Top Tracker electronics status

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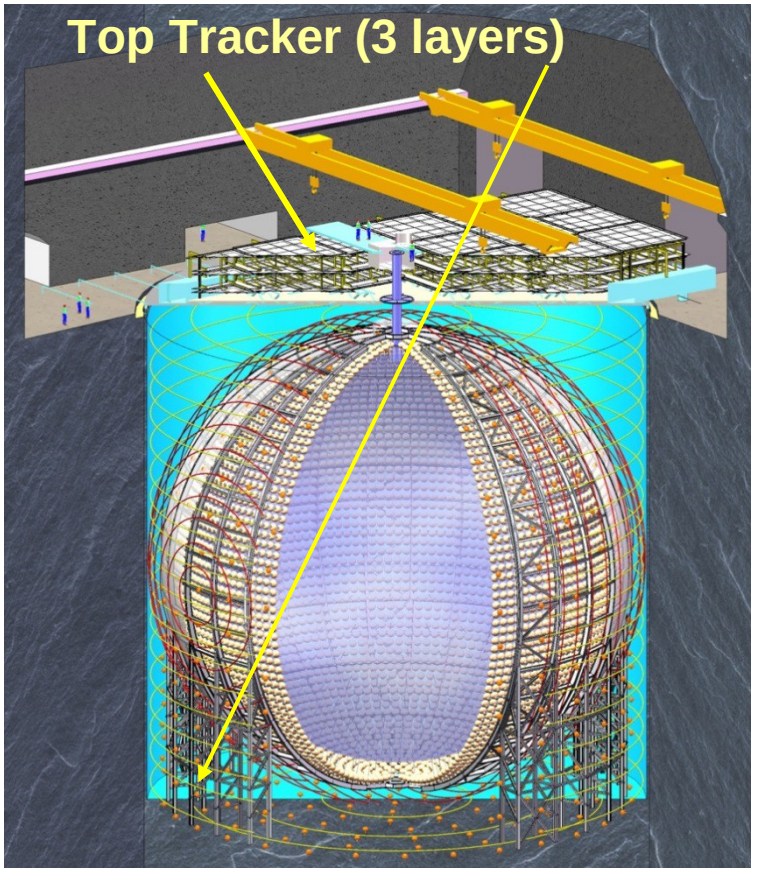
on behalf of TT-electronics group

