Integration of the FTK demonstrator at Pisa and CAEN; AMBFTK, LAMBFTK and Proto-AUX tests

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SEVENTH FRAMEWORK PROGRAMME

Aristotle University of Thessaloniki

CAEN Tools for Discover

UNIVERSITÀ DI PISA

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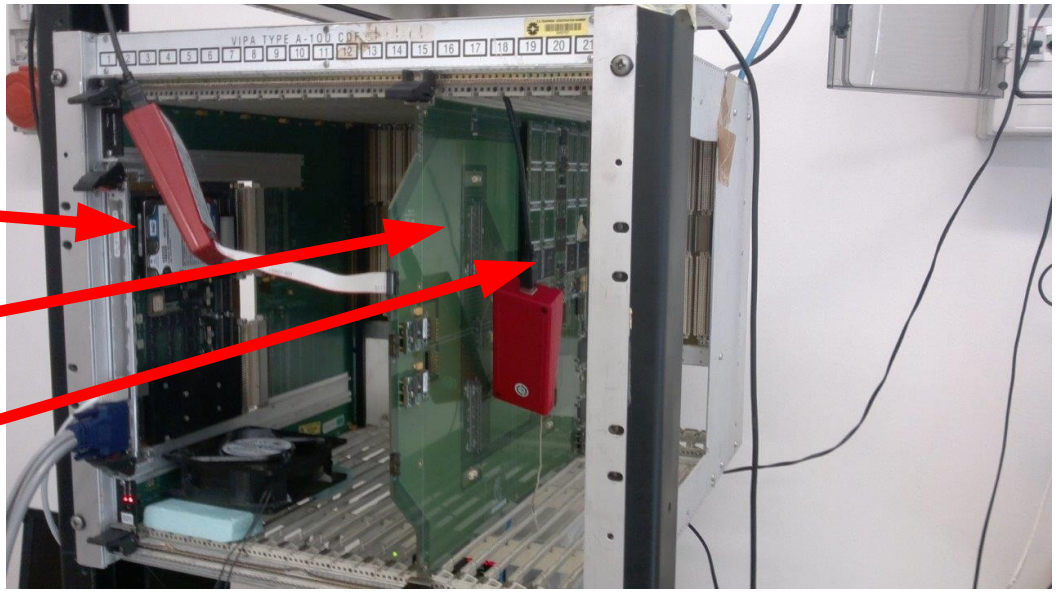
A. FTK demonstrators : status and plan

A1. FTK demonstrators at U. Pisa and CAEN

- U. Pisa:
  - 9U VME crate with
  - CPU board (VP315)
  - The heart of FTK:

    AMBFTK (2012) v1.1

    with a **L**ittle **AM B**oard for this (a “LAMBFTK”)



- CAEN:
  - 9U VME crate with
  - CPU board (VP315)
  - (test with:
    - AMBSlim v3.0 with a LAMBSlim, and
    - AMBFTK+LAMBFTK

A2. FTK demonstrator at CAEN: Lessons (1)

- **AMBFTK @ CAEN**
  - Pisa → CAEN: Installed and tested a few times with the standalone tests described later

With Marco. We are enjoying the role of a “ventillator” before we put a mechanical one!

A2. FTK demonstrator at CAEN: Lessons (2)

- **AMBFTK @ CAEN**
  - Problem: takes long to setup the TDAQ software via /afs
  - So, decided to find a solution where the CPU will not need to go to the "outside world":
    - Leave the OS on the disc, and
    - Have the TDAQ software on the same on-board disc (or on a PC close to it)
  - Till then, moved back the CPU and the AMBFTK to Pisa (CAEN → Pisa)

A3. FTK demonstrators at CAEN/Pisa:
Actions to facilitate all future installations

- **We have 4 CPUs (VP717) without disc for the test-stands**
  - like those to go in the VME FTK crates in ATLAS
- **OS installation:**
  - At CERN, these CPUs boot from a remote image of the OS
  - When outside CERN, the TDAQ sysadmins suggest strongly to have the OS local to an on-board disc
  - So, we ordered 1 on-board hard-disc (500GB) for each CPU
- **TDAQ software:**
  - When a very fast connection with CERN is available (like in U. Pisa), can setup the TDAQ software remotely, via /afs
  - In order not to depend on the network, we decided to also put the TDAQ software on the on-board discs
- **In process of installing the OS & TDAQ software on the discs**
  - Installation at CERN, they'll deliver the discs, we'll mount them on the CPUs, test them at U. Pisa and ditribute them (CAEN, PRIELE, AUTH)

A4. FTK demonstrator at Pisa:
Actions to facilitate all future installations

- **In parallel, prepare a backup solution:**

  (if for whatever reason it's proven that it's best to have the TDAQ software outside the VME CPU)

  - Learned to install and run the TDAQ software locally, at a PC in the lab

  - **Next:**
    - nfs mount the PC disc to the VME CPU
    - This way, we'll be able to setup the TDAQ software on the VME CPU without having to fetch CERN

