# JEM upgrades and optical data transmission to FEX for Phase 1

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# Phase 1 – plans : JEP

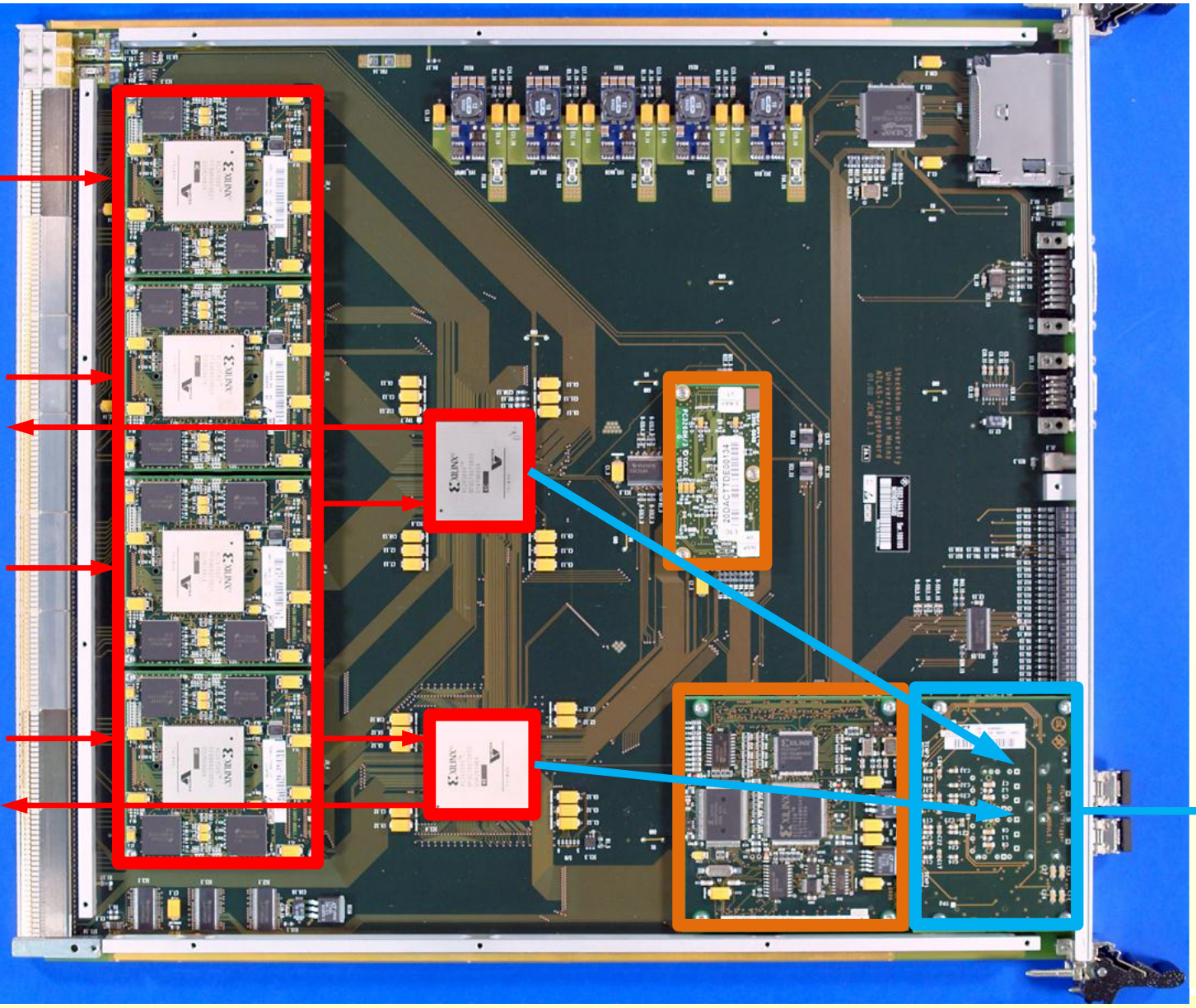
Journey to prehistory:

- JEP comprising 32 JEMs
- JEM is modular system
  - Large and empty main board
  - Seven mezzanine modules
- JEP conceived ~ Y2K
- Detailed design and production in 2003/6
- Expected to run until phase 2 (202x)
- Maintenance issue
  - FPGA design tools / device support (ISE 10.1)
  - Spare modules and electronic components
    - Number of spare mainboards seems adequate right now
    - Mezzanine modules of some concern
      - Input modules had been rather difficult to procure in sufficient quantities due to production issues
      - Problems with cleaning / drying procedure after assembly
      - A few modules had died early
      - Situation seems stable currently
    - No experience with long term operation of home built modules yet

