

# TIB Test Results from Production Modules

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INFN Firenze



# Introduction

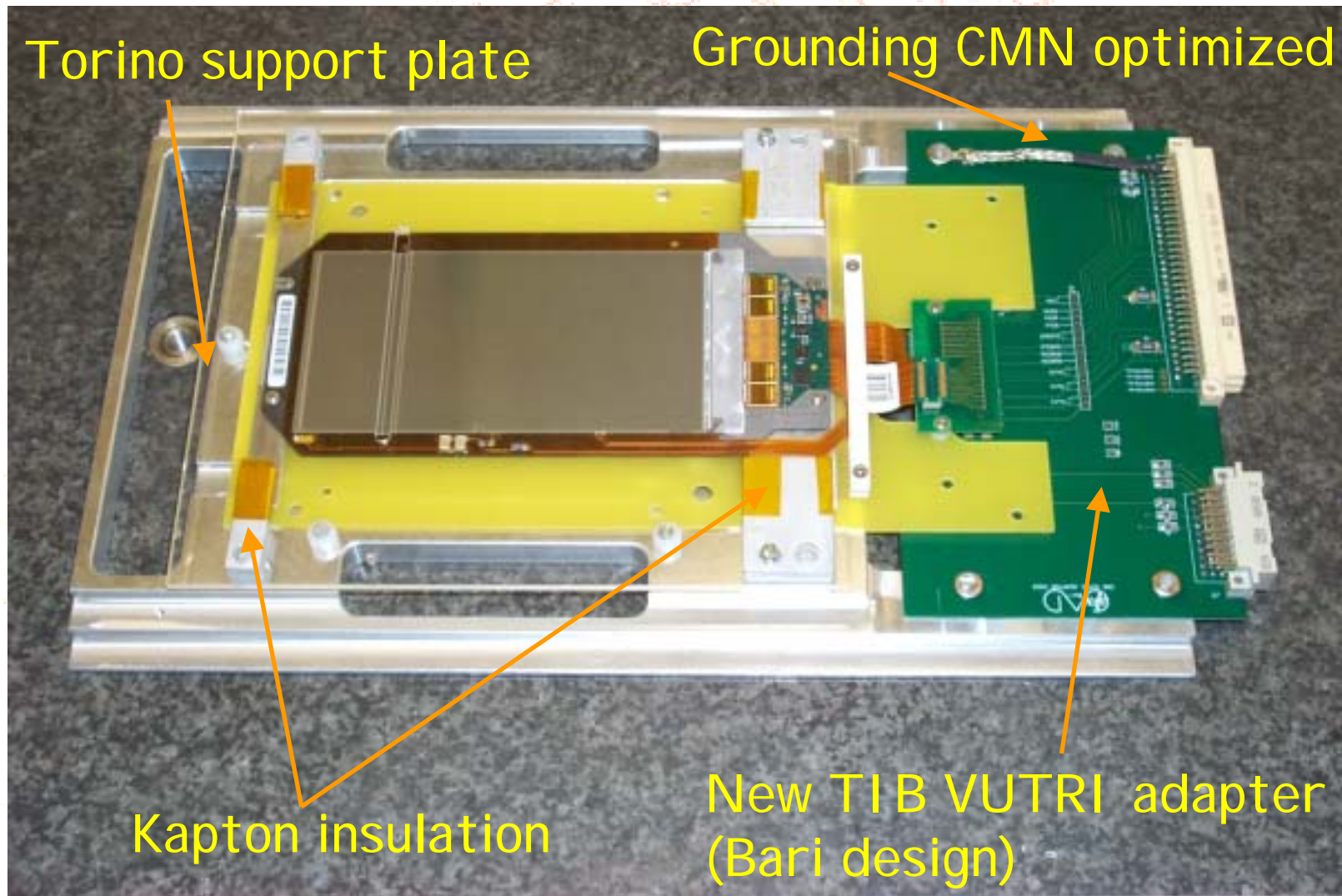
- The TIB community has started the production of final modules
- **6 centres** involved in this production:
  - Bari (gantry, bonding)
  - Firenze (bonding)
  - Padova (bonding)
  - Perugia (gantry)
  - Pisa (bonding)
  - Torino (bonding)



# Introduction

- GOAL: 100 modules to be assembled and tested within the end of September
- Taking profit of the results from Torino's Task Force on cuts and the summer efforts from ARC people, now TIB is using ARCS version 6.2.1
- The results from different centres are now fully comparable

# Sample Module





# ARCS Full Test

- As decided in the meeting in Torino, the **FULL TEST** consists of:
  - Pedestals and noise in all the 4 modes
  - Pulse shape in all the 4 modes
  - Pipeline test in peak inv on
  - Pinhole test in peak inv off  
(only for bonded modules)



