

KLM Update

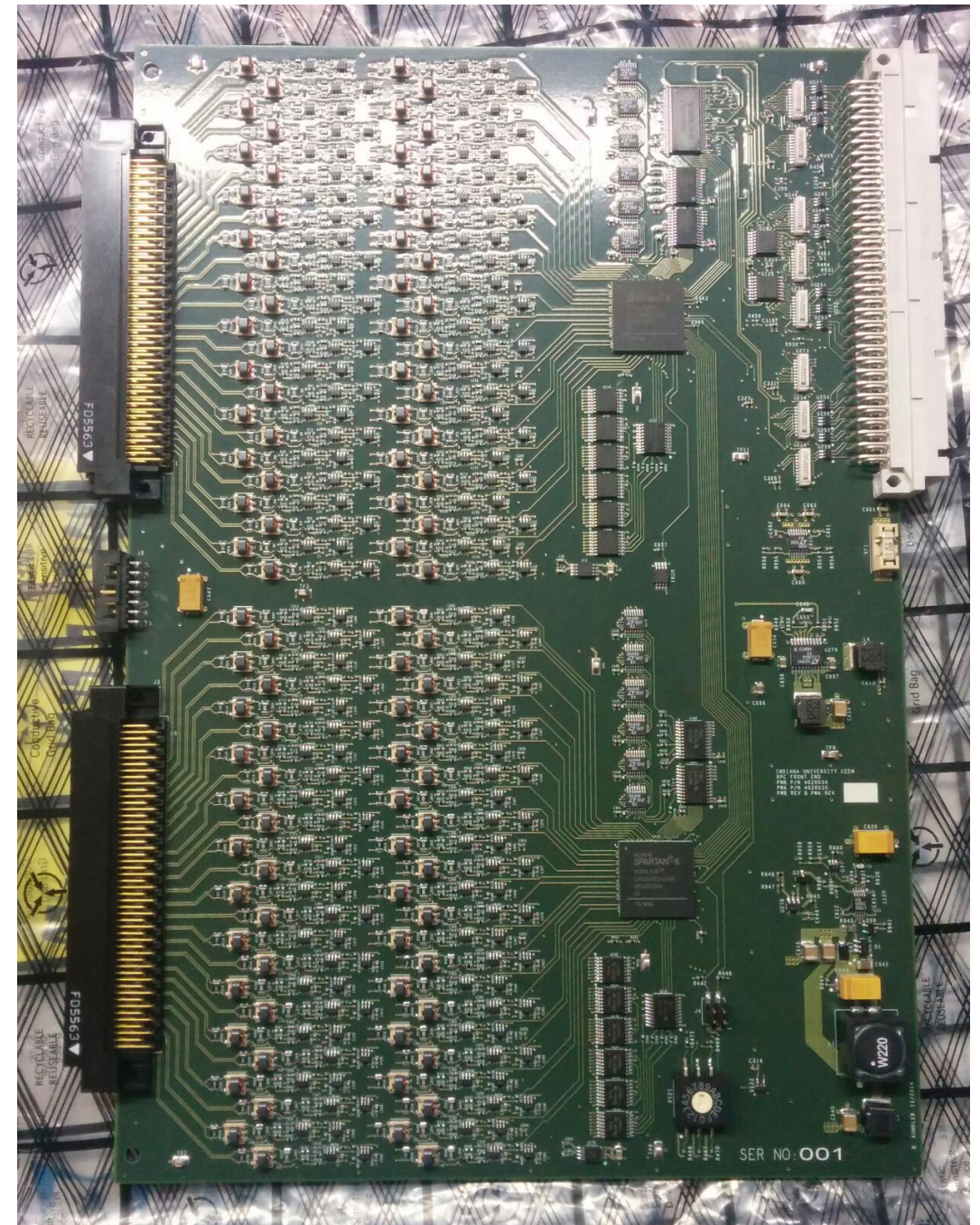
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INFN - Frascati

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INFN - Roma 3

Meeting Belle II Italia
Trieste - May 5, 2017

KLM - RPC Front End

- Installazione, commissioning e mantenimento del sistema di lettura degli RPC del barrel KLM
 - 16 crate, contenenti ciascuno 13 schede
- Realizzazione di circa 250 schede di FE, compreso spares, su progetto Indiana U.