A5. FTK demonstrators: PLAN
to have smooth future installations

- **PLAN:**
  - Get the on-board discs from CERN,
  - mount them on the CPUs,
  - test them at U. Pisa and
  - distribute them to the other FTK demonstrator sites:
    - CAEN, PRIELE, AUTH
  - If problems:
    - duplicate the “backup plan” from above to each FTK demonstrator site

B. AMBFTK, LAMBFTK and proto-AUX tests (mainly Daniel)

B1. Test procedure for the functional tests

- **Boot the CPU: OS (Scientific Linux CERN: SLC5) on the on-board disc**

- **Log in & setup the ATLAS Trigger&DAQ (TDAQ) software:**
  - Thus, the user has all the VME libraries available to talk to the AMBoard elements via VME

- **Load the firmware (.bit file) to the AMboard using Xilinx's ISE**
  - Now the AM board elements can listen to VME commands

- **Run the stand-alone / funcionality tests:**
  1) Generate a bank of patterns and load them to the AM chips
  2) Generate a random set of hits, given these patterns
  3) Give the hits to the AM chips and let them find macthing patterns (roads)
  4) Given the hits and the patterns, simulate what roads should have been found by the AM chips
  5) Compare found and predicted: if OK, all is fine!

B2. Testing the AMBFTK/LAMBFTK

- AMBFTK/LAMBFTK:
  - Both Serial and Parallel links on the AM board
  - Step towards the “all-serial” ABMSLP/LAMBSLP boards
- @ CAEN : functional tests before back to Pisa
- @ U. Pisa: more complete tests
  - AMchip04 works!
    - finds patterns as expected
    - 6 AM chips on the LAMBFTK
  - Serial links loading & outputting the patterns on the input/output FPGAs work
    - with some problems still to understand

B3. Testing the AMB ←→ protoAUX connection

- **AMBFTK + protoAUX board @ Pisa**
  - Connection between the AMB and the AUX via the P3 connection: OK
    - need to continue this work with more intensive tests