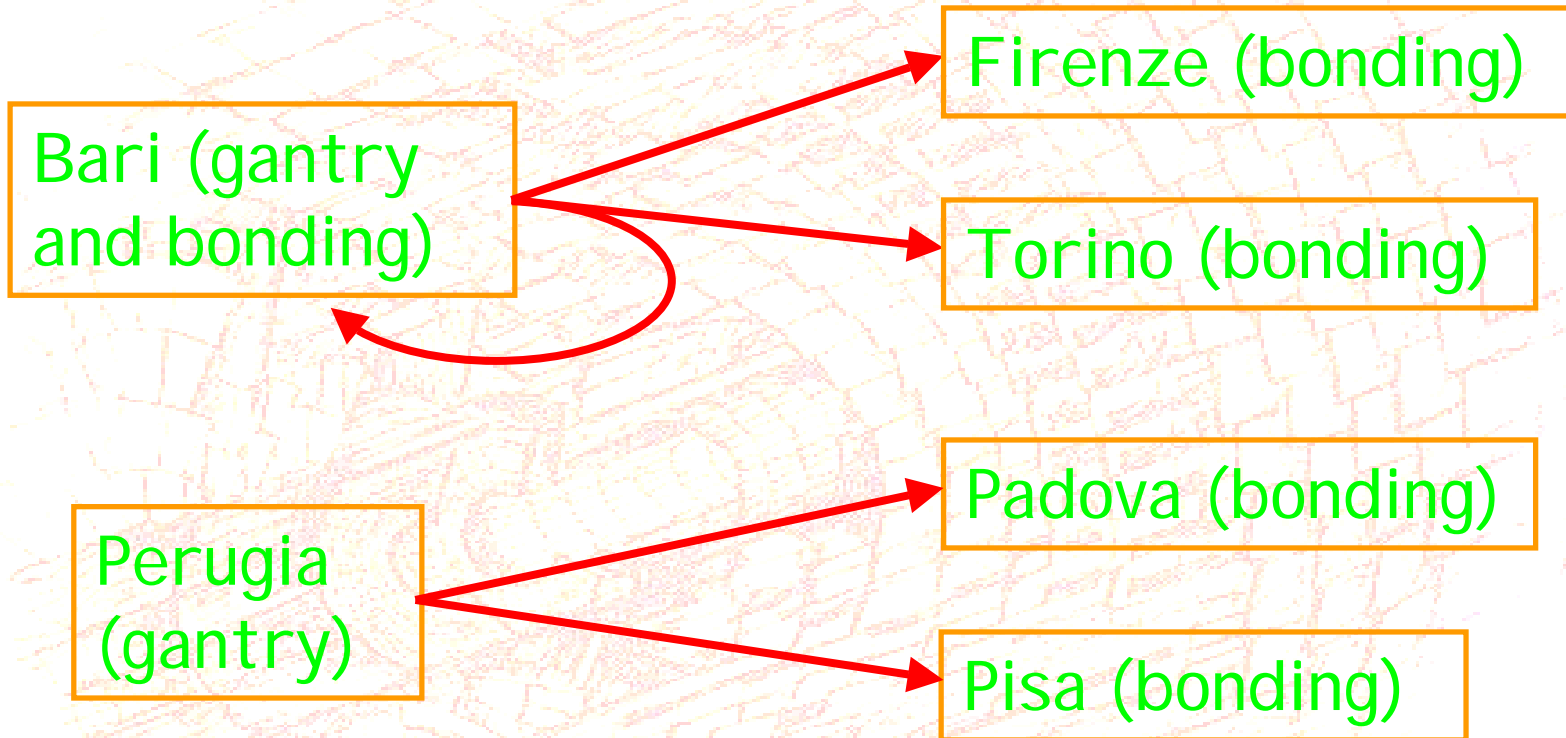
# Overview

Status updated to 15 September

- Modules assembled: 64
  - 28 Bari
  - 36 Perugia
- Modules bonded and tested: 35 (40)
  - 6 (+5 HV bonded) Bari
  - 8 Firenze
  - 8 Torino
  - 13 Pisa
- No problem during shipping by commercial express carrier



# Module Distribution





# Gantry in Bari

- 48 hybrids received
- 28 modules assembled at a rate of 4 per day
  - 1 showed some problems after assembly: under investigation
- Delivery status
  - 8 to Firenze (received)
  - 8 to Torino (received)
- ARCS full test is performed at every step



# Gantry in Perugia

- 48 hybrids received
  - 1 with some problems: under investigation
- 28 at a rate of 4 mod per day
- 8 at a rate of 8 mod per day
- Delivery status:
  - 16 modules to Pisa (delivered)
  - 8 to Padova (delivered)
  - 12 to Pisa (to be delivered)
- Normally only fast test is performed before and after assembly
  - Deep test is performed only for problematic hybrids (>5 bad strips, to be revised)



# Issues on Fast Tests at Gantries



- ARCS fast test doesn't produce an output with the bad strips list
- This list is needed for future reference
- ➔ **full test every time?**  
(not so time expensive, a full test requires just a few minutes)
- New setting file with cuts for hybrid + pitch adapter is needed (Bari-like?)