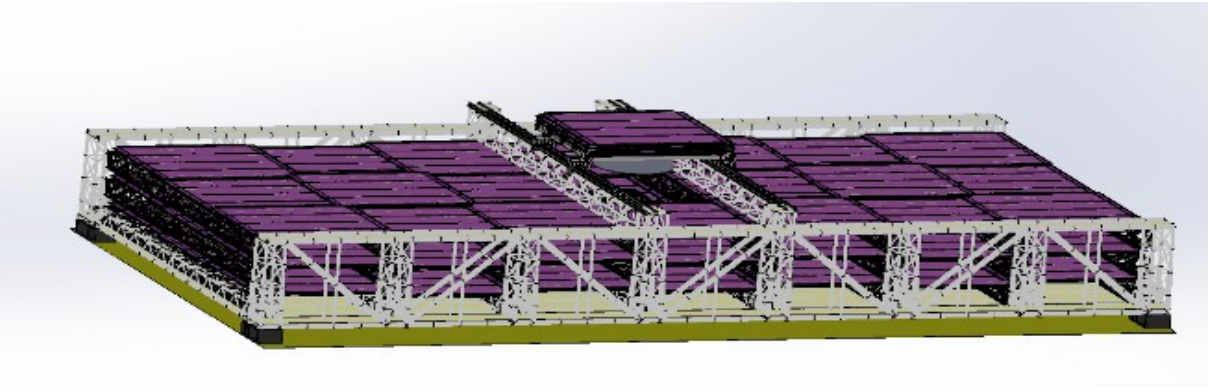
JUNO EU-AM meeting

25 October 2022

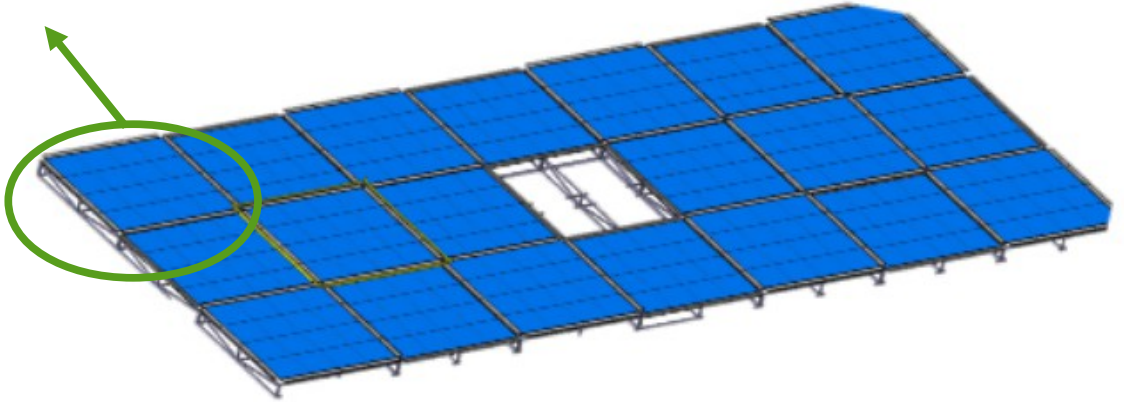
JUNO Top Tracker



Needed to:
Studies on cosmogenic background.
Monitor Central Detector and Water Cerenkov efficiency and tracking performances on cosmic rays.