→ Think about replacement JEMs, built in recent technology

Consider different partitioning of functionality into modules

# Current JEM : components and data paths



FPGAs and mezzanines

Real-time and DAQ paths

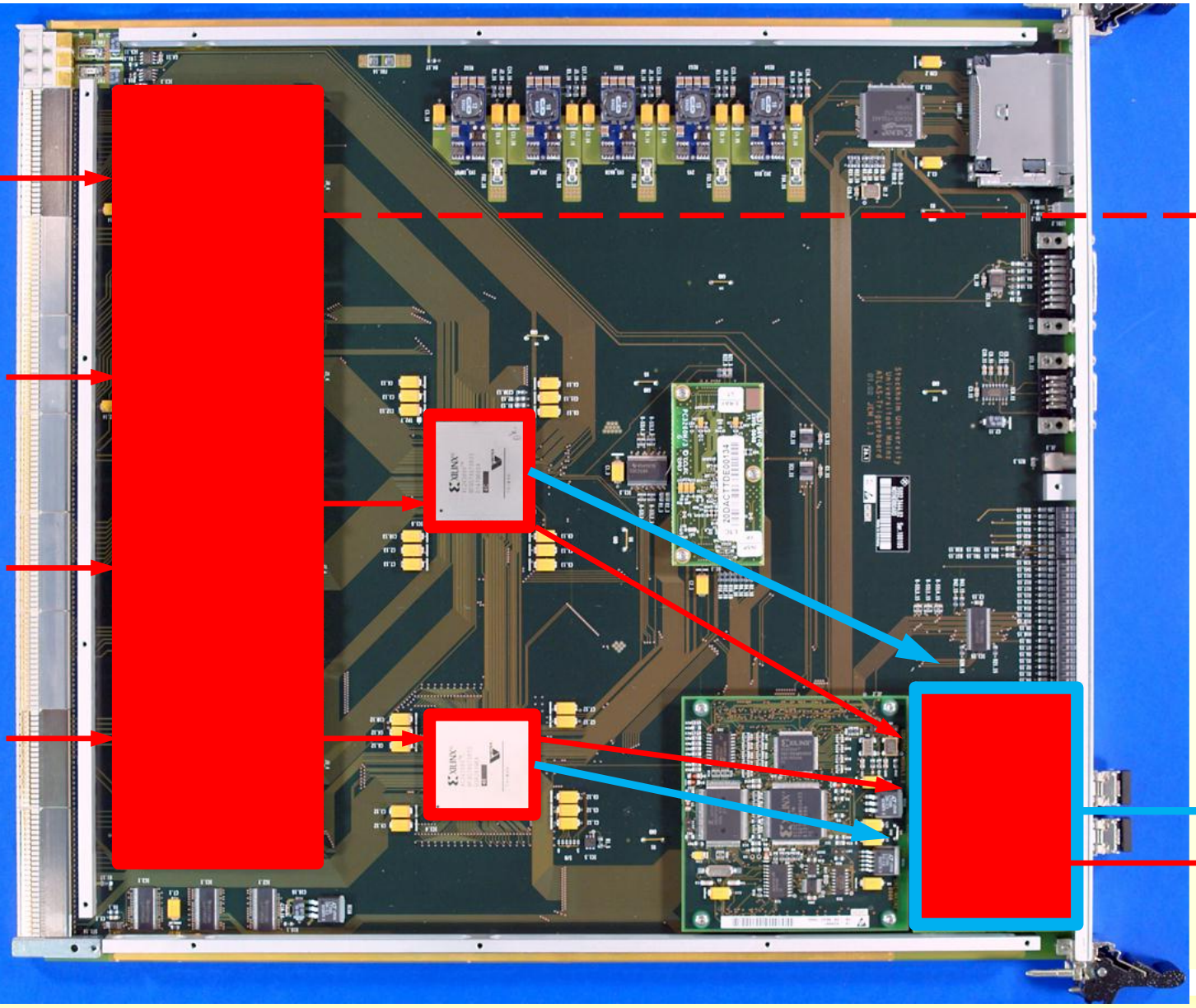
# How to renew the Jet/Energy processor…

- Initially: Increase JEM optical output capacity (real-time!) by renewal of low-cost G-link daughter modules. Add option to downgrade JEMs to fixed functionality, non software configurable fibre driver modules via an alternative FPGA configuration
- Increase hadronic data path bandwidth so as to allow for finer granularity on jet/energy processing (.1×.1)
- Options under discussion with Heidelberg
  - Renewal of JEM input daughter modules incl. electrical ~850 Mb/s input capability
    - Equalization circuitry
    - FPGA-internal de-serialization
    - Bunch crossing demultiplexing (as on cluster processor)
  - Optical data transmission from current PPr / nMCM
- Add feature extractor
  - Supply with electromagnetic data from Digital PreProcessor
  - Supply with hadronic data from renewed JEM daughters / nMCM
- Several fex options have been discussed: two distinct fex crates, electromagnetic/jet fexes interspersed in same crate/backplane,…