# Bonding in Bari

- 6 modules bonded and tested in 4 days
- 5 with HV bonded
- No cooling yet possible, due to missing dryer (expected in these days)



# Bonding in Firenze

- 1 day, needed for tuning and setup, for the first module
- 7 modules fully bonded and tested in 2.5 days
- Some problems in the generation of the XML output
- LT laboratory not yet available, so we ran a “LT equivalent” using a climatic chamber and the old Catania single module passive box



# LT Cooling Cycle in Firenze

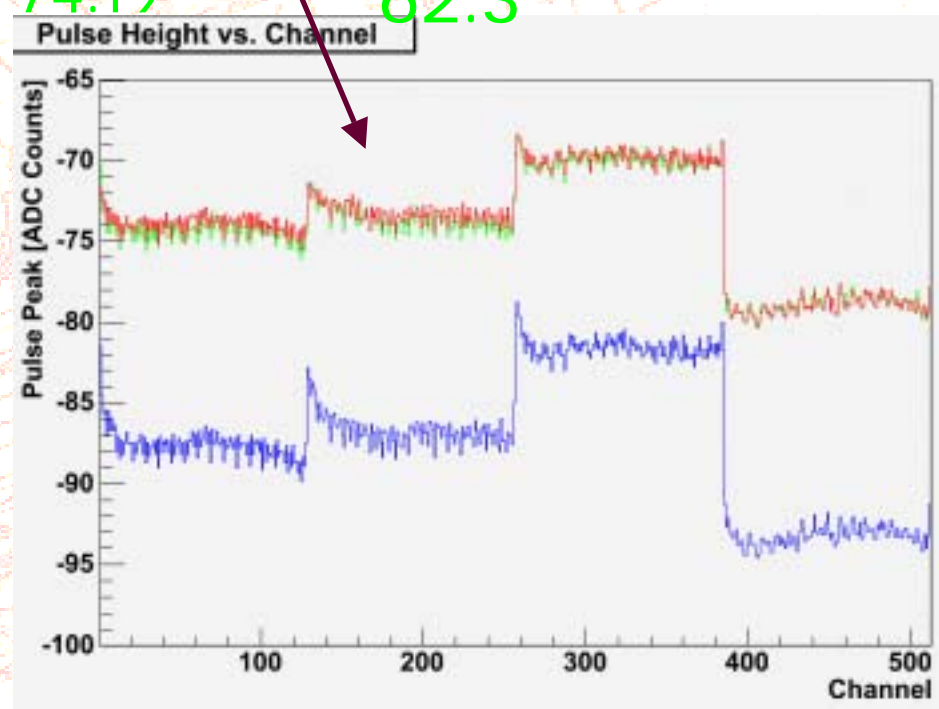
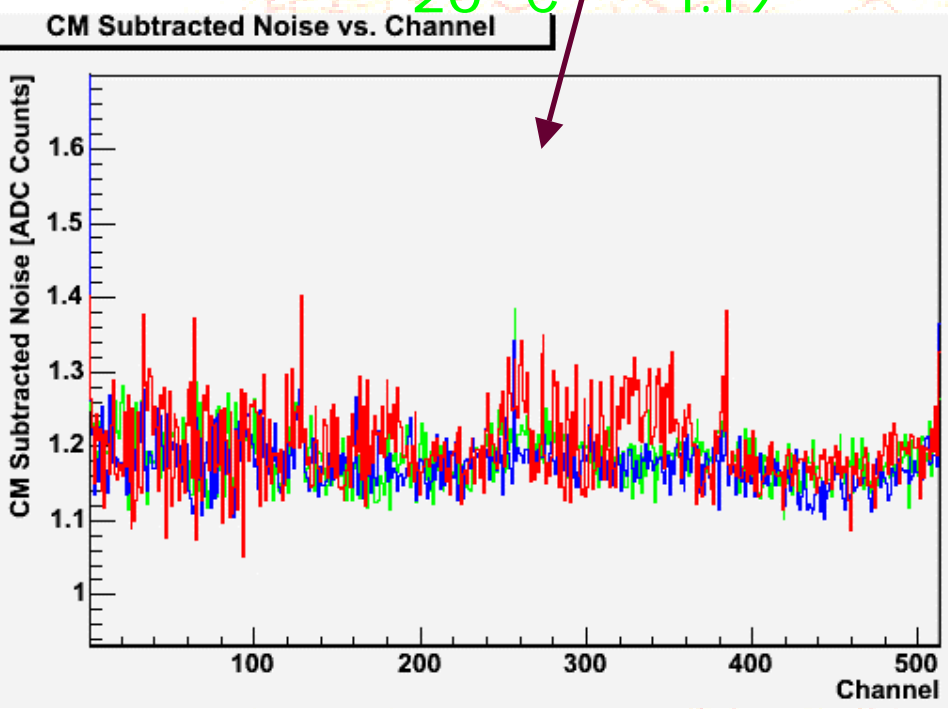
- Active reading with ARCS during all the cycles
- 2 modules tested:
- First module thermal cycle (module 032):
  - From 20 °C to -22 °C in 1.5 hour
  - -22 °C for about 18 hours
  - Back to 20 °C in 1.5 hour
- Second module thermal cycle (module 026):
  - From 20 °C to -11 °C in 1 hour
  - -11 °C for about 70 hours
  - Back to 20 °C in 1 hour



# LT Cooling Cycle in Firenze

One example: mod 032, peak inv on:

	Noise	Calibration	S/N
20 °C	1.20	73.97	61.5
-22 °C	1.17	87.26	74.6
20 °C	1.19	74.19	62.3