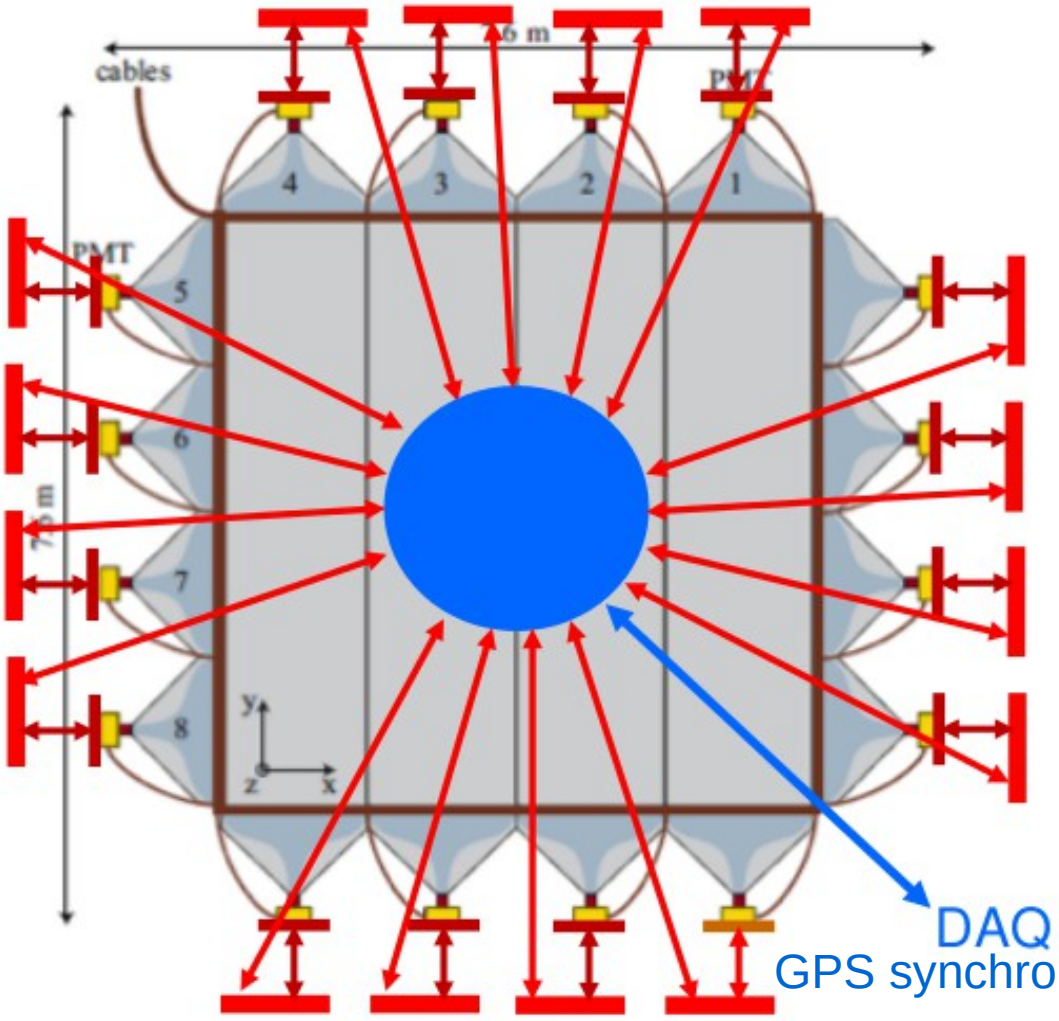
One wall: the basic unit of TT DAQ



Top Tracker in numbers:
63 walls
496 modules
64000 channels
Two levels trigger

TT installation start (according to present schedule): September 2023

Top Tracker electronics



MAROC3 board (FEC):
It hosts MAROC3 chip and logic strictly required to make it work.

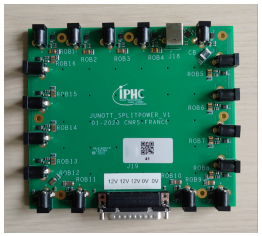
Read-out board:
Manages MAROC3 setting and read-out.
Hosts PMT HV power supply.
Hosts FADC for charge read-out.
Sends to Concentrator PMT OR.

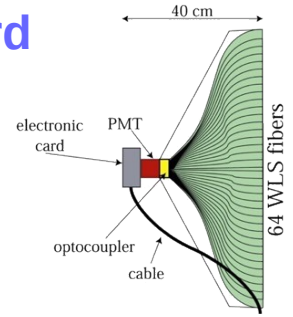
Concentrator board:
Generates wall trigger.
Trigger time-stamp with respect to GPS signal.
Measures time difference between PMT Ors and trigger.
Collect read-out board data and send them to DAQ.
Deliver DCS commands to read-out boards.

L2 trigger board for coincidences between layers.

