

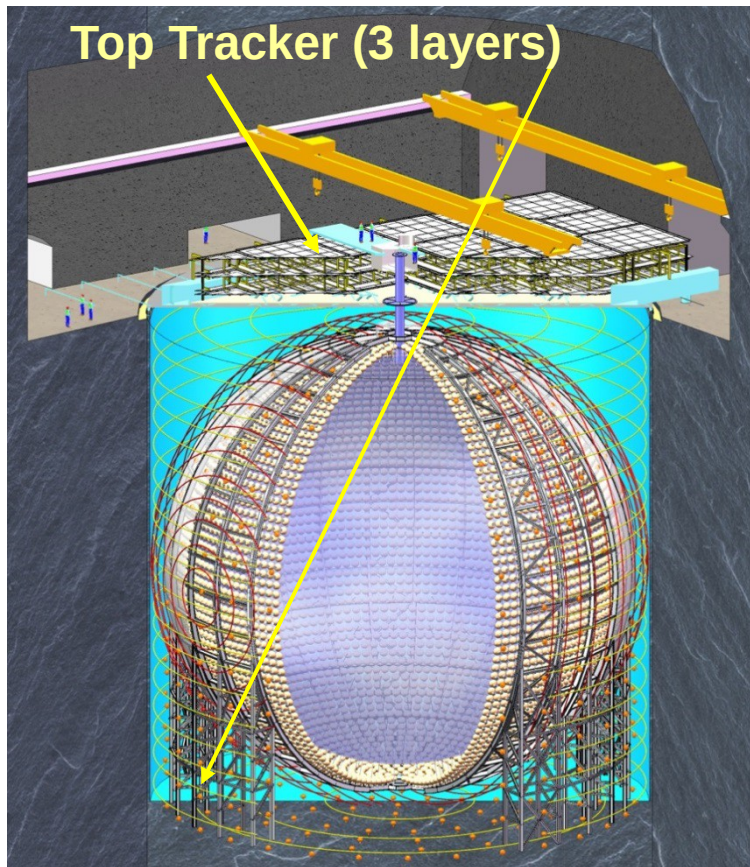
# Status of TT electronics

A. Paoloni  
On behalf of LNF group

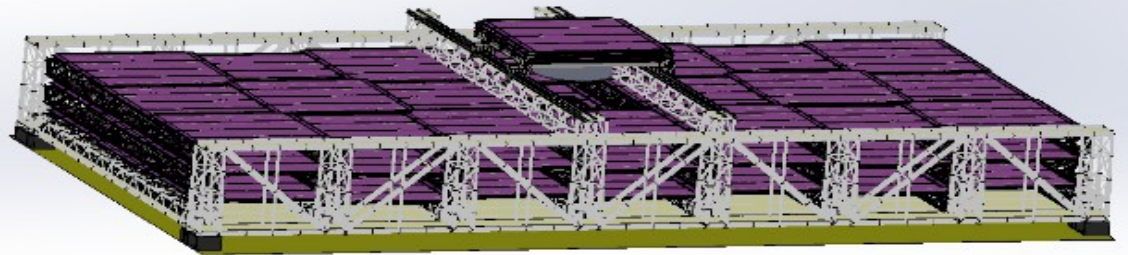
JUNO Italia Meeting

28 March 2023

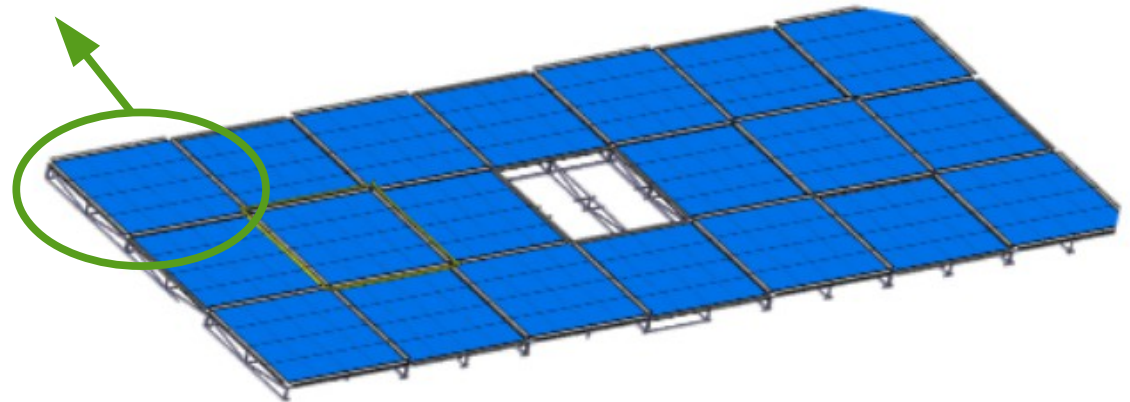
# JUNO Top Tracker



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



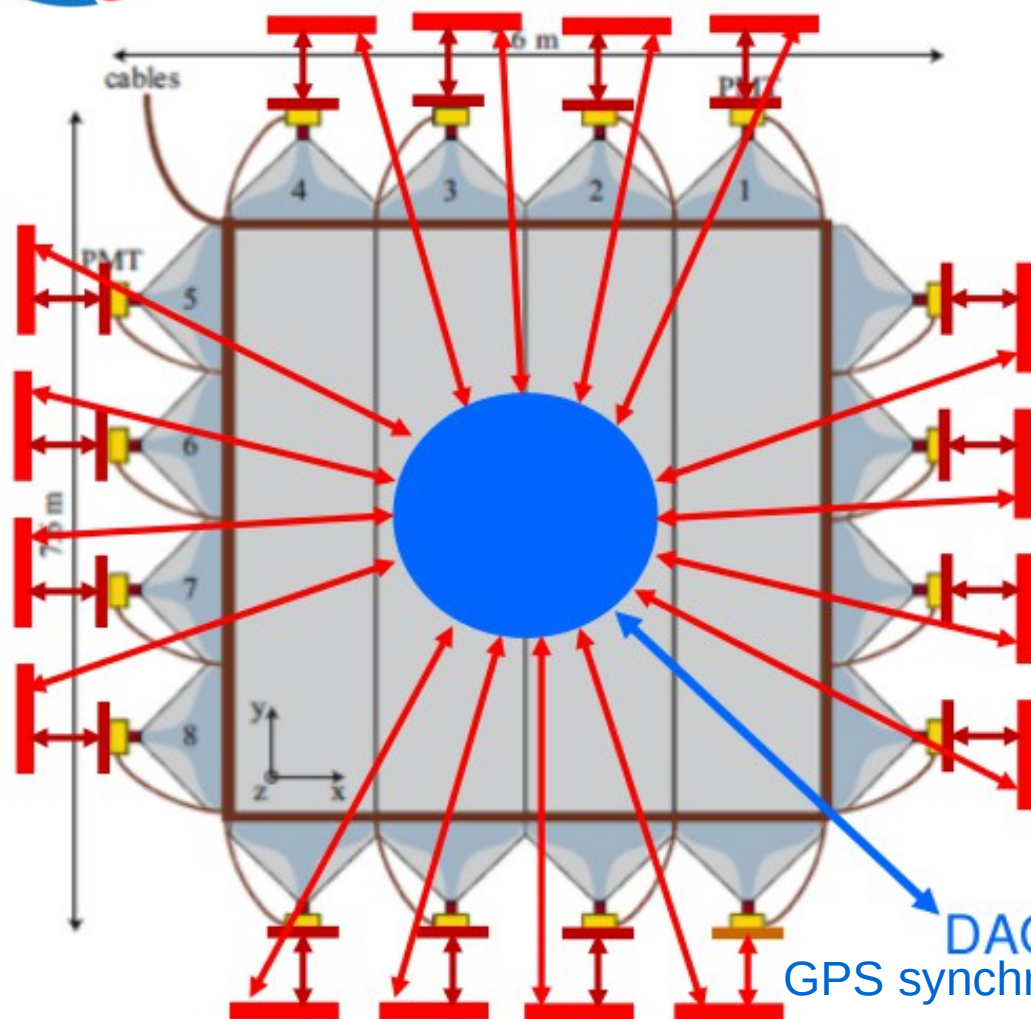
One wall: the basic unit of TT DAQ