16/9/2003

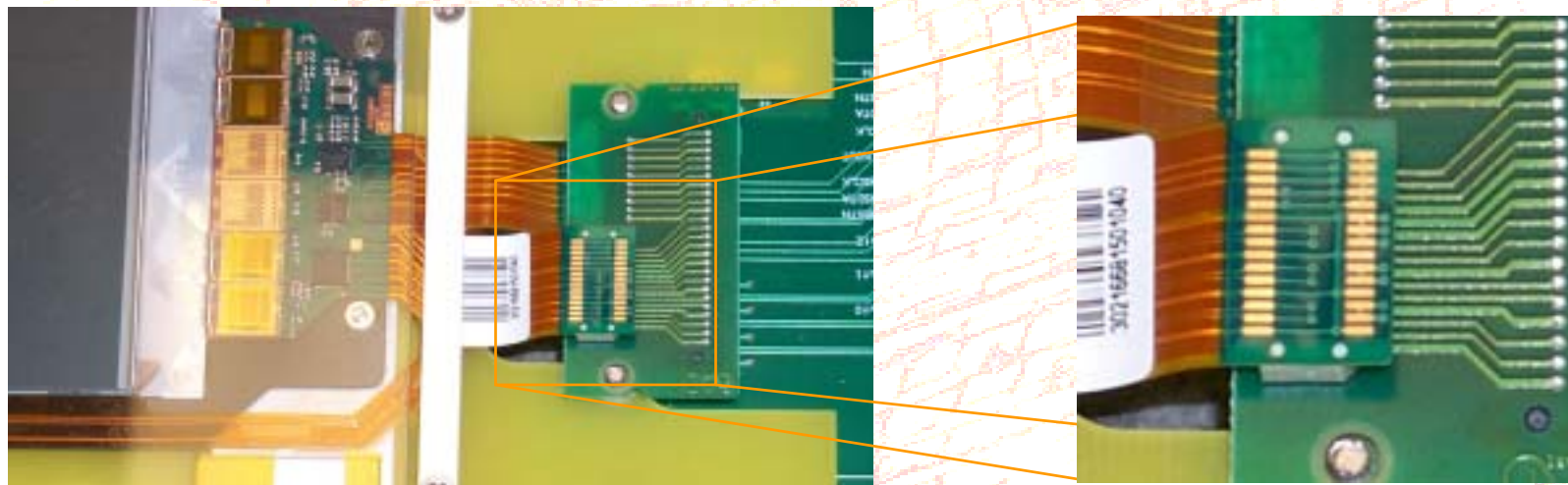
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# Firenze: A Problematic Module



- Module 027 passed all inspections and fast tests before and after HV bonding
- But, after bonding:
  - At first we lost one differential channel of one couple of APVs
  - Then we completely lost the analog output of this line and one differential channel of the other couple





# Firenze: A Problematic Module

- To investigate the problem, we:
  - Dismounted the connector and checked for damages and electrical continuity on the kapton cable: **OK**, **BUT a crack was seen on kapton near NAIS connector**
  - Tried that ERNI adapter on another (good) module: **OK**
  - Tried module 027 with another (good) ERNI adapter: **OK**
- Then we tried again module 027 with its original ERNI adapter: **OK !**
- Our hypothesis: continuity failing under mechanical stress



# REMARK

- Module 026 (thermally cycled during 3 days) had a **20  $\mu\text{m}$  wide** crack on the kapton near NAI S connector **BEFORE** the thermal cycle
- The cooling did not worsen this crack and the module works perfectly also after the thermal stress



# Bonding in Padova

- 8 modules shipped on last Friday
- Optical inspection **OK** on all of them
- Starting to bond right now...
- ...waiting for details



