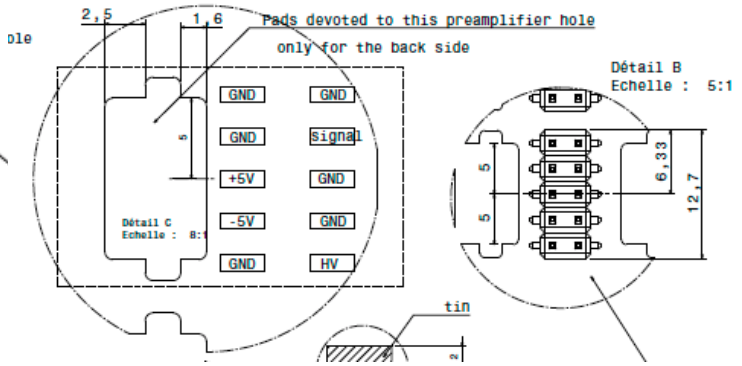
✳ Design solutions taken from IC / FT-CAL experience (IPN-Orsay and INFN-Genova design)

ECal Motherboard Mechanical design



- Mechanical design: IPN-Orsay
- Final design after iterations between Genova, Orsay and JLab
- Mechanics defined: 4 MB (TL, TR, BL, BR)





HPS Motherboard Electronic Design

Electrical design: INFN-GE Electronic Service

Design coordinated with JLab (to reuse existing parts: cables, connectors ...)

First step (ORCAD) finished

Last step (ALEGRO) just started

- 4 PCB (115, 115, 106, 106 channels each)
- E.g.: TOP LEFT board (115 chs)
  - 115 SMD connectors (AMP 10 pin, same as used in FT-Cal) for preamps very similar to old MB (pin slightly smaller),
  - 15 TE signal connectors from 16 pin each, same as old MB
  - 2 HV connectors (15 pin) DSUB 750V, 5A, different from old MB for easier routing.
  - 1 LV connectors (6 pin).

- Same HV grouping (as old MB)
- Same 3M signal signal cable

PCB:

10 layers

3 signals + 1 HV + 1 fan-out + 5 GND

Layout specifications:

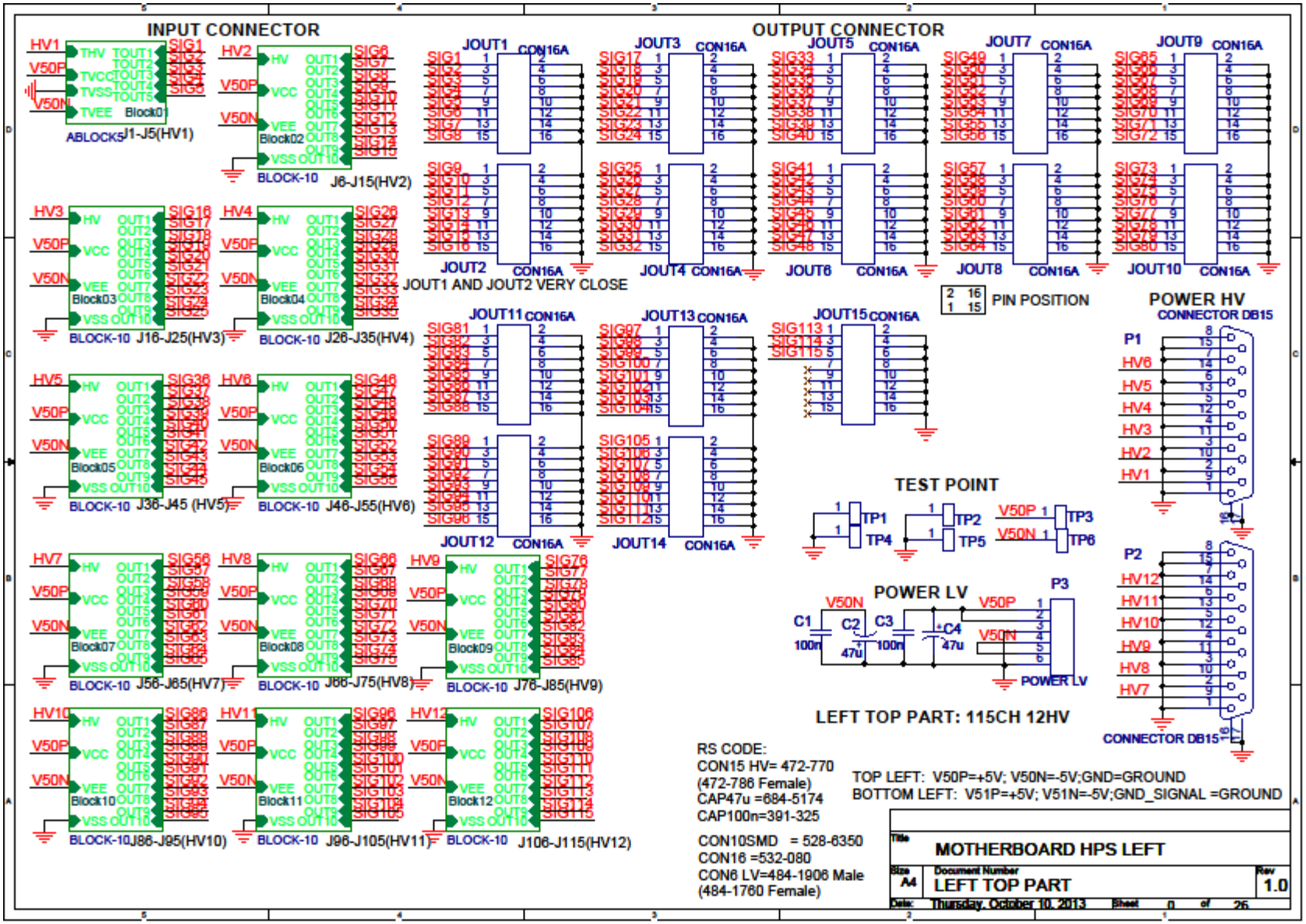
115 signal traces with 50 Ohms impedance.