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



# Top Tracker wall electronics

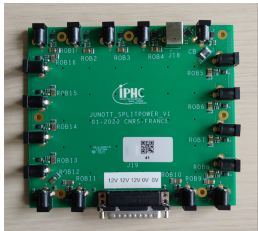


- MAROC3 board (FEC):**  
It hosts MAROC3 chip and logic strictly required to make it work.
- Read-out board (ROB):**  
Manages MAROC3 setting and read-out.  
Hosts PMT HV power supply.  
Hosts FADC for charge read-out.  
Sends to Concentrator PMT OR.
- Concentrator board:**  
Generates wall trigger.  
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.

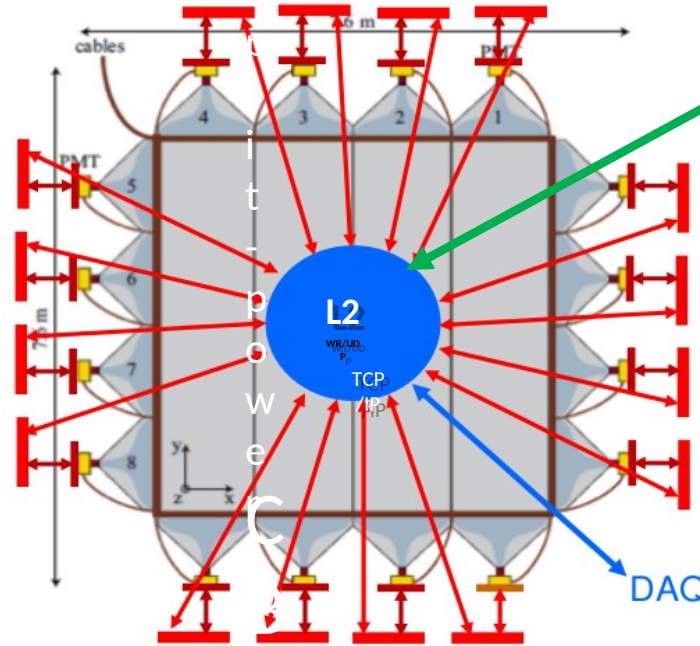
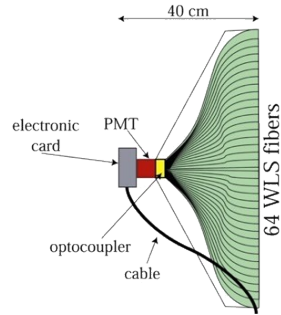
63 walls in the TT system  
1 Global Trigger Board (GTB)

# TT wall read-out electronics

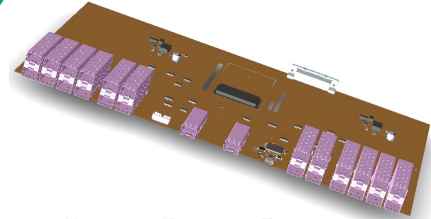
Split power



H7546 Hamamatsu  
64 ch MAPMT

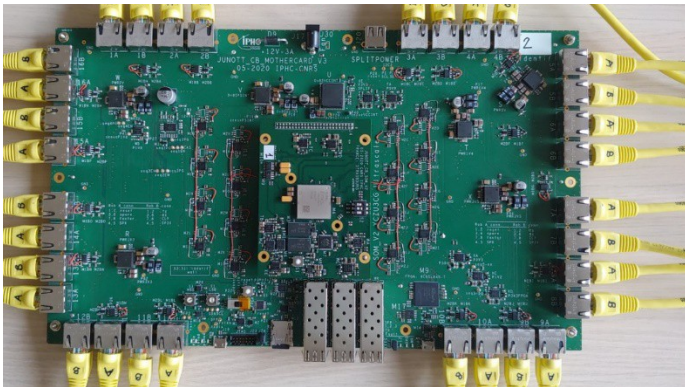


L2 trigger (GTB)