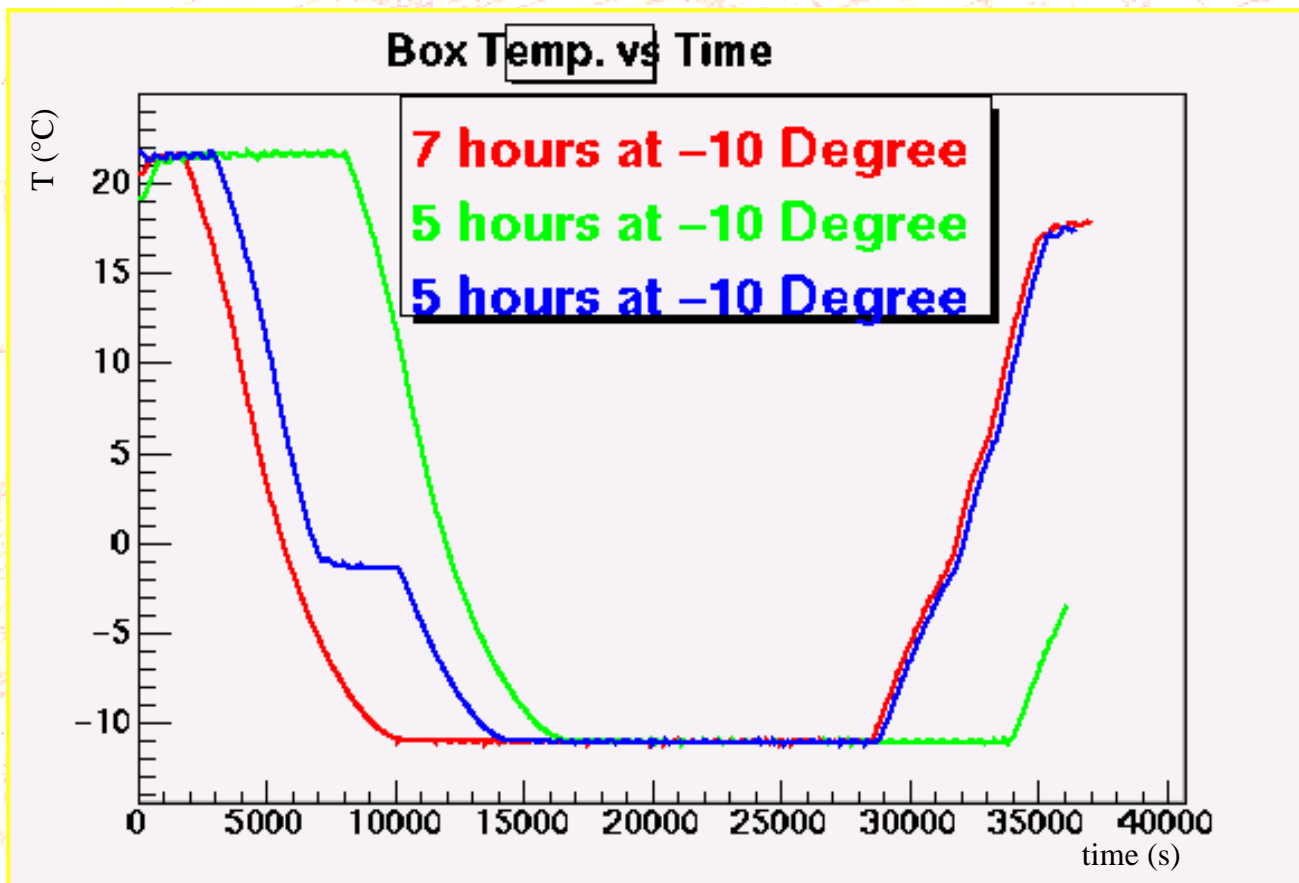
# Bonding in Pisa

- 13 modules bonded and tested at a rate of 3 per day
- Waiting for 12 more modules from Perugia
- Passive thermal cycling for 12 modules
- One module was tested with LT in Vienna box
- 3 modules were found with some problem on the kapton cable
- Some problems with the creation of the XML file for the DB



# Long Term Test in Pisa

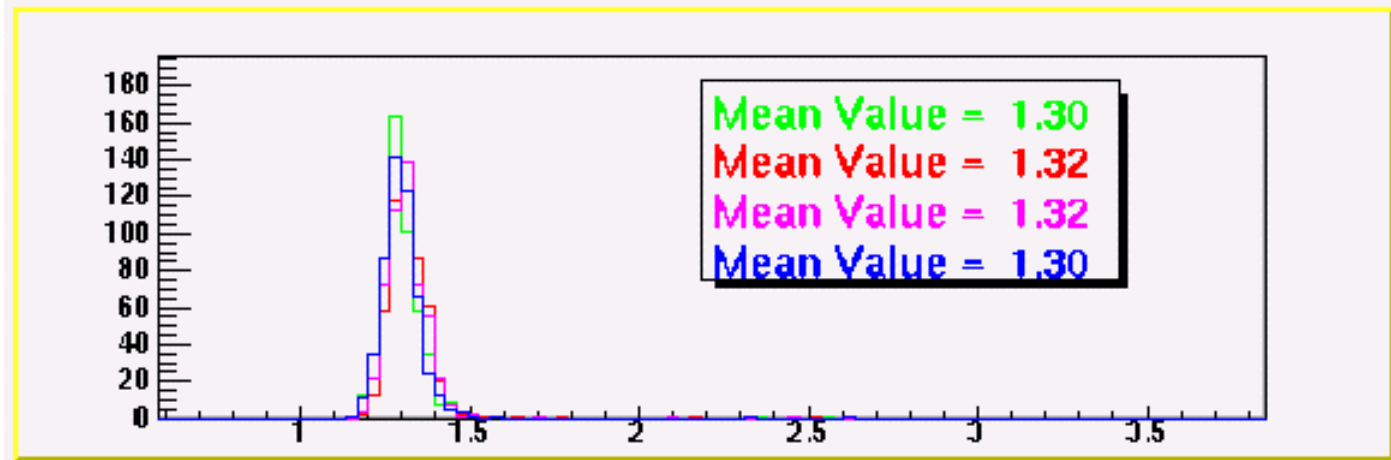
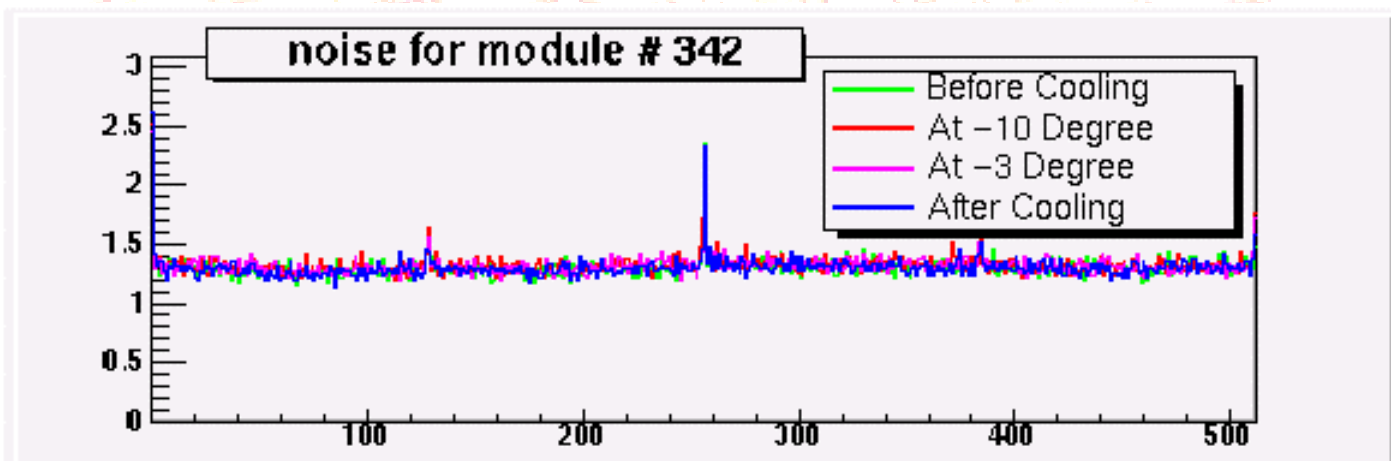
One module was tested with 3 thermal cycles for 17 hours with LT software