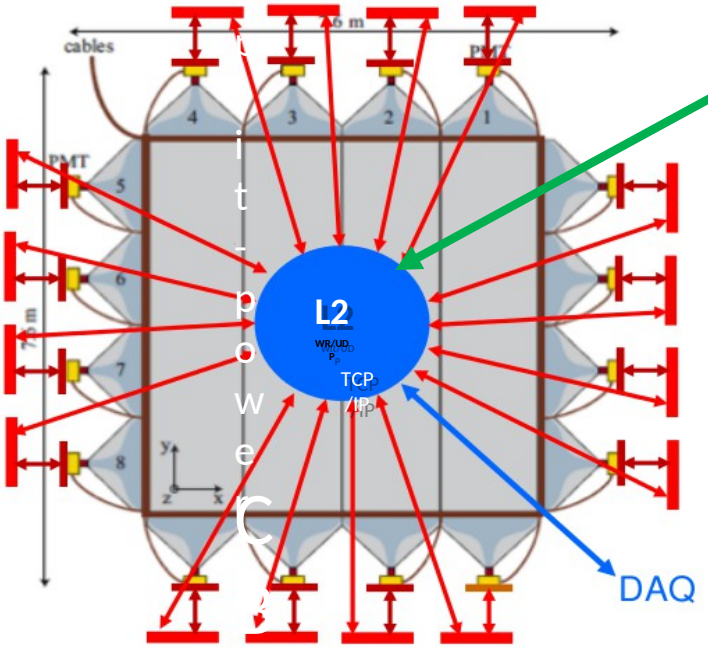
TT wall read-out electronics

Split power board

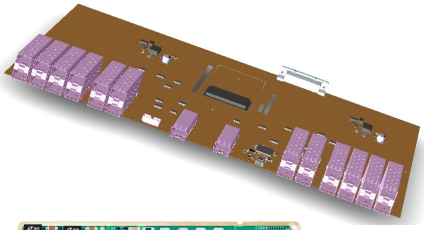




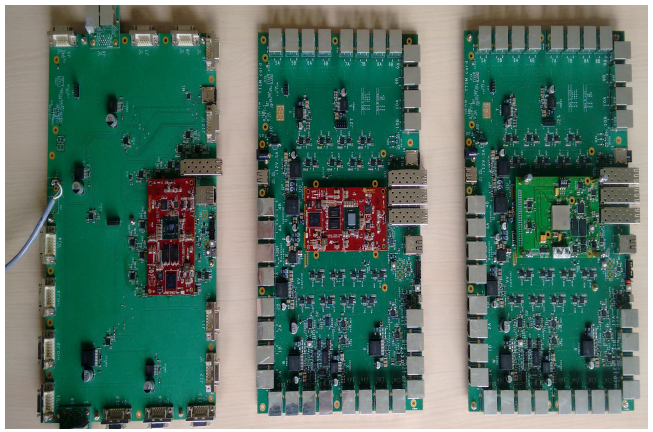
H7546 Hamamatsu
64 ch MAPMT



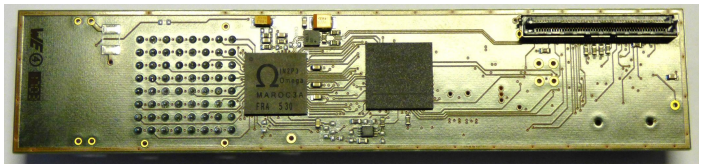
L2 trigger (GTB)



Concentrator Board



Front-End Board



System in numbers:
1000 FEB+ROB
63 Concentrator + Split power boards
1 L2 GTB
+ power supply + cabling

TT endcap:
Read-out and
Front-End Boards

TT wall read-out electronics

System in numbers:
1000 Front-End Boards + Read-Out Boards
63 Concentrator + Split power boards
1 L2 GTB
+ power supply + cabling