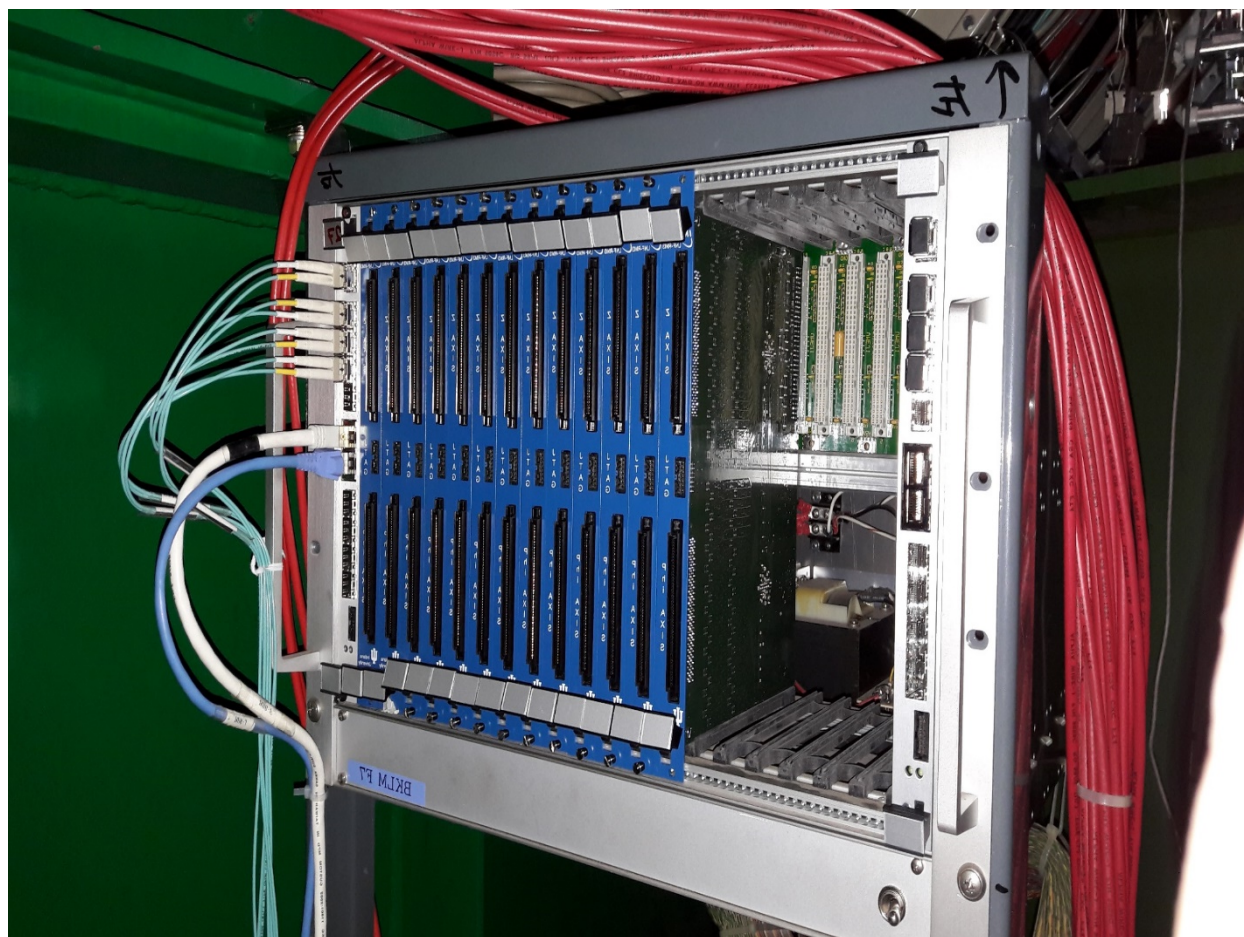


Timeline

- A Marzo 2016, approvazione INFN
- A Maggio 2016 realizzati 3 prototipi, testati in Indiana
- A Giugno 2016 test positivo delle tre schede prototipo installate in un crate sul detector
- A fine Giugno partita gara per la produzione dei PCB, approvvigionamento dei componenti e montaggio delle schede
- A fine Settembre aggiudicata gara, fine Ottobre stipulato contratto
 - Pre-produzione di 15 schede entro fine anno

Production Status

- Pre-production of 15 boards was completed middle of January
- Bench test done in Frascati before shipping to KEK
- On detector tests at KEK started end of January



