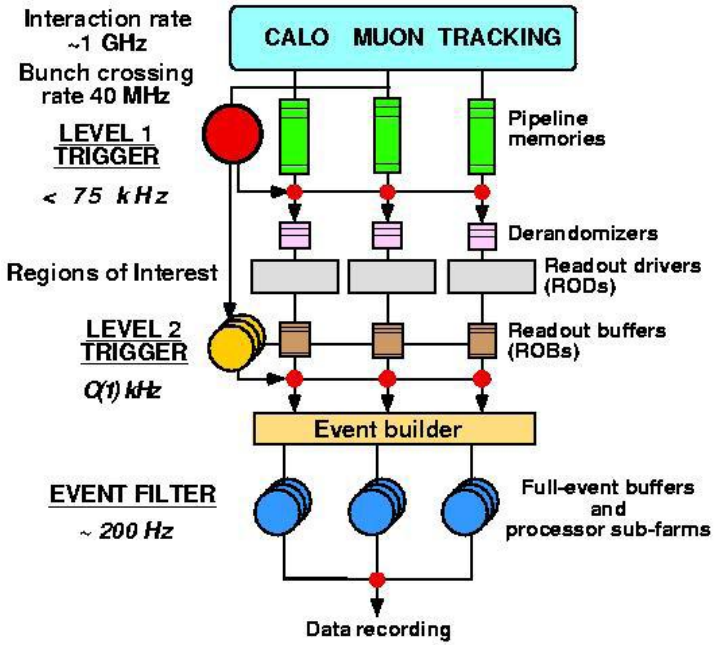
# Perspectives for xTCA in ATLAS

Philippe Farthouat, CERN

- Readout architecture
- Use of VME in ATLAS
- Is VME not adequate for future systems?
- Interest in ATCA
- Tentative time scale for development and deployment of ATCA based systems
- List of projects
- Risks

# Current Readout Architecture

- ReadOut Drivers (ROD) and ReadOut Buffers (ROBIN element of the ROS) separated
  - ROD in VME
  - ROS in PCs
  - S-Link in between
- Reasons for separation
  - Easier commissioning
  - Factorisation



# VME based RODs

- In normal data taking
  - The VMEbus does see the data
    - They go through S-Links
  - VMEbus used for configuration, control and monitoring
    - Limited bandwidth
- During special runs (standalone, calibration,...)
  - DAQ software running in the VME crate
  - Trigger rate can be limited

# What has been good with VME

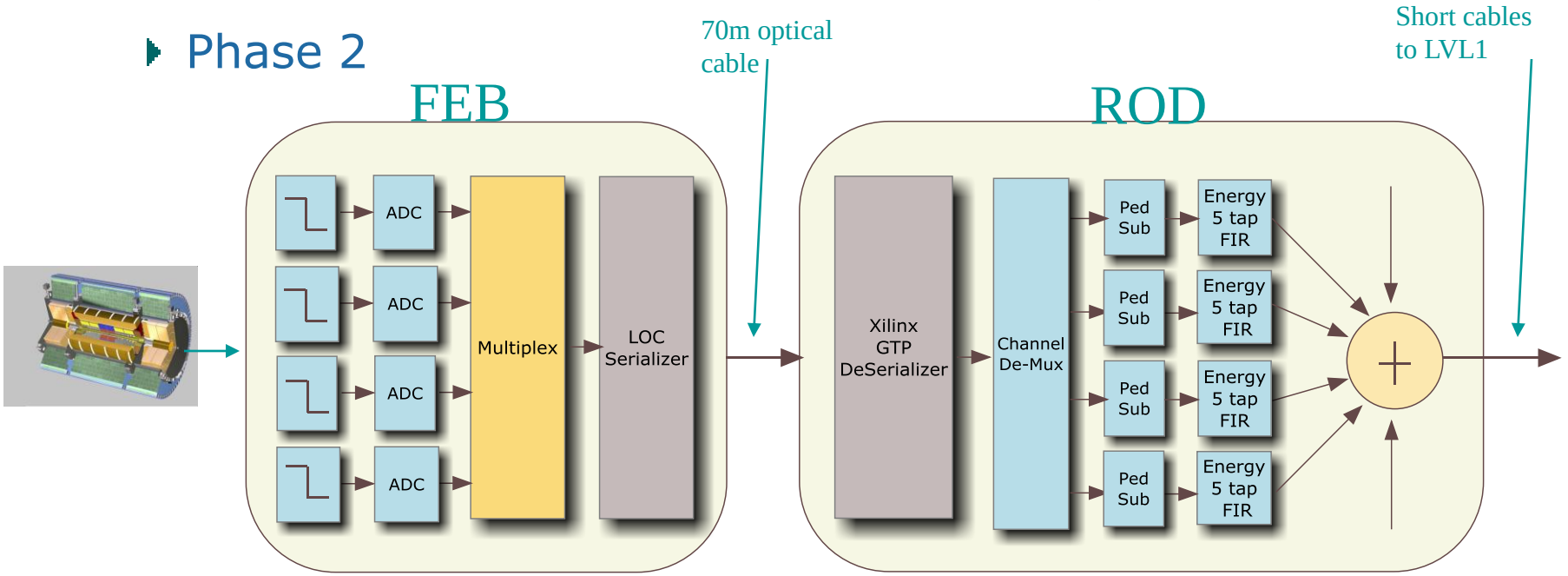
- Availability of standardised crates and easy procurement process
  - Easily integrated in the counting room
    - Size, cooling, ...
  - Different flavours although a single protocol
    - Size, power supplies
- Availability of maintenance contract
- Availability of Single Board Computers
  - Family with upgrade capability
  - Standard ATLAS software
    - ROD crate DAQ
- Overall relatively low overhead cost
  - 840 ChF per slot for a 9U system & 640 ChF per slot for a 6U system
  - Includes bin, fan-tray, power supply and SBC
- About 220 crates in ATLAS