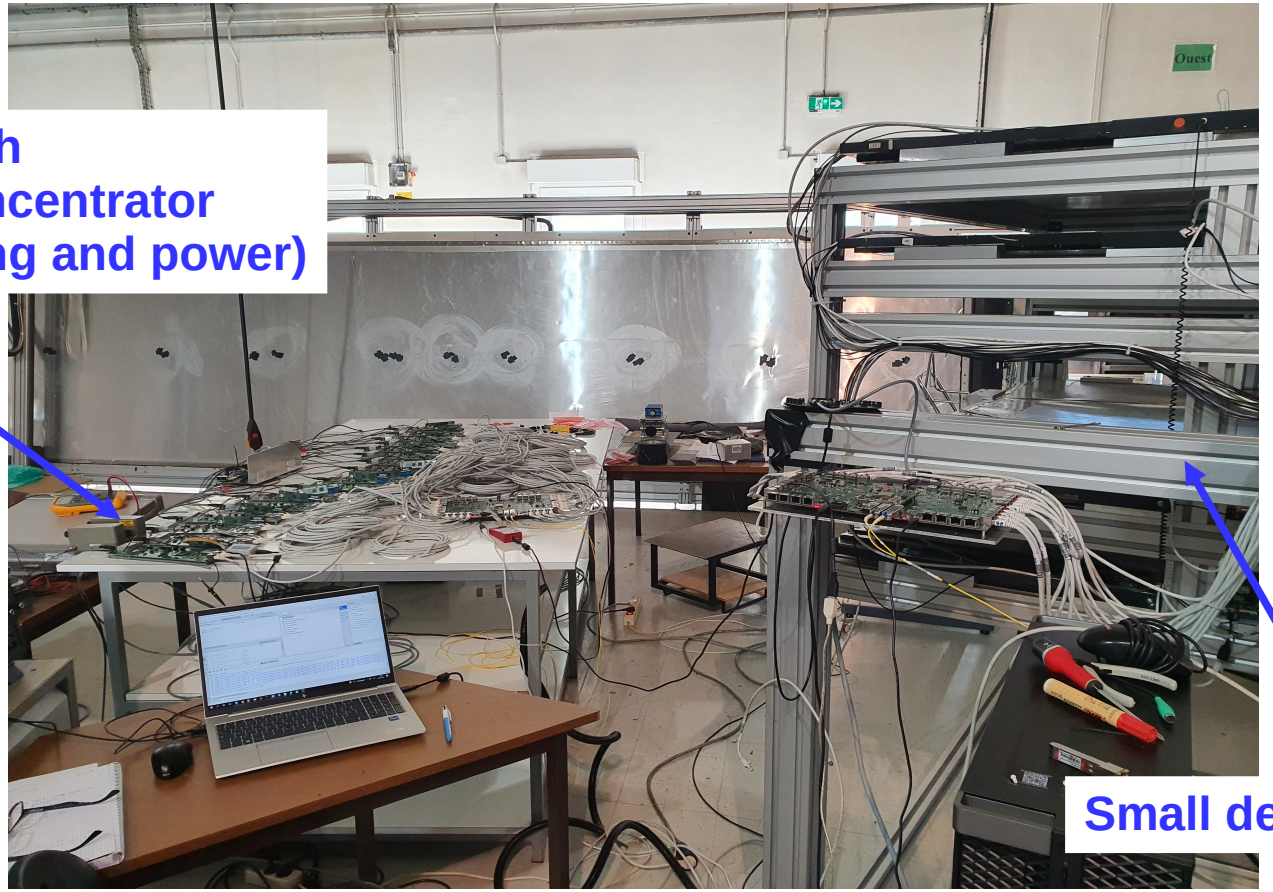
TT walls+MaPMTs
1200 FEB
80 Split power boards
Already on site.

Concentrator and L2 GTB:
See dedicated presentations

ROB production started
Concentrators tender placed
(see next slides)

Test of TT Wall electronics chain

Tests with prototype concentrators at Strasbourg, during November 2021, both on detector prototype and on test-bench.