# Long Term Test in Pisa

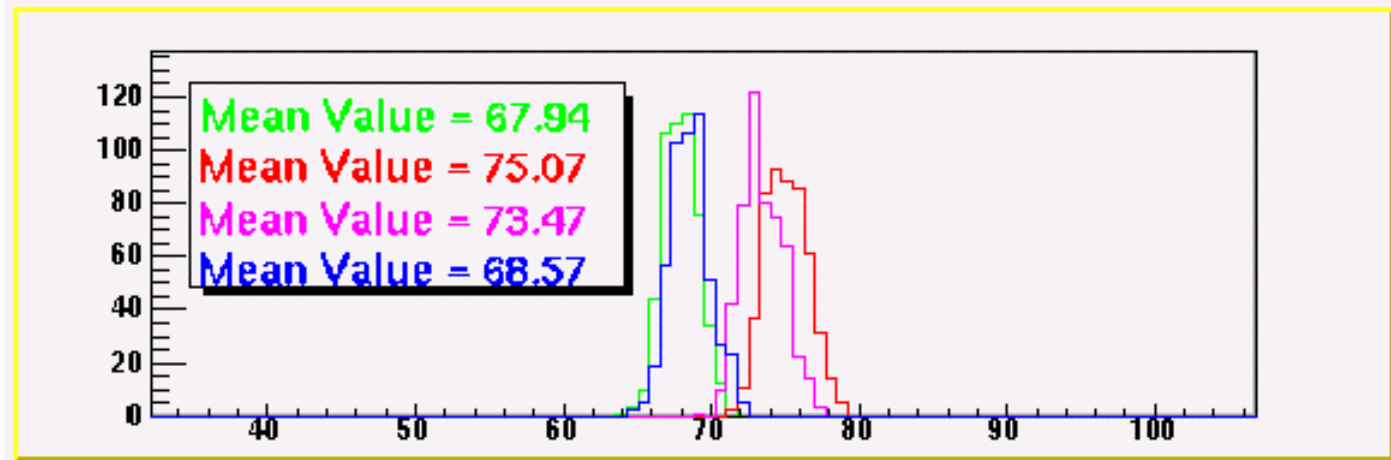
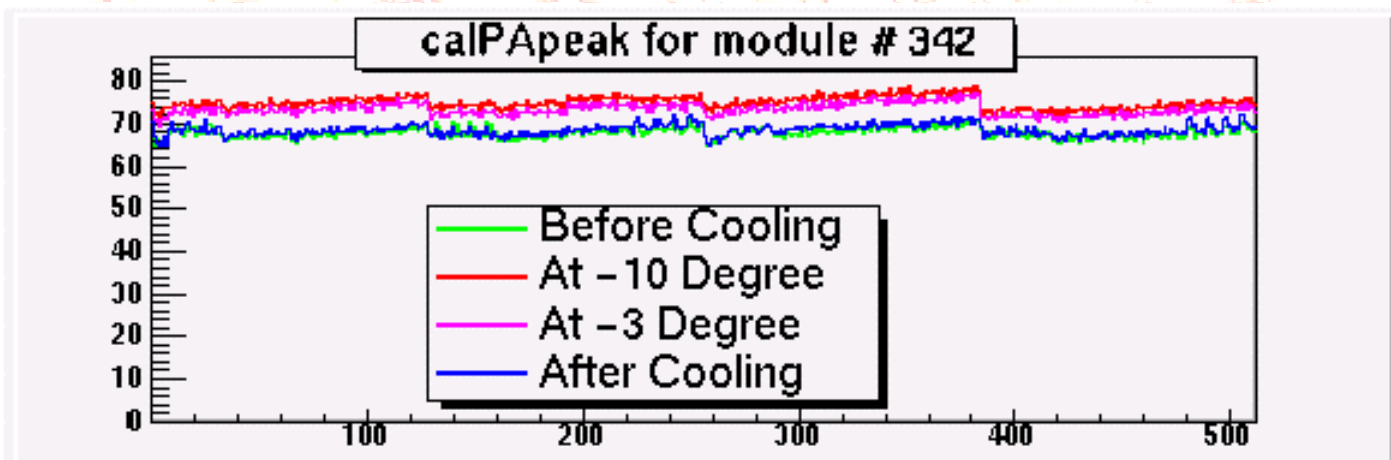
## Noise during the cooling cycles