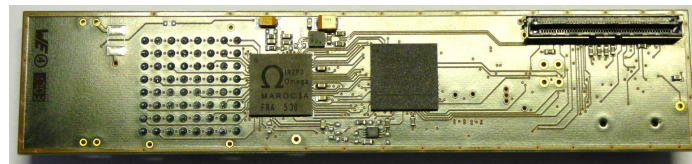


TT endcap:  
Read-out (ROB) and  
Front-End Boards

Concentrator Board



Front-End Board



# Read-out board

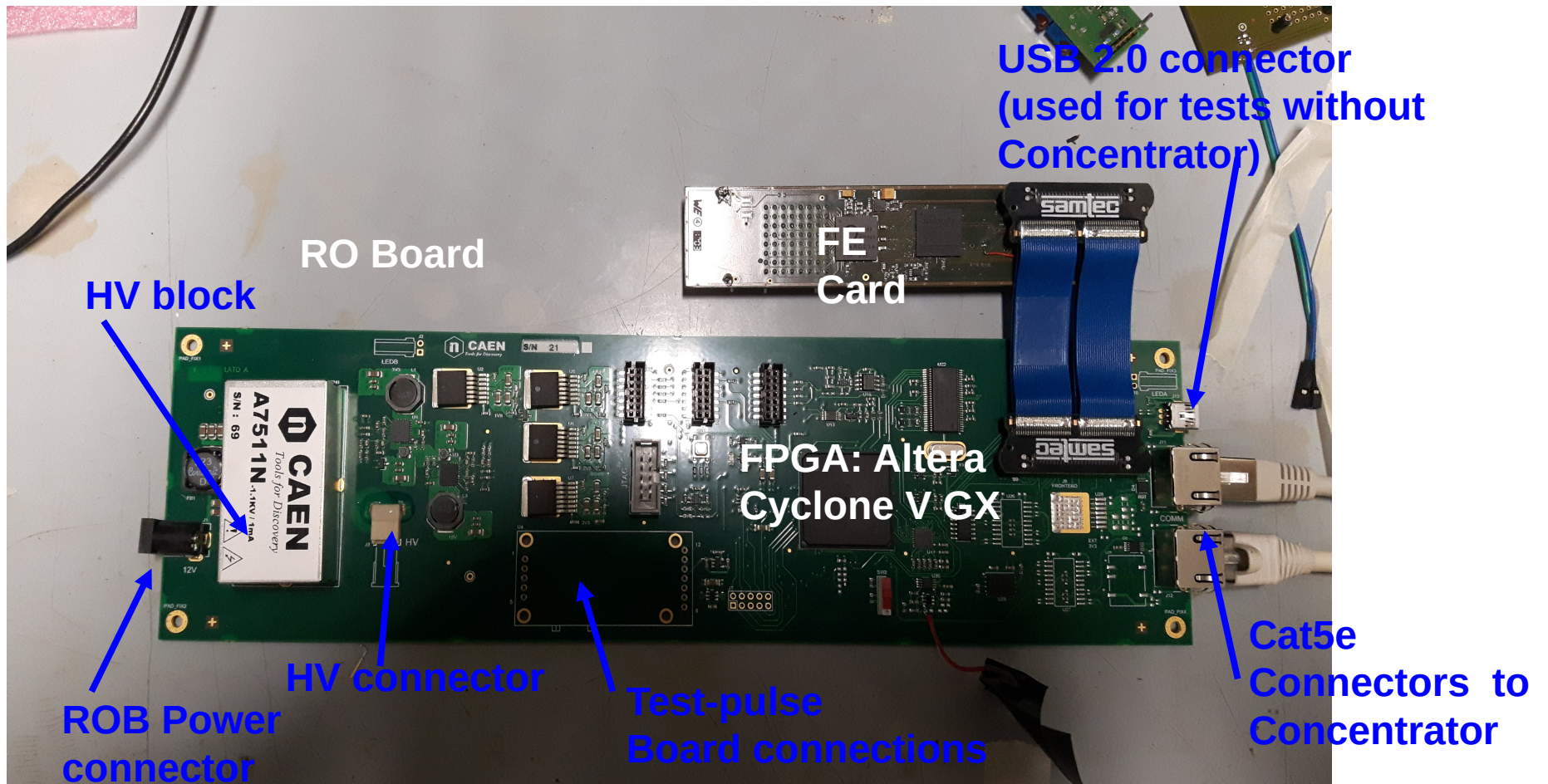
Design and production by CAEN.