# Is VME not adequate for future systems?

- If we keep the same readout architecture and the same functional boundaries
  - VME can still do the job
  - Monitoring tasks could run in PC connected to ROD through ethernet
- However, it’s difficult to predict what VME will be in the years 2022–2032 (HL-LHC)
  - First designs in VME in 1982 or so...
  - VXS could be a natural extension

# Interest in ATCA (1)

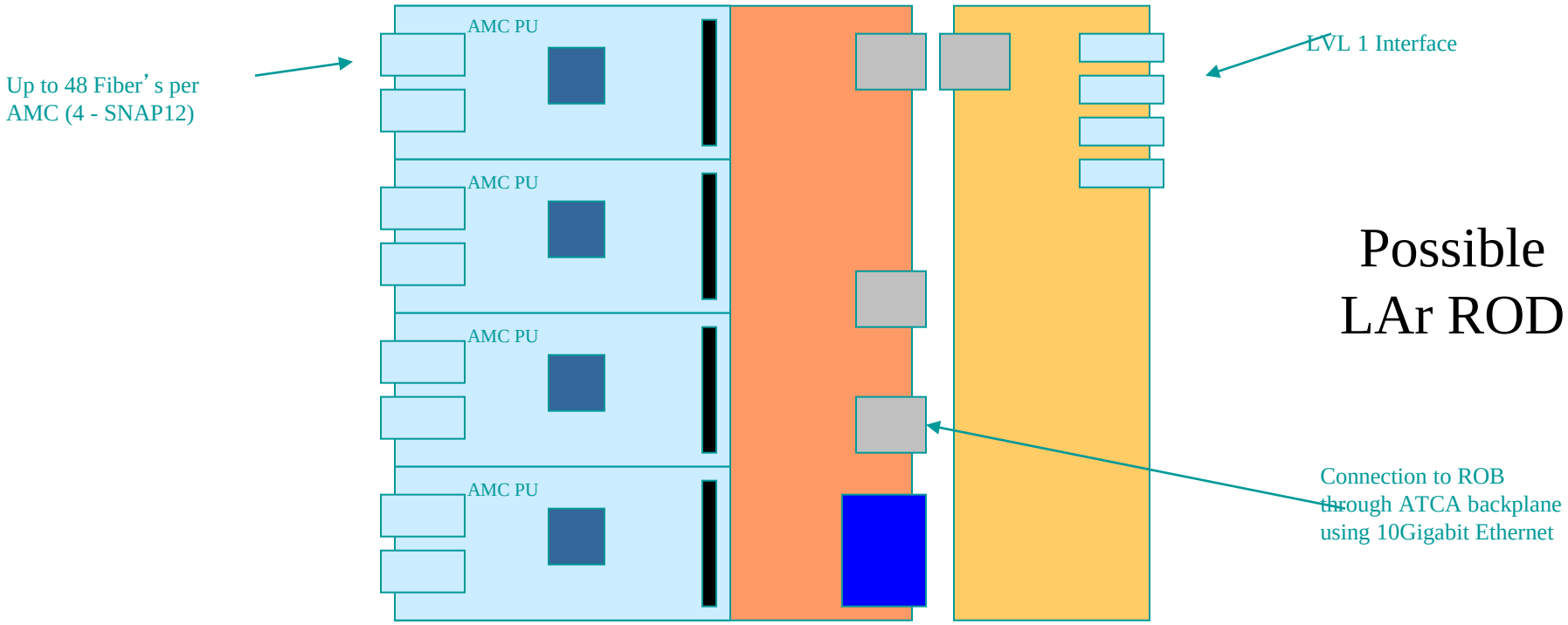
- High speed connections between boards could be very useful for the calorimeters upgrades
  - Phase 2