# Long Term Test in Pisa

## Calibration during the cooling cycles





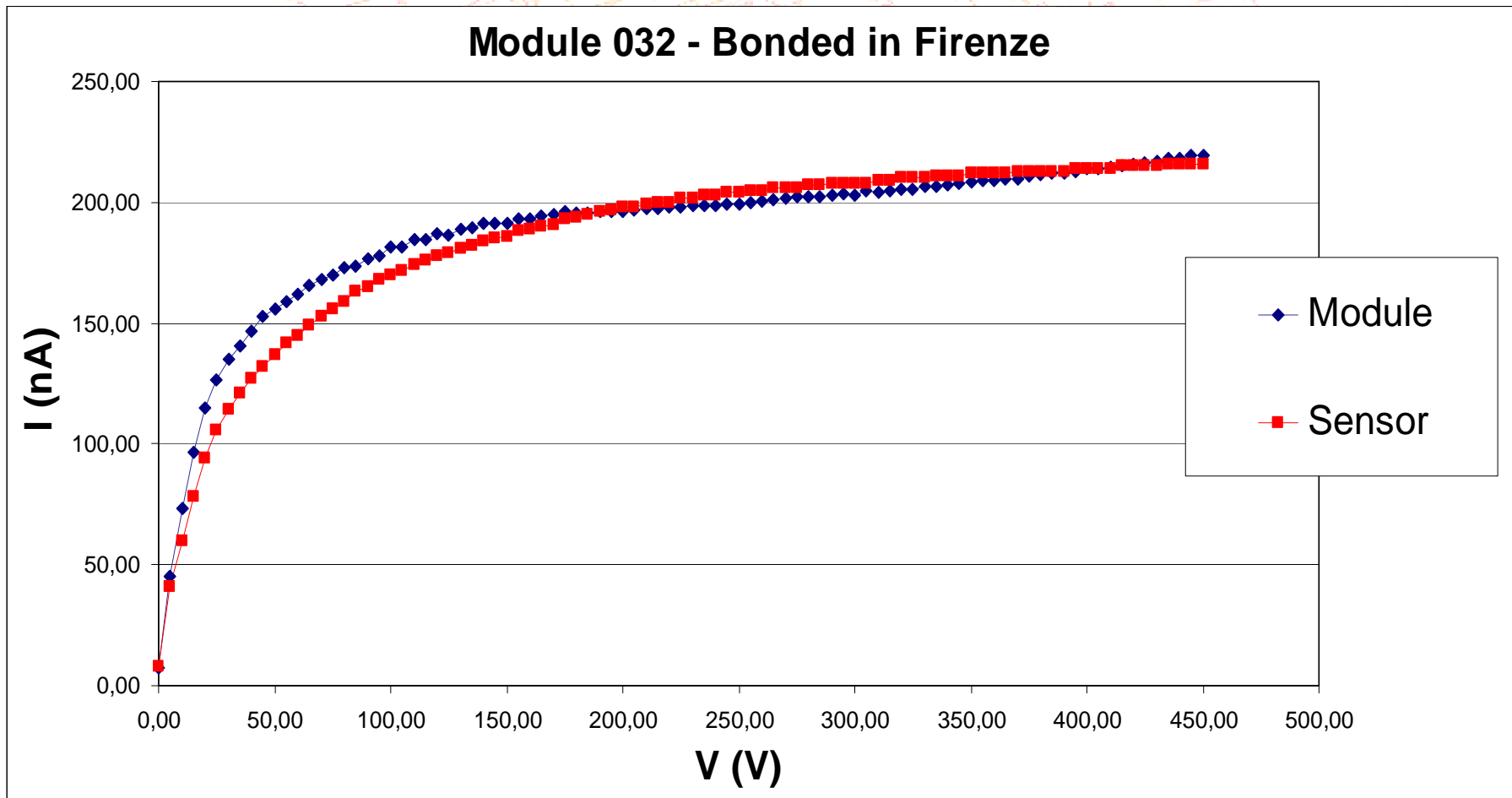
# Bonding in Torino

- 8 modules bonded and tested at a rate of 2 per day
- 1 hybrid seems to show a problem with the I<sup>2</sup>C communications – solved playing with connectors on ERNI adaptor
- One module has a current of 420 nA @ 450 V
  - From the sensor db should be 182 nA
  - Has to be rejected?