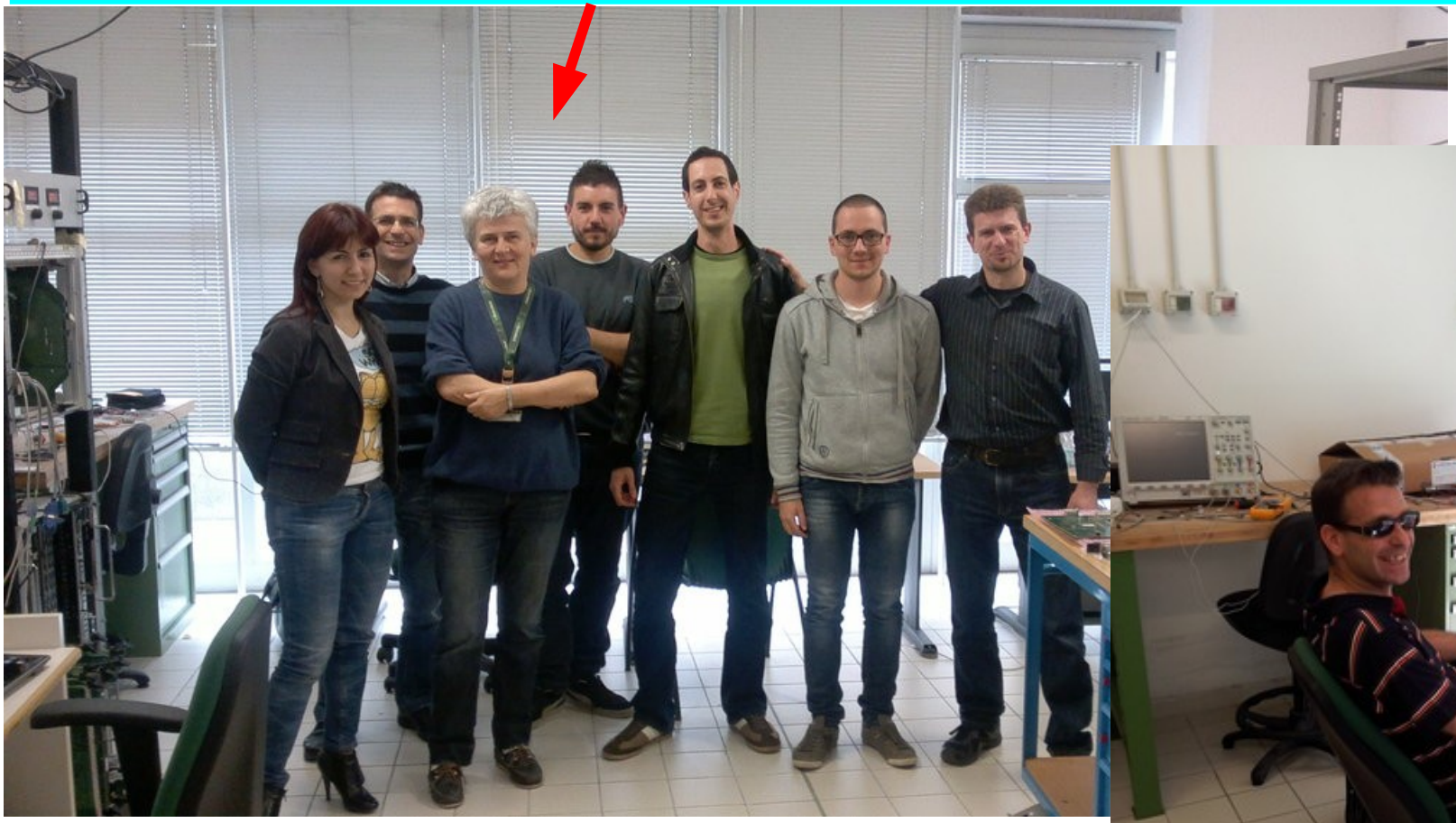
C. In two words

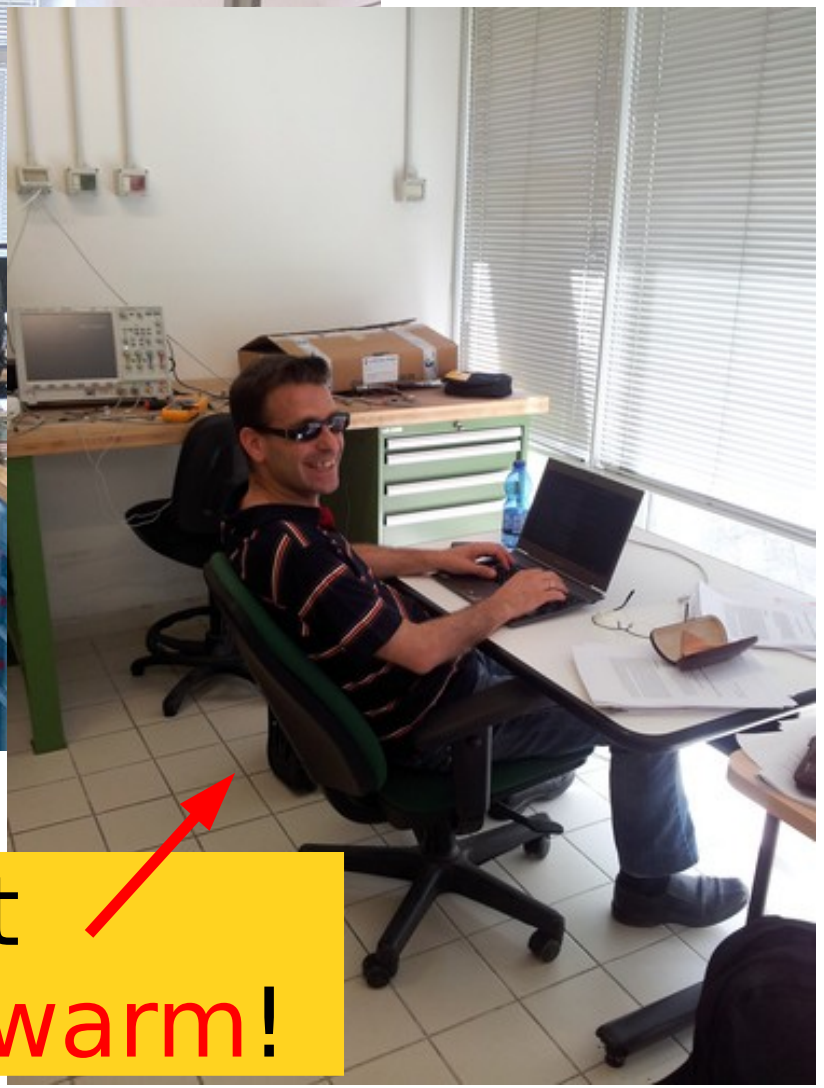
Summary

- Ironed the plan for equiping the FTK demonstator sites with basic VME CPU functioning
    - Implemetation in progress
- The AMchip04 and the AMBFTK/LAMBFTK works
    - The mixed serial & parallel buses, on the way from the all parallel to the all serial (AMBSLP/FTKSLP)
- The protoAUX card talks fine with the AMBFTK

  via the P3 connector
- Time flies, see next

End of May at the FTK lab in Pisa – notice the sweaters





It took a while but it finally became sunny & warm!

Thanks!

Two time-consuming stages in tracking: Pattern recognition & Track fitting

Pattern recognition with Associative memories (dedicated chips) – find track candidates with enough hits on the Silicon detectors

High-precision measurement of the track parameters by an FPGA working only with the info on the matched pattern