- In the case we change the architecture and we merge the ROD and the ROS on the same physical system
  - **Not at all the baseline**

# Why ATCA?

- Need boards large enough to accommodate the I/O

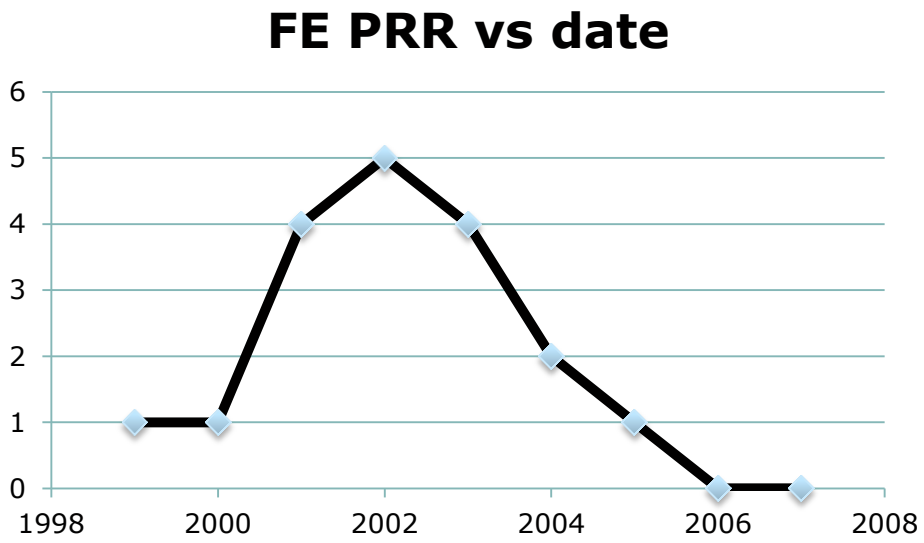


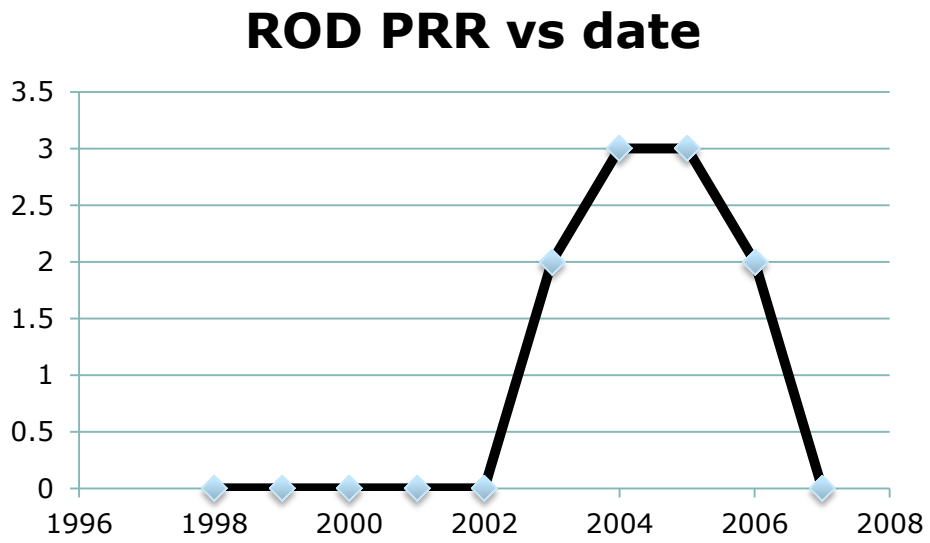
# Wish list

- Whatever the selected new standard will be we'll need the following:
  - Integration in the existing infrastructure
    - Cooling with vertical air-flow
  - Common family of crates (as done for VME)
  - Controller (Shelf manager & control software, embedded CPU?)
  - Purchasing and maintenance contracts