ROB hardware frozen since December 2021. Components procured.

Production started. First batch (~500) realized and under test. The rest for June.

All boards tested by CAEN + 10% re-tested by LNF.

Firmware under finalization (dialog with concentrator with Strasbourg group)



# 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)

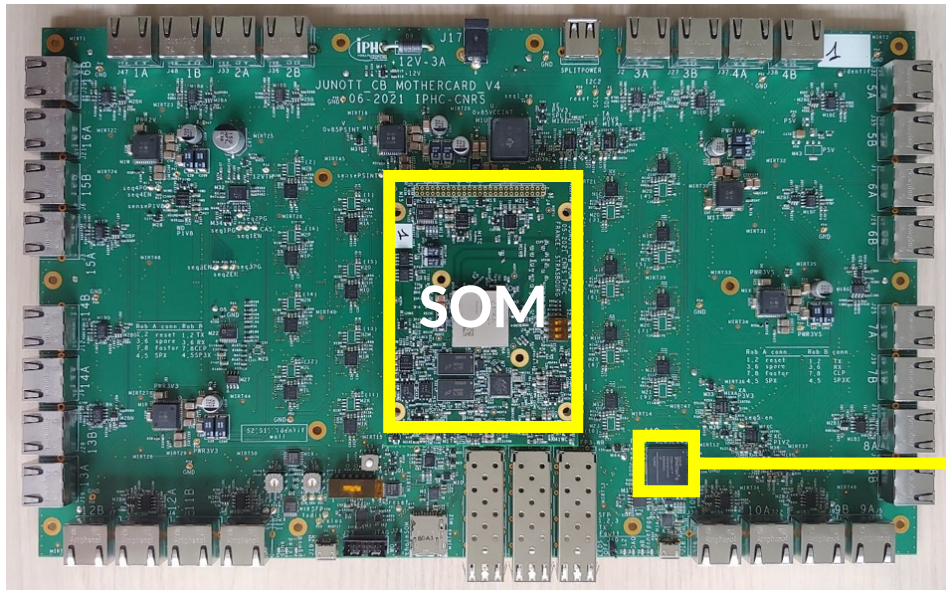


Small detector prototype

# Concentrator

## § Role of the Concentrator Board :

- This board gathers data from a wall (16 ROBs + FEB)
  - It also has the role of L1 trigger
  - It is the only connection to the rest of the world for the wall
  - Time stamping of the events
- *Spartan 6 FPGA (White Rabbit)*



CB v4

Designed by Strasbourg group.  
Order placed by INFN to ACEA (France) for 80 boards.  
Due to present situation in components, some components have been procured by INFN and IN2P3 outside of the order.  
At present all components have been procured and the production started.

# Status summary

1200 FEC + LV splitter Boards tested and delivered to experimental site with Osiris.  
13 Wiener power supplies + FEC-ROB Samtec cables delivered on December 2022.



Samtec cable  
box

Power supplies

ROB under production

Concentrator: order placed, production started

Global Trigger Board: prototype phase

Cabling: finalizing the choice, money allocated to IHEP for buying them in China