Signal: 0.2 mm line width and 0.2 mm min. spacing.

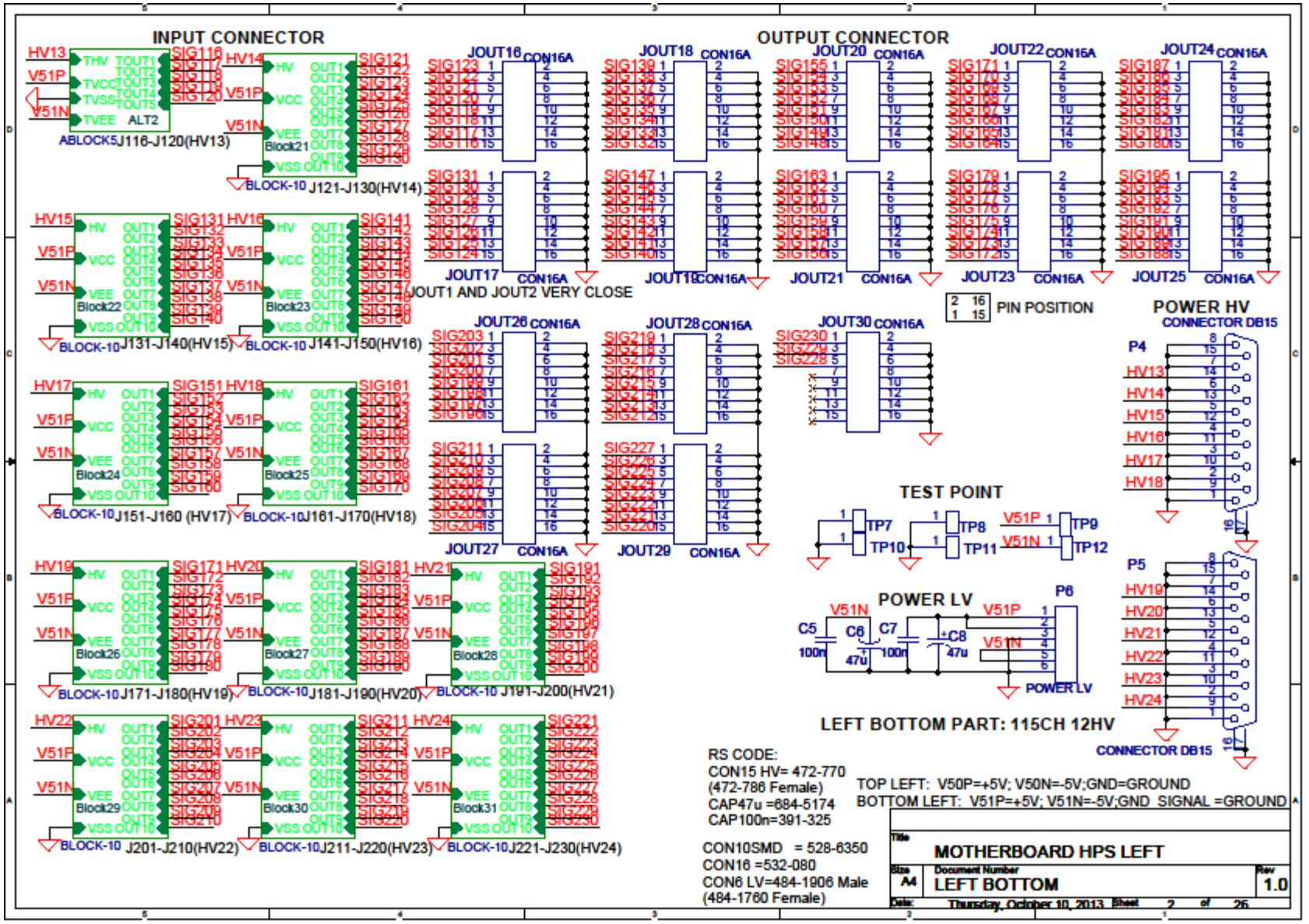
HV: 0.6 mm line width and 0.9 mm min. spacing.