Important:

- Keep current JEP running while new hardware being commissioned
- Eventually switch to improved jet/energy trigger

# Reworked JEM: components and data paths



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real-time and DAQ paths

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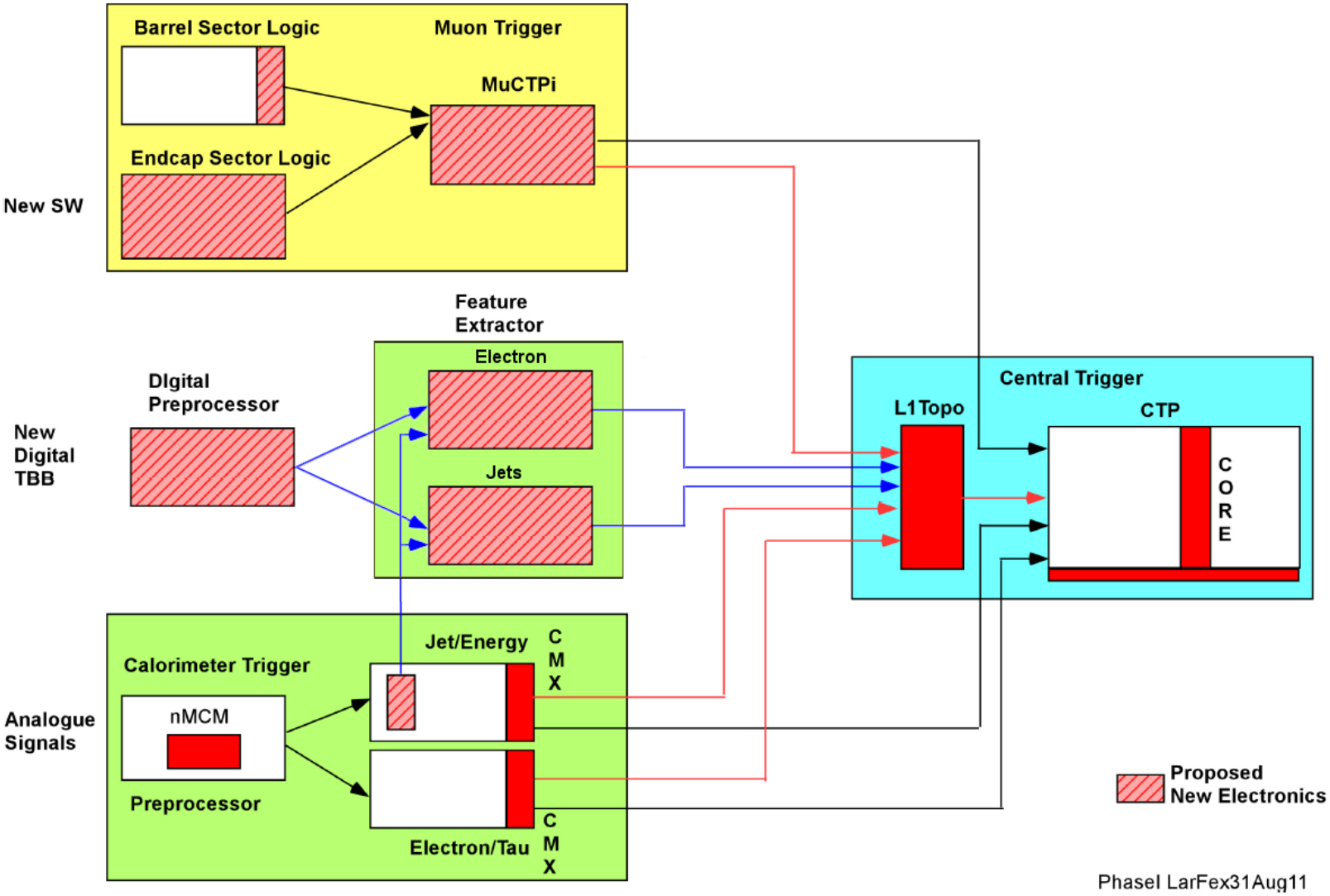
# Phase-1 upgrade with new JEP



# News from Mainz

Firmware / on-line software:

… Mainz are keeping students busy writing code
Large fraction of some initial version of the framework is done.
Eagerly awaiting first tests on the real thing…

The GOLD saga:

- Production from mid June, 6 weeks lead time…
- PCB production had been suspended at manufacturer for couple of weeks due to general problems with electroplating of PCBs with narrow structures
- After that problem had been resolved we were promised the PCBs for Sep. 02
- Errors found at electrical test
- PCBs re-done. Should have arrived by end of last week
- Yesterday: PCBs are electrically tested ok. Machined and posted…
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# The GOLD ! (the first PCB)

Arrived at 12:00 today

2nd copy had died when being machined

+ 3 weeks for assembly…