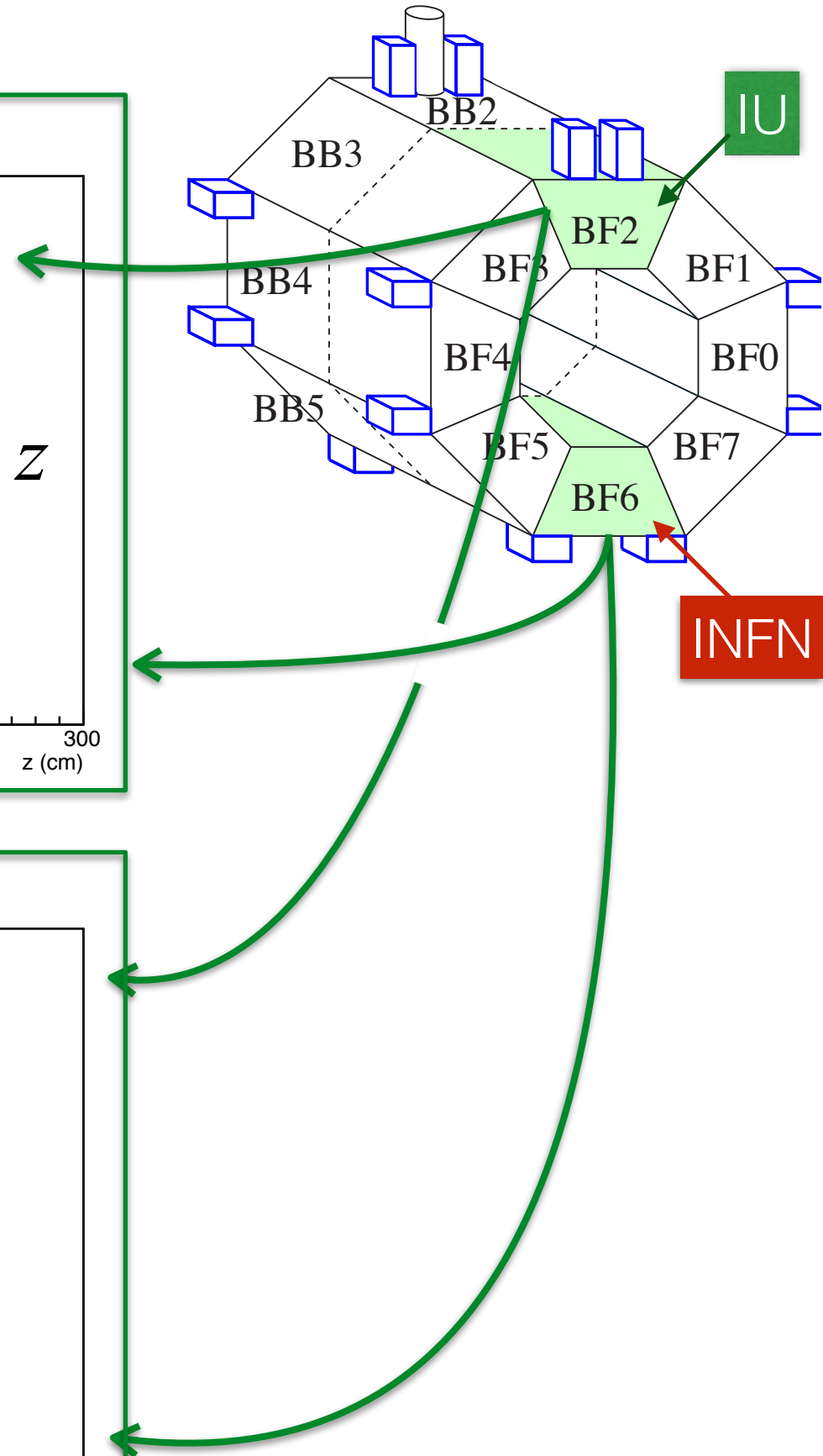
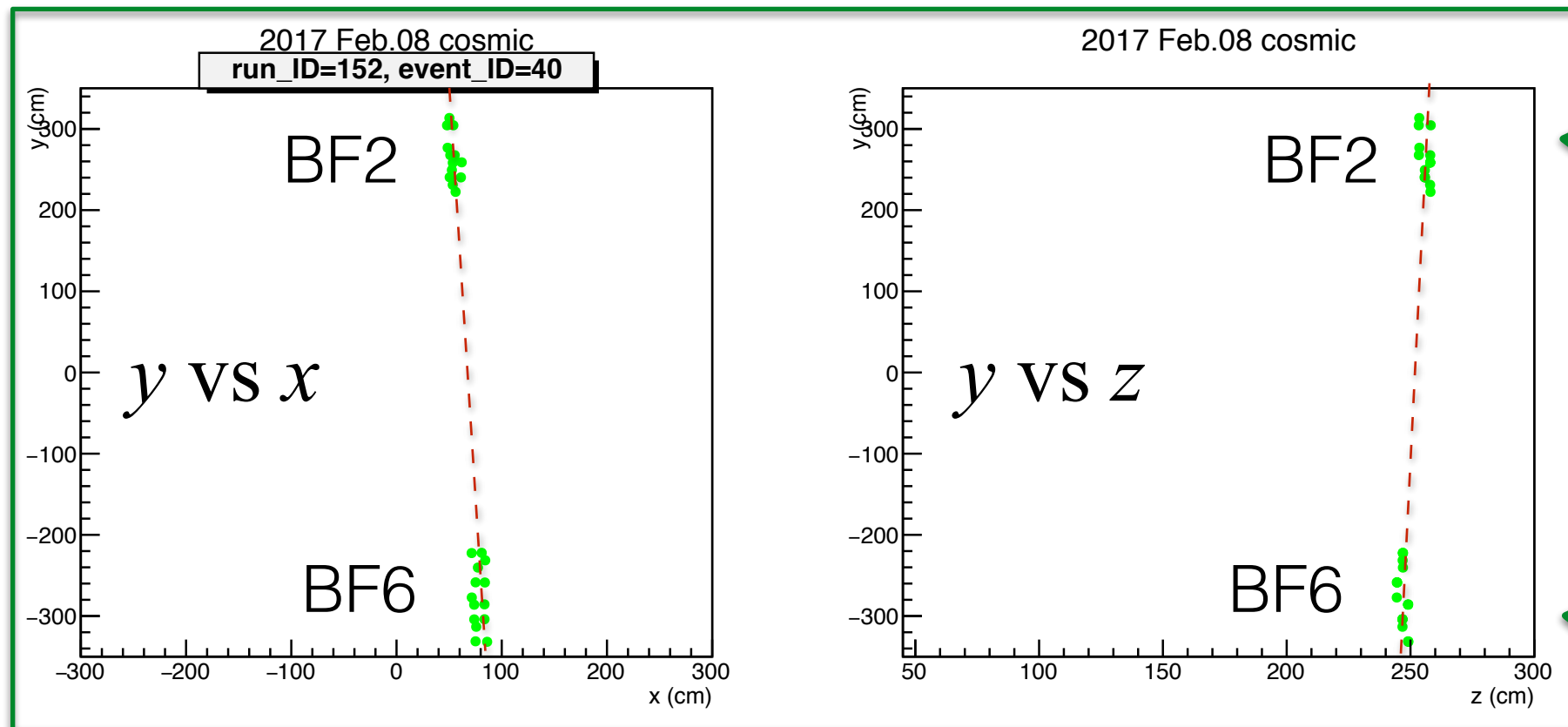