Ground ring between two signals as FT-Cal project.

LEFT TOP Design (115 channels)



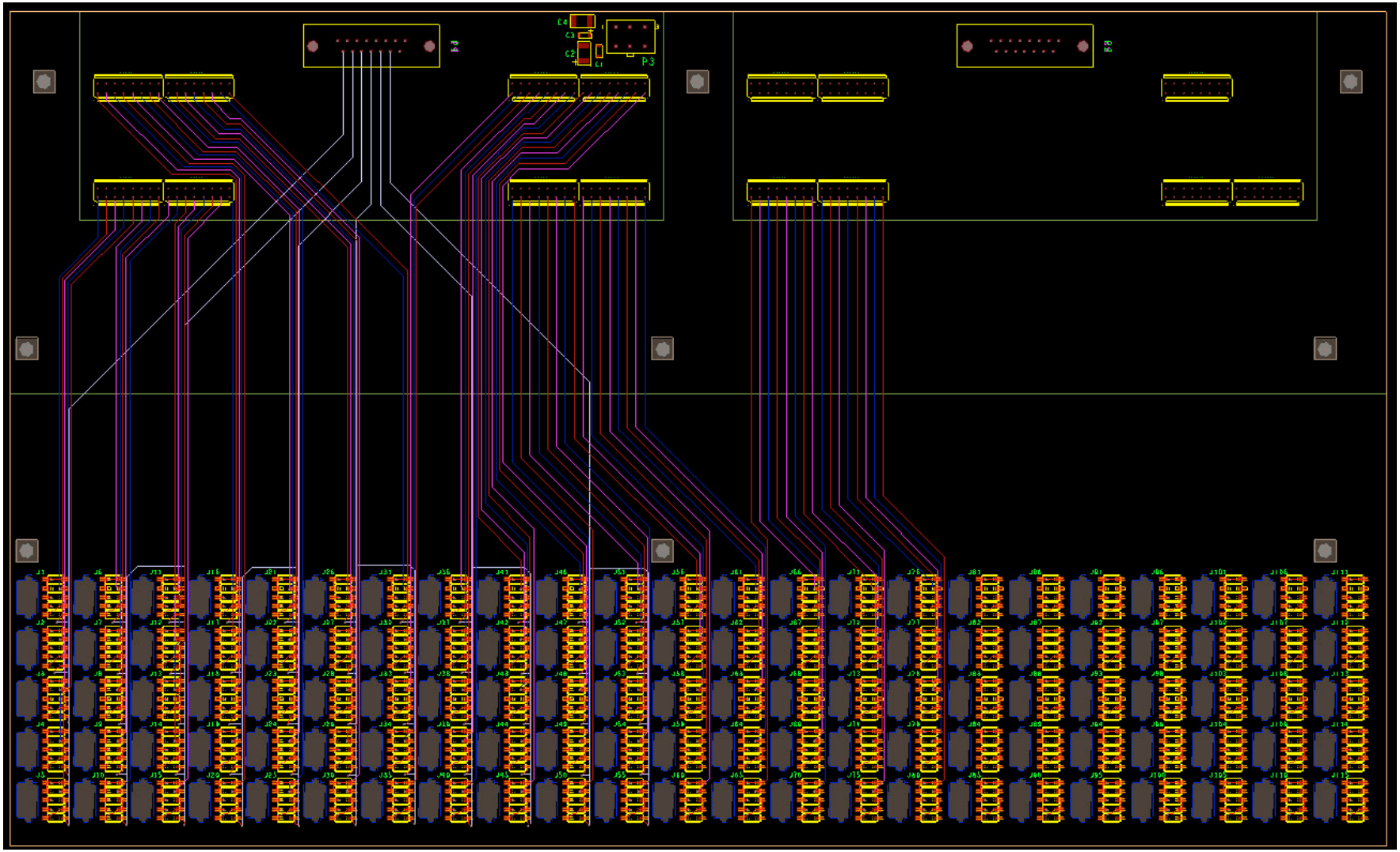
LEFT BOTTOM Design (115 channels)