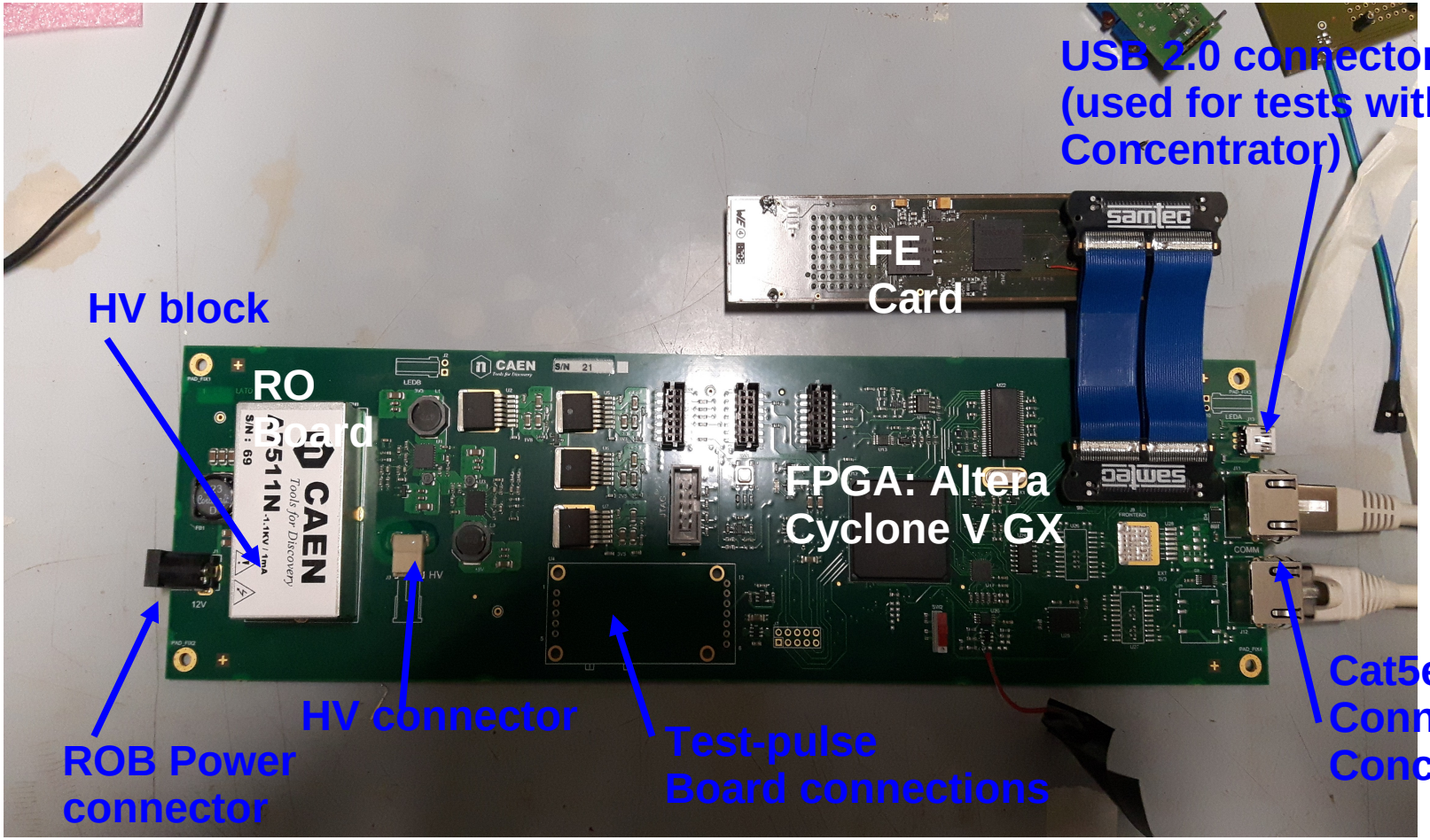


Test bench with 16 ROBs + Concentrator (realistic cabling and power)

Small detector prototype

Read-out board

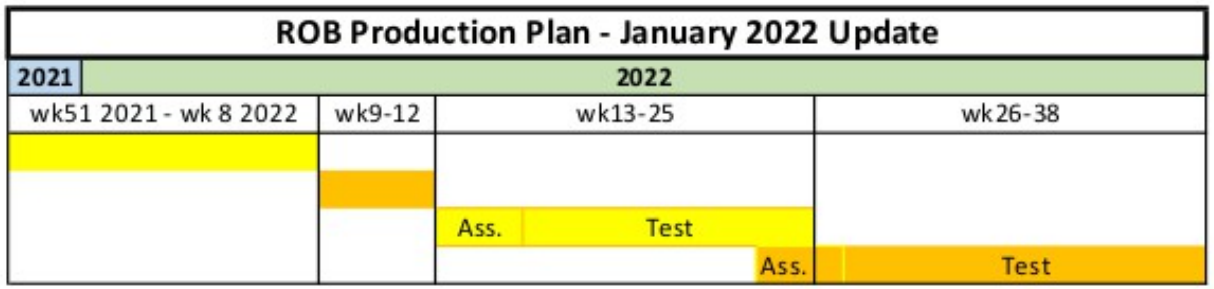
Pre-production board tested. Final production started.
Finalization of firmware ongoing.
SAMTEC cables between Read-out and Front-end boards procured.