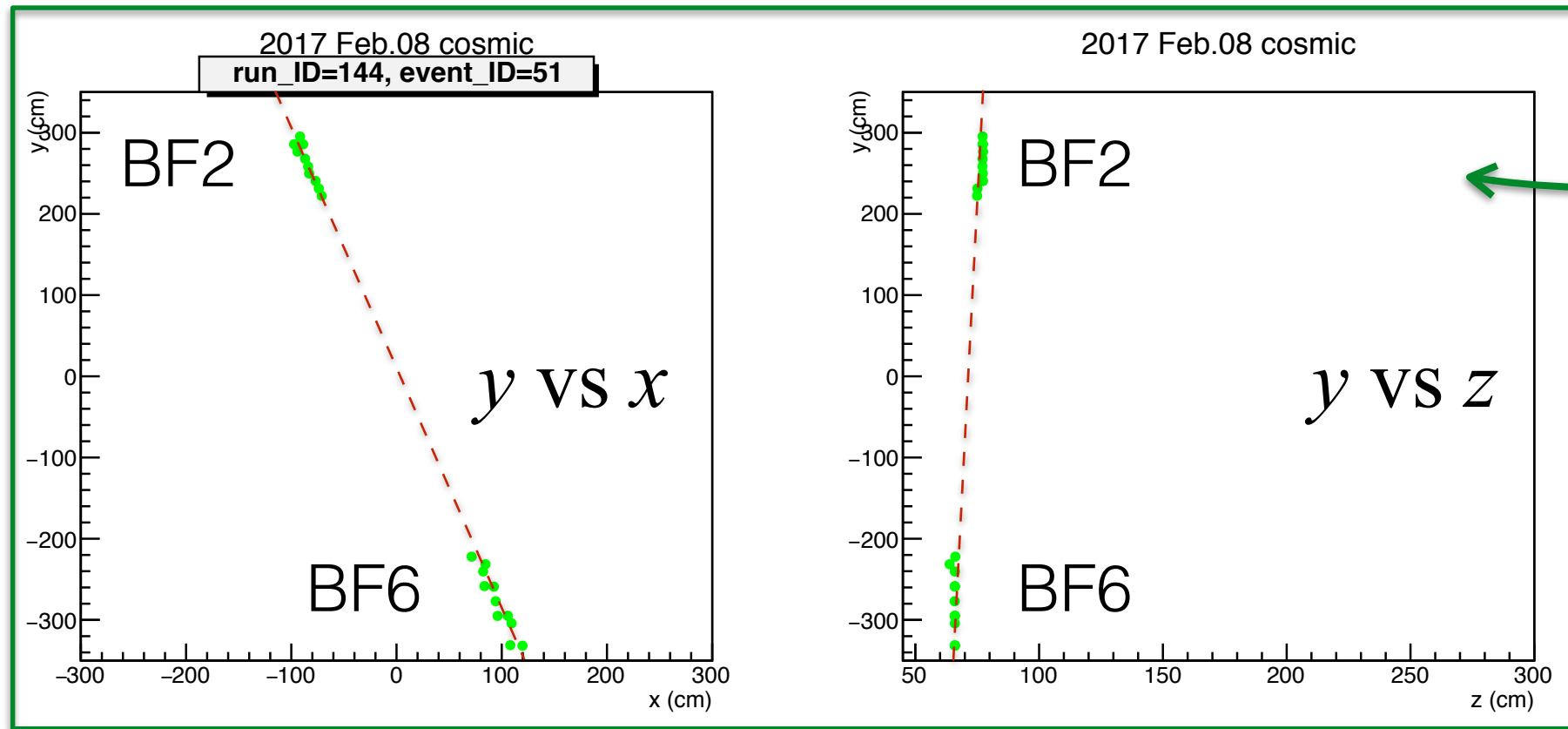
At February B2GM, first fully instrumented crate with INFN made boards:

Belle II KLM Sector BF6

KEK Test

- Tested in crate BF6, with HV on
- 12 tested ok, few cosmic ray tracks offline OK
- Three boards with problems:
 - S/N 11 no hits
 - S/N 6 shows hot channel (channel 17)
 - S/N 13 spoils readout out of the whole crate

Reconstruction sees RPC tracks in both sectors



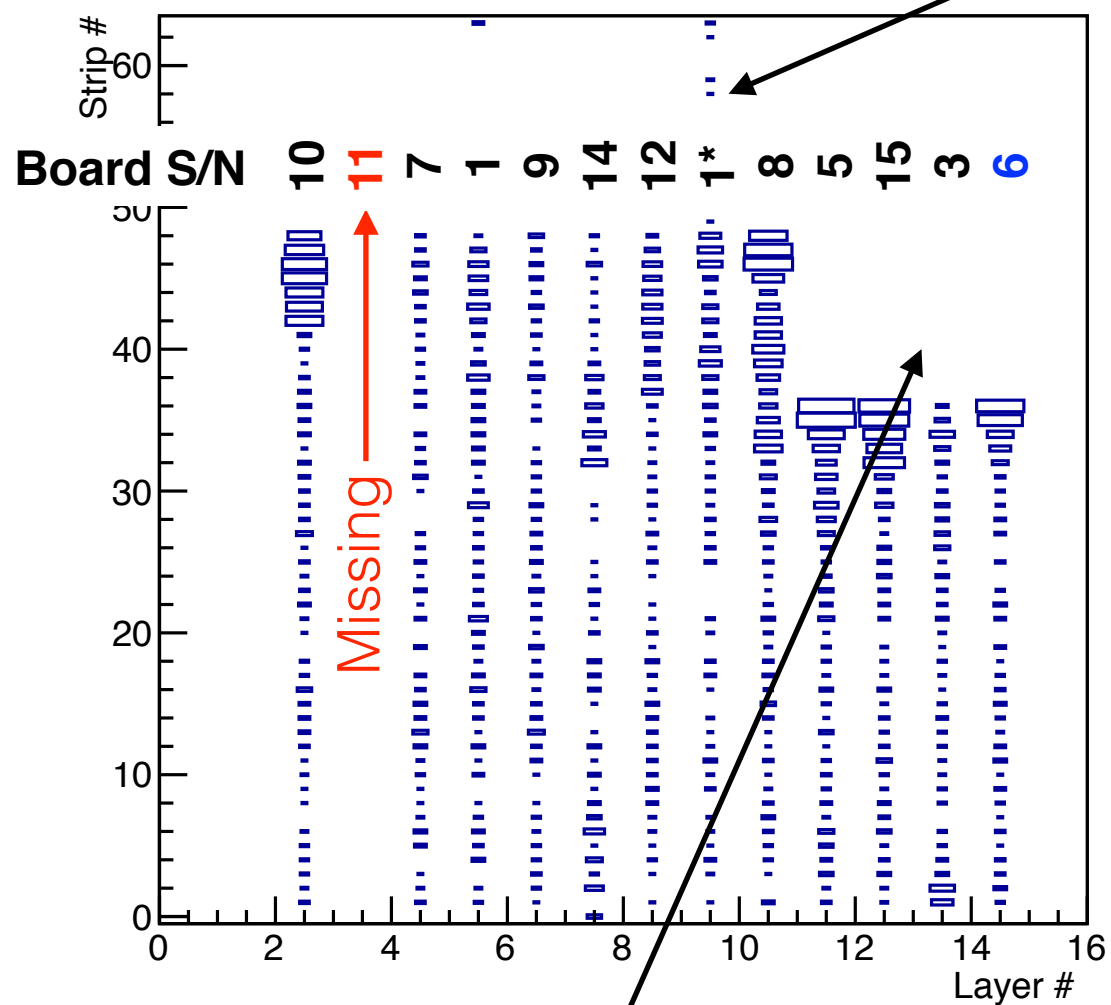
13-Feb

Trigger Stream

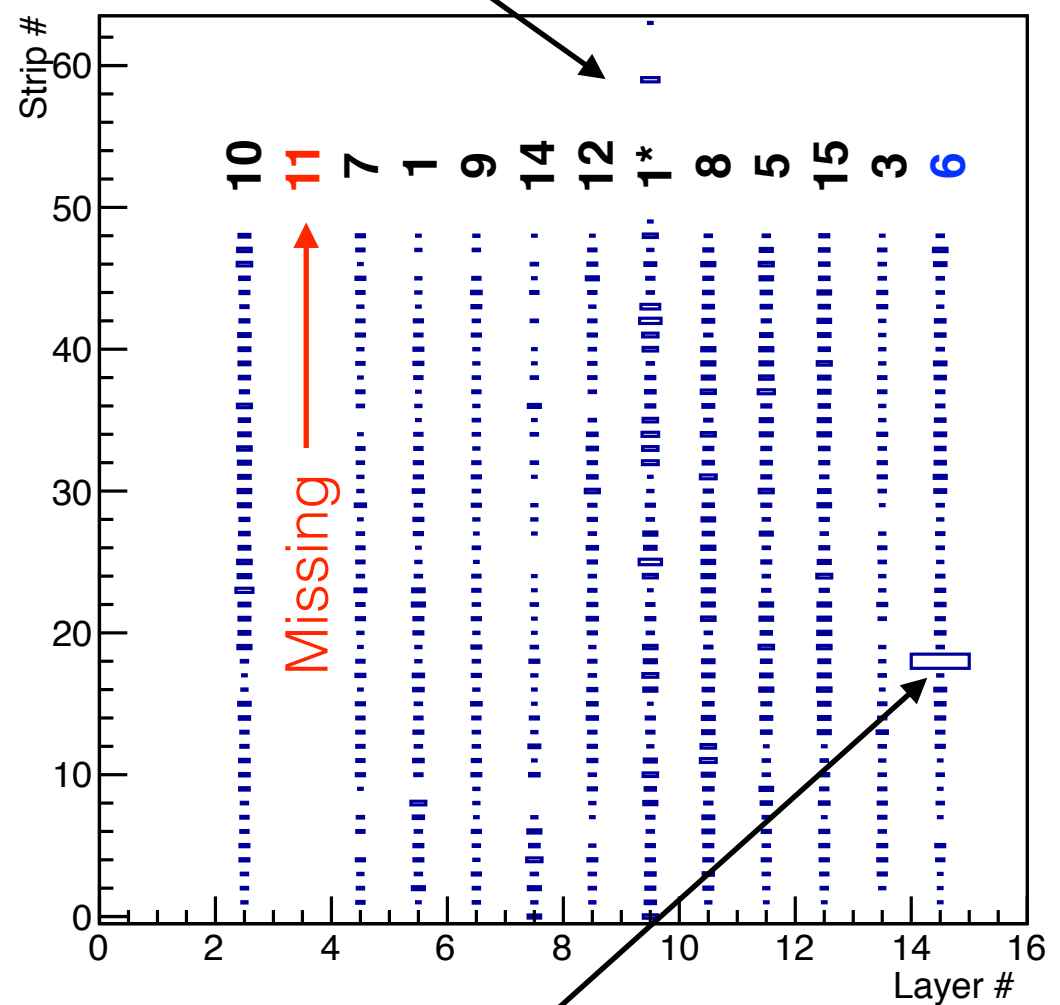
1* = #1 of the pre-pre-production

Strip address out-of-bound

BF6 ϕ -View Occupancy



BF6 Z-View Occupancy



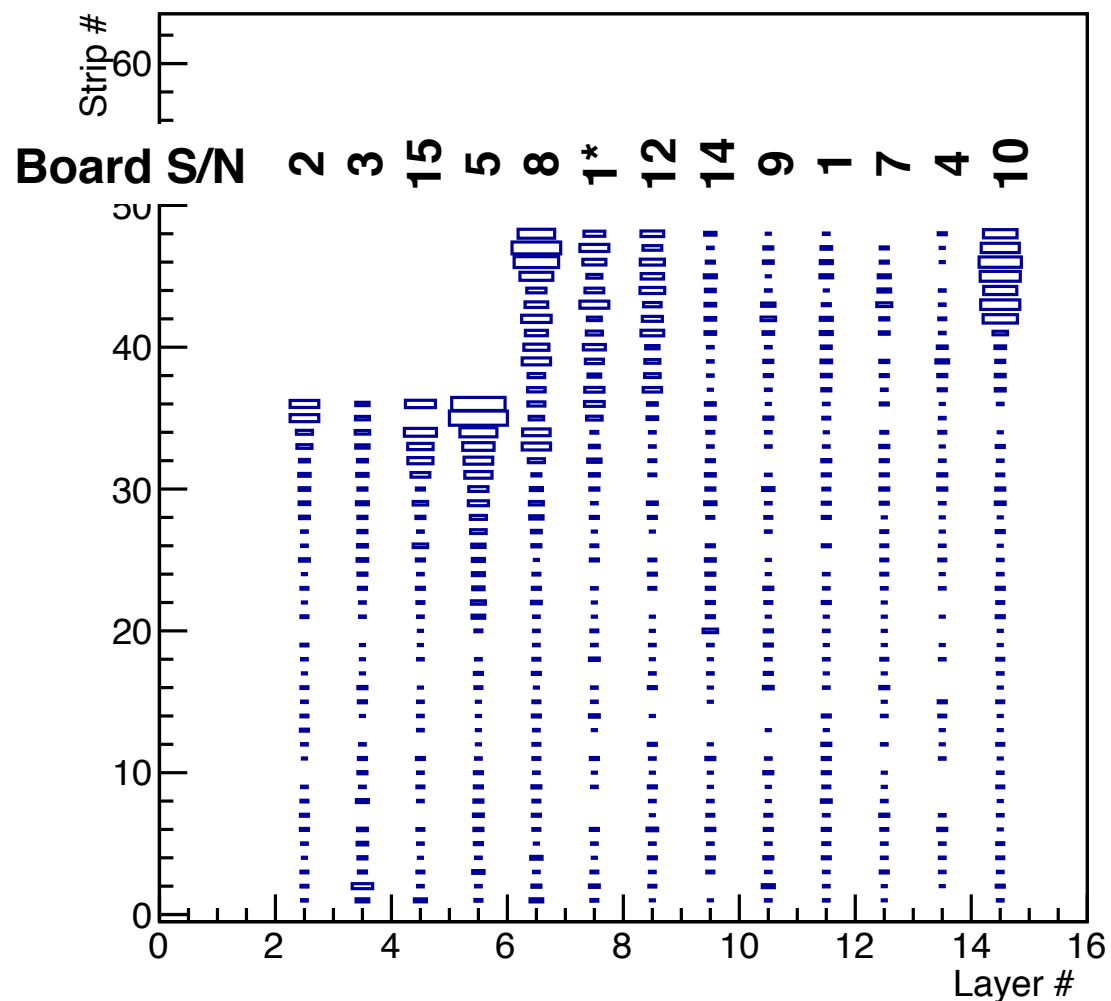
Note inverted cabling

Hot channel S/N 6

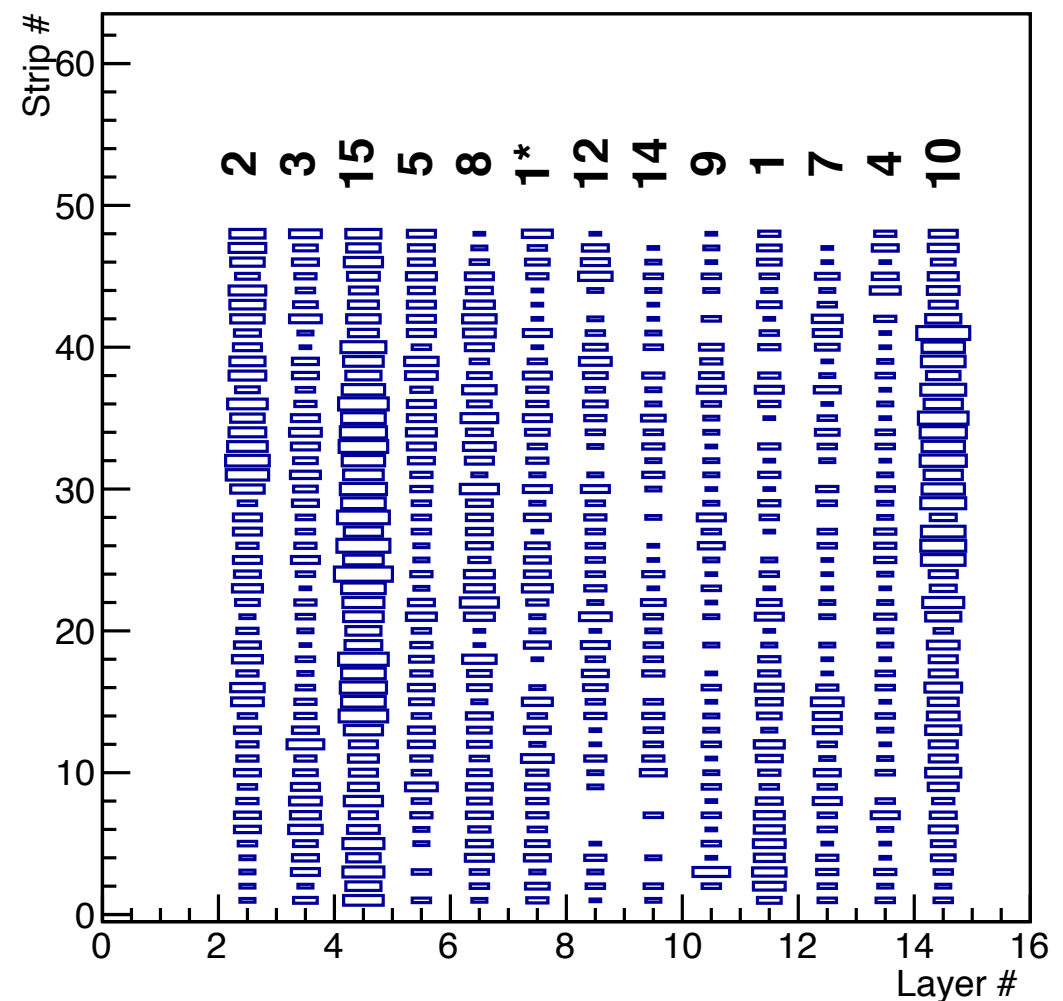
15 Feb - all 13 OK!

After correcting the boards' addresses, re-cabling and screwing down the boards to the crate

BF6 ϕ -View Occupancy



BF6 Z-View Occupancy



Replaced faulty #11 (\rightarrow #2) and #6 (\rightarrow #4)

Both replacement boards were OK

Status as of Feb 20th, 2017

- Of 15 boards, 3 had production problems which have been identified and fixed
- Implement improvements to the production process proposed by Artel and proceed to a second pre-production of 65 boards
 - Expect delivery by April 20th
- Actually received at Frascati
 - 10 on April 21st
 - 52 on April 28th
 - 3 are being reworked at the company, will be delivered soon

Status of second pre-production

- The first 10 boards had many production problems
 - 5 out of 10 with bad component soldering
 - We immediately notified the company and returned the faulty boards
- This was due to a malfunctioning of the AOI machine
 - This machine has been serviced and re-calibrated
- The 5 boards were tested with the AOI machine which was now able to spot all the soldering and component placing problems
- The automated optical inspection has been repeated on the second batch of 52 boards, before shipping to us