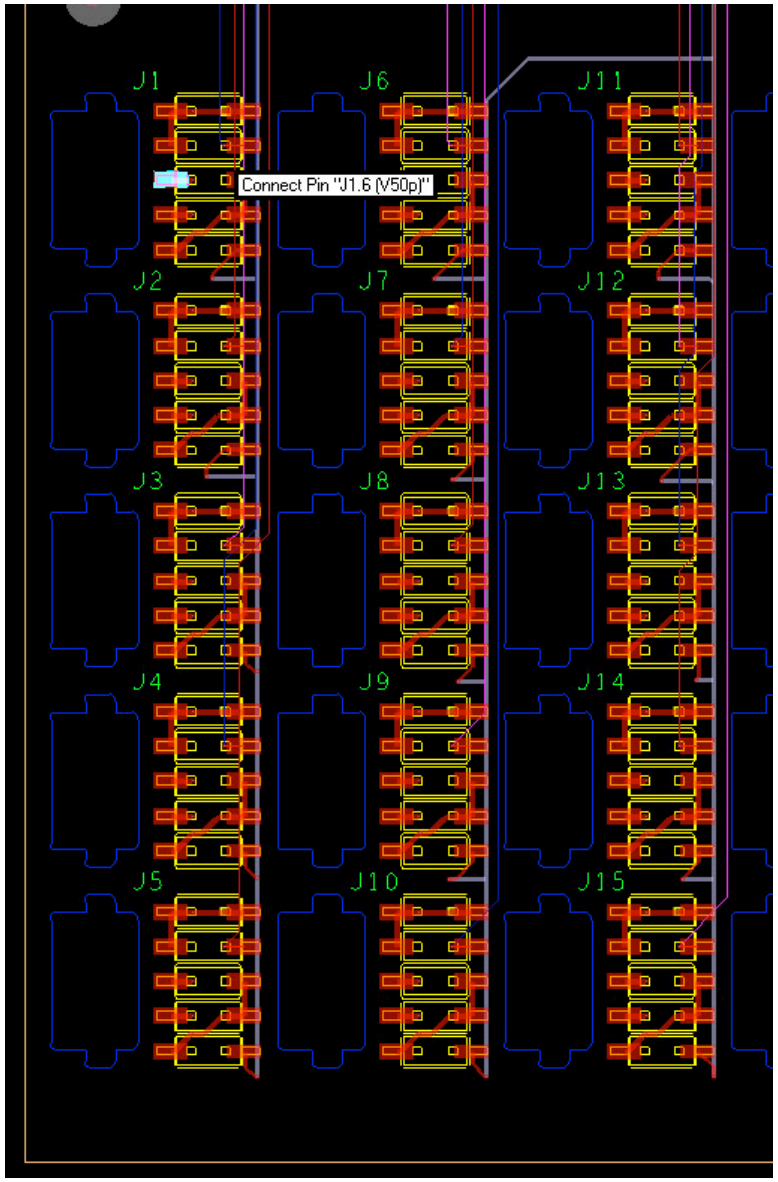
HV Grouping

- Old: hits-load well distributed
- New: simple trace routing
- We are working to find a compromise

LEFT TOP Routing (preliminary)



Routing Zoom on 3 columns



HPS Motherboard WorkPlan

- Mechanical Specifications with Orsay — Done!
- Design of LEFT TOP and LEFT BOTTOM boards — Done!
- Layout routing of LEFT TOP and LEFT BOTTOM boards — in progress
- Left T/B Boards purchase requisition — November
- Design of RIGHT TOP and RIGHT BOTTOM boards with the correct HV grouping — November
- Layout routing of RIGHT TOP and RIGHT BOTTOM boards. — December
- Test Left T/B Electrical connections and Full crosstalk — December
- Board Productions and Assembly (with the same company serving the FT-Cal). 12k euro — January 2014
- Test on Electrical connections and Full crosstalk test with FT-Cal crystals 3k euro — Mid February 2014