# Current System Schedule

- PRR dates for the FE electronics and for the RODs



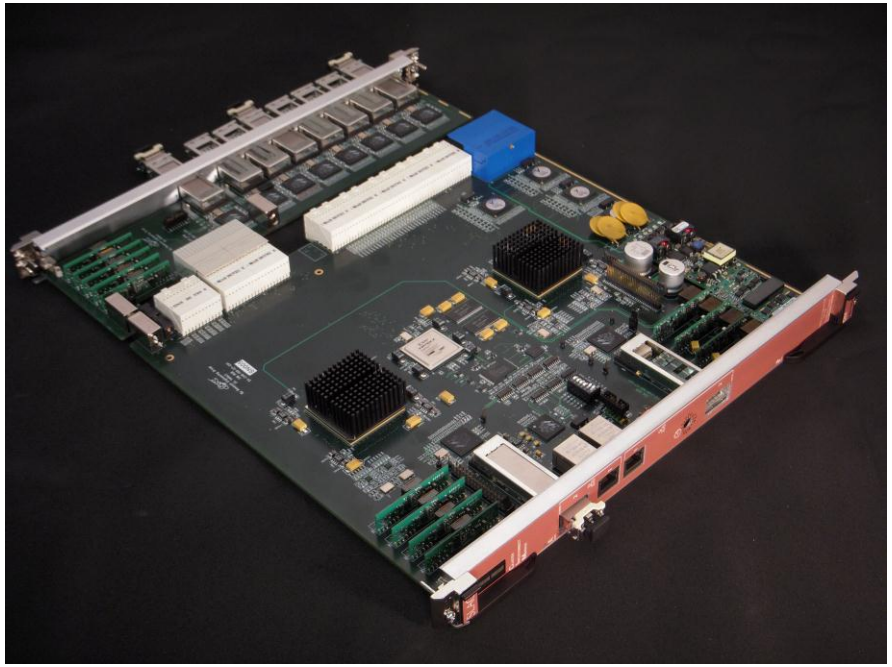
# Tentative Schedule

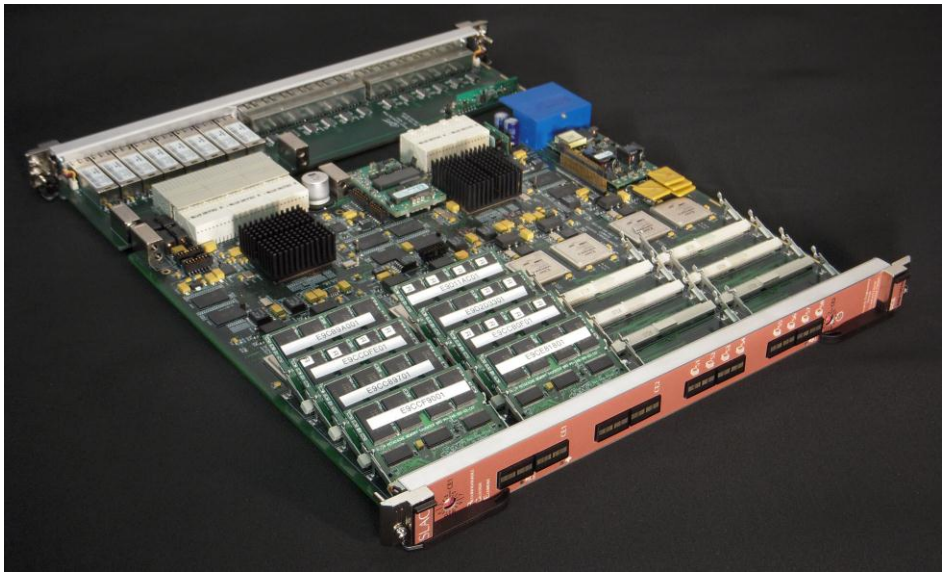
- Not yet discussed in ATLAS
- Large change in off-detector electronics not before Phase-2 (2022 or so)
  - Although some new parts for level-1 calorimeter and possibly new muon detector parts (New small wheel) could be installed for Phase-1
- Decision on which platform is to be used to be done within the next 2 years
  - Decision process not defined yet
  - Standardisation needed
- Availability of standard elements (crates, etc.) for deployment 2 