Test results of second pre-production

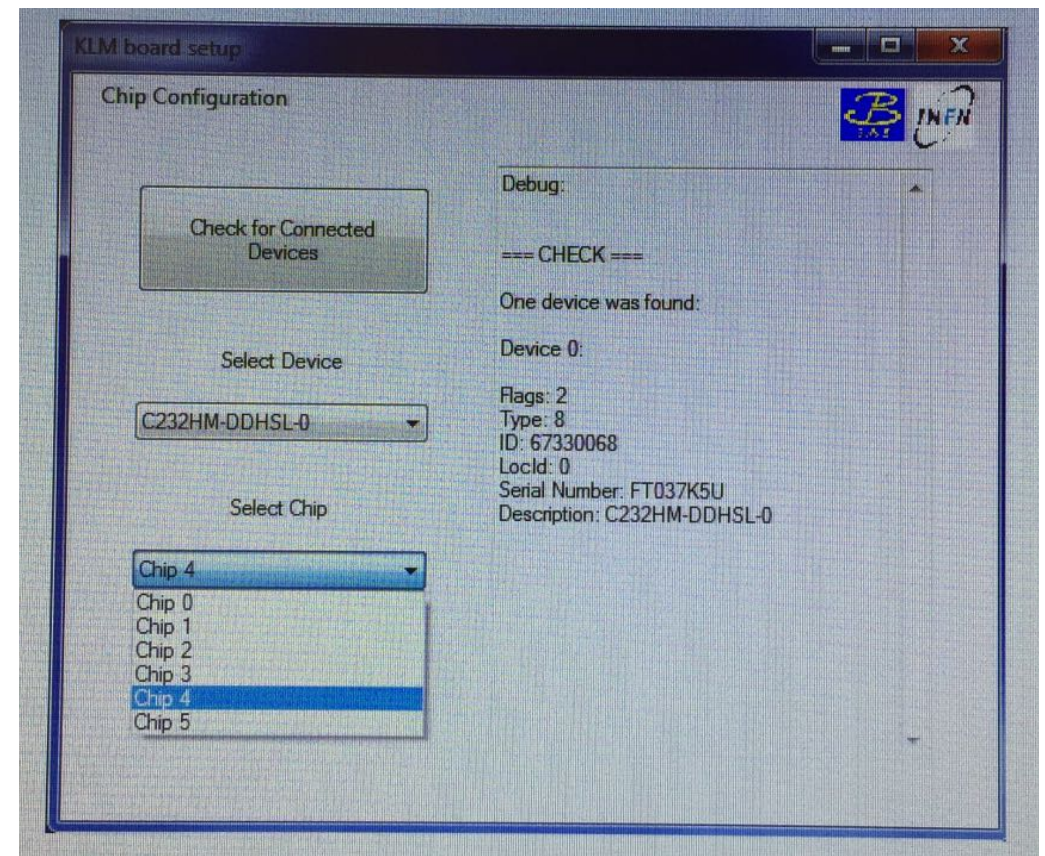
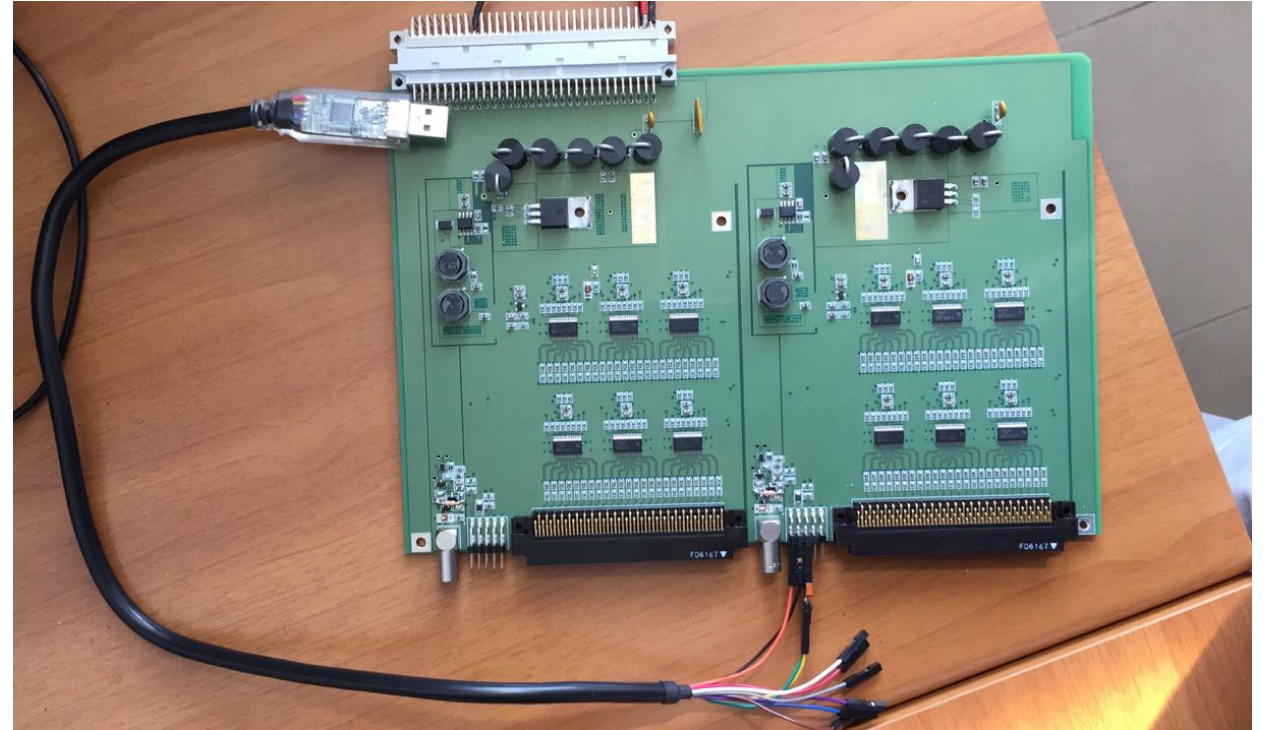
- We are presently testing the second batch
- So far, we tested 25 boards out of 52
 - 20 passed the test immediately
 - 1 with problem related to soldering of the backplane connectors, easily solved by re-soldering
 - now OK
 - 1 with a problem with the soldering of one IC, easily solved by re-soldering
 - now OK
 - 2 still under investigation
- We think that the production problems are now reduced to an acceptable rate, and easily solvable
 - Will give the company a green light to the final production of the last 170 boards