# IV Test

Except for 1 module (Torino), there are no problems on the current before and after bonding





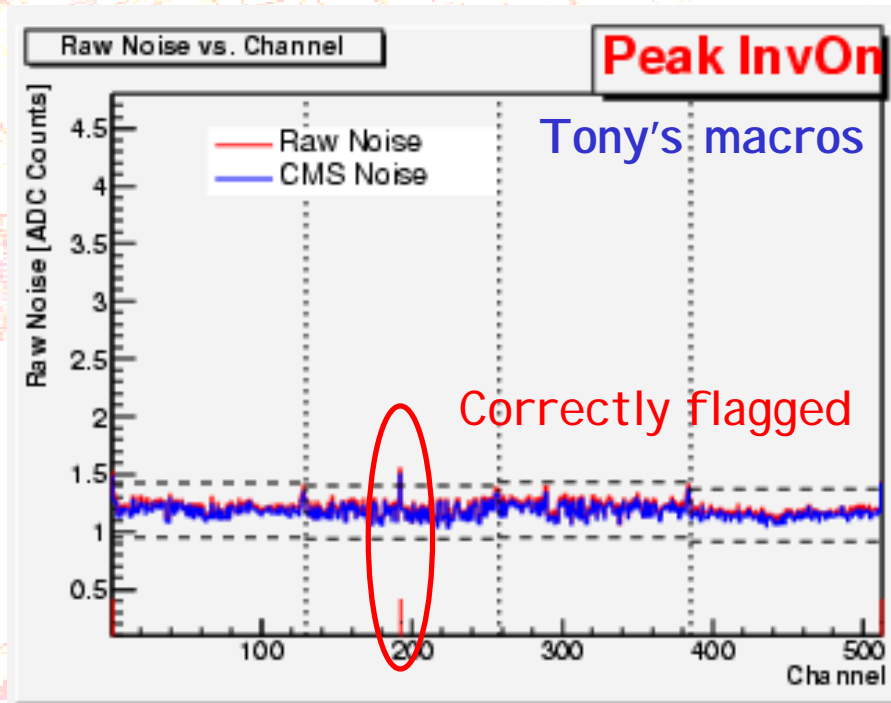
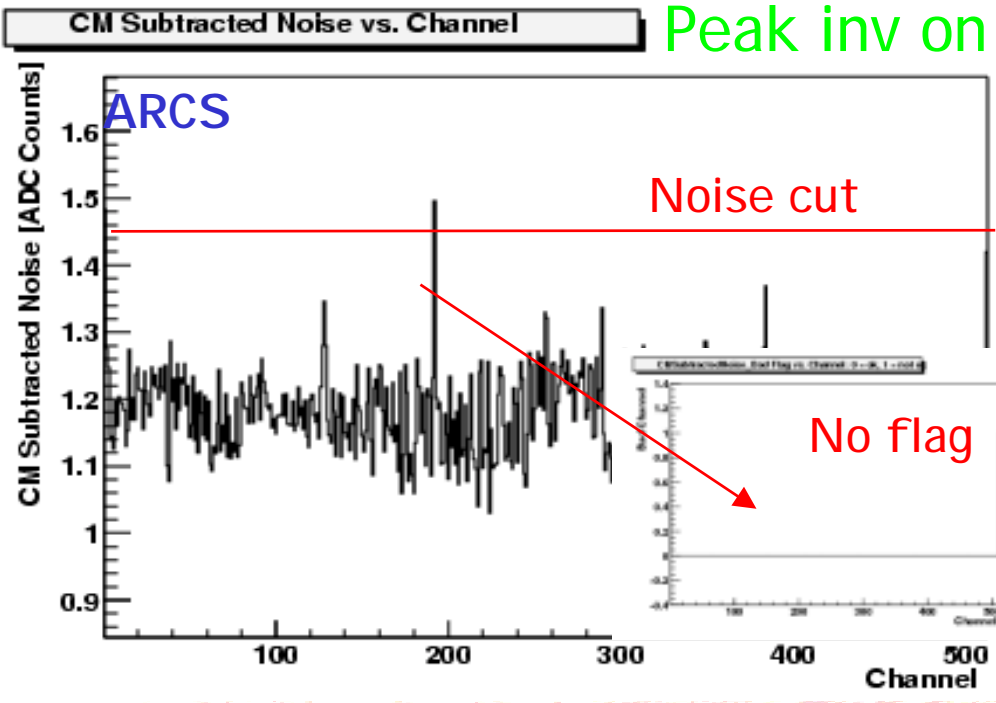
# Some Problems with ARCS

- XML output:
  - If in a full test we run a LED test, a lot of strips are flagged as bad (**Flag = 64**)
    - This result appears in the XML output also if this test is not considered **mandatory**
  - It seems that only 2 modes (peak and dec inv off) are used to evaluate the final **chflag**
- IV:
  - ARC software seems to accept only 10 points from an external text file. This value should be raised at least to 45/50 (steps of 10 V up to 450 V)
- **Comments from ARCS people?**



# Some Problems with ARCS

- There is still some difference between ARC results and Tony's macros
- Some strips seem not to be marked from ARC analysis routine





# Conclusions

- Gantry:
  - 64 modules produced in September
  - peak rate of 8 modules per day reached in Perugia, 4 modules per day can be easily guaranteed
- Bonding and testing:
  - 35 modules bonded and tested (almost 18000 strip)
  - Between 2 (Firenze - Torino) and 3 (Pisa) modules per day
  - Bad channel percentage still to be defined, but well below 0.1%
- Passive cold test: new boxes shipped at the end of last week from Catania
- Vienna box not yet fully operational in all centres, needs more work