Read-out board production

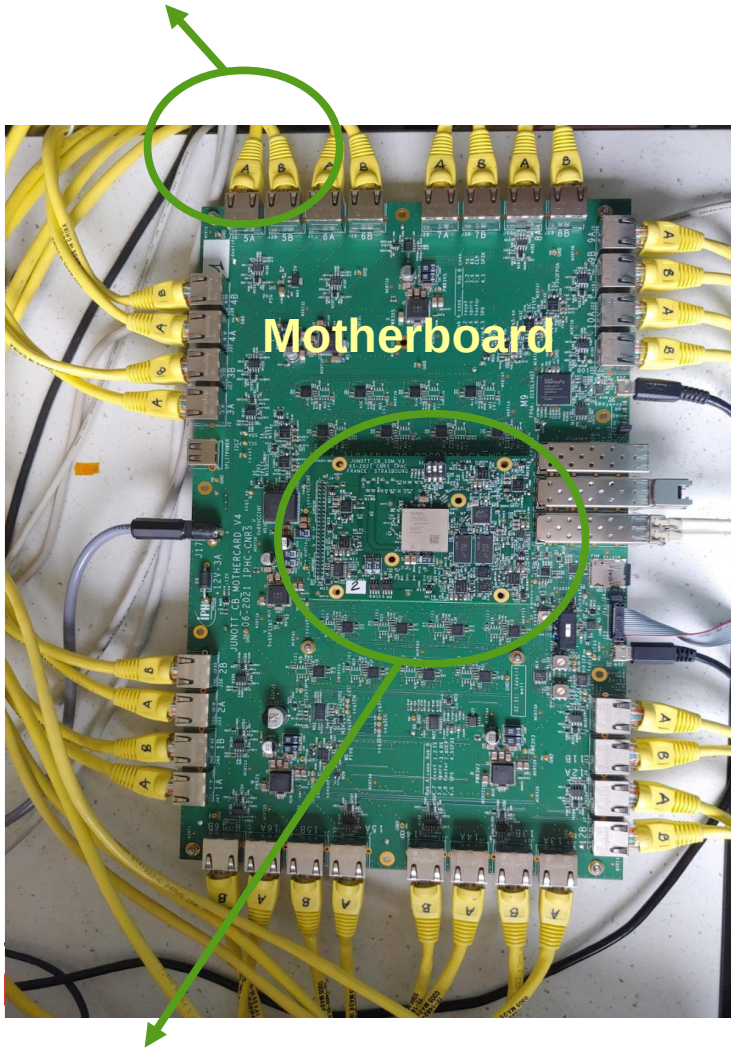
ROB production status:
Components procurement for production accomplished by CAEN.
Test protocol (CAEN and LNF) defined for mass production.
Estimated time for production: about 6 months (Tests included).

	Start	End
Pre-serie of 20 units Assembly	23/12/21	25/02/22
Pre-serie of 20 units Qualification Test	28/02/22	25/03/22
1st Bunch Assembly and Test (500 units)	28/03/22	24/06/22
2st Bunch Assembly and Test (500 units)	14/06/22	23/09/22



CAEN
Tools for Discovery

Concentrator



Concentrator mother-board with SOM mezzanine.
Fan-in data from 16 ROBs.
Xlinx Zynq Ultrascale+ FPGA on SOM.
Spartan 6 FPGA for White-Rabbit interface.

Protoypes tested.
FDR on January GM.
SOM PCBs, Xlinx Zynq FPGA and RAM procured.
Opto-electronics converters also procured.
143 kEuro allocated for production.
Tender started, firm choosen, but troubles with components procurement (extra-cost/delays).