Bench Test

- There is still one test we want to make in Italy before shipping to KEK, that is pulsing the boards
 - This will test the analog inputs and the soldering of the front signal connectors
- Roma 3 is building a pulsing system which will be used to pulse all channels of 13 boards in a crate
- System for pulsing 1 board at a time is under test at Frascati, work in progress to make multi board pulsing possible
- We'll perform this test before shipping to KEK these 65 boards

Sistema Impulsaggio

- Arrivate e testate 5 carte (previste 13 per un intero crate).
- Si utilizza I2C per poter selezionare il pattern dei canali da impulsare.
- Viene sincronizzato col concentratore ottico tramite FTWS.
- Abbiamo sviluppato un programma su windows che amministra il sistema.

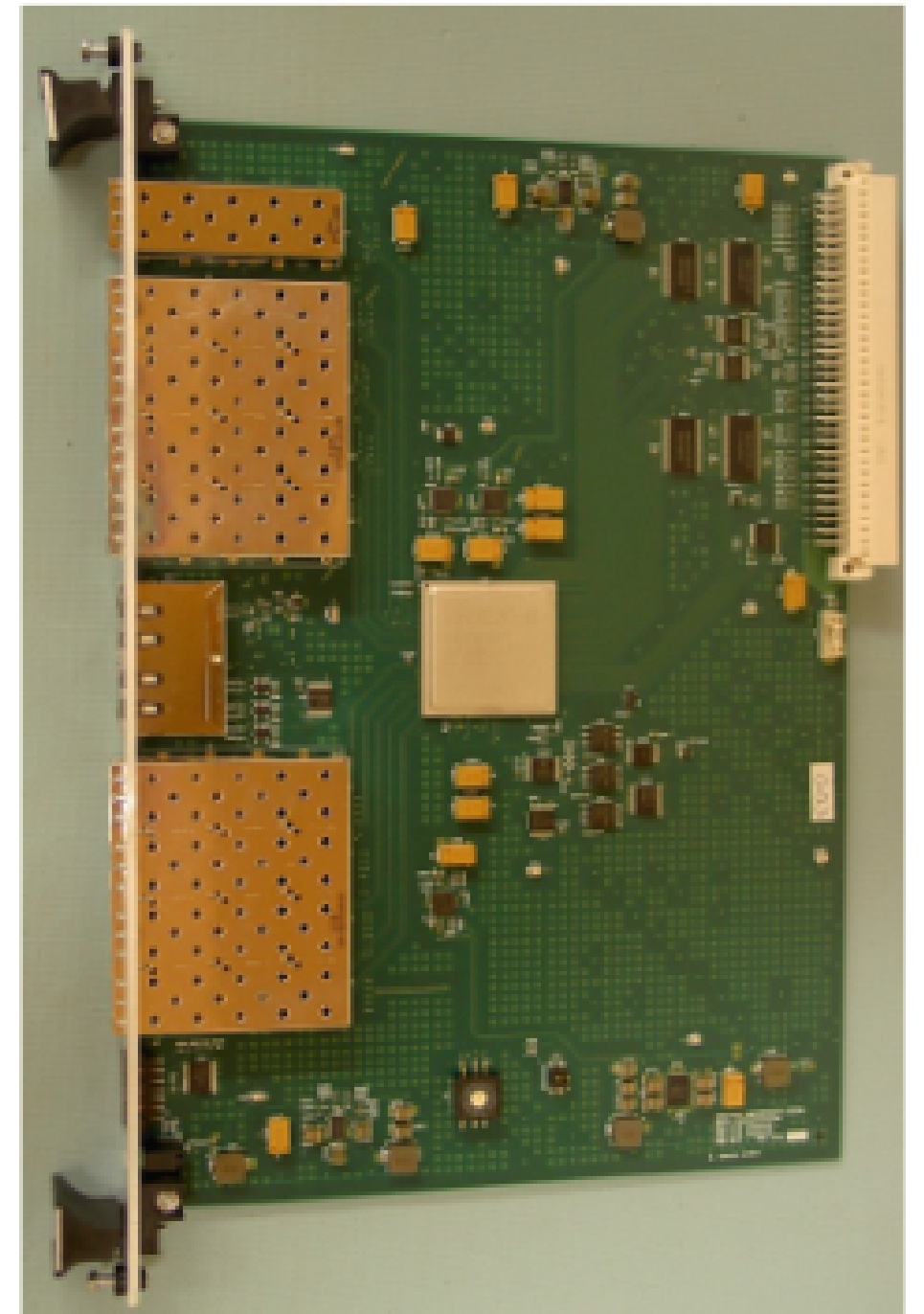


Test Laboratory @ LNF



Installation Plan

- We are not the only players in the field for the installation and final commissioning on the detector
- The terminator boards needed in each crate are being made at Indiana U.
 - Delivery to KEK of the full production promised by end of May
 - One board to be delivered to Frascati to be used in our test stand, not yet received



Installation Plan

- We are planning to install these 65 boards in June
 - This is 5 crates worth of boards, which would make it 7/16 total installed crates
- The production of the last 170 boards will take 5-6 weeks, could be completed by the end of June if we give the green light early next week, as we are planning to do
- Testing @ LNF will be done in parallel to the production (2-3 shipments)
- Start installation of the last 9 crates early July, which will take about 4-5 weeks

Conclusions

- The production of the KLM RPC FE boards is well underway (~1/3 done)
- Despite a small delay due to some initial production problems, we should still be able to meet our initial goal of completing the installation of the 13 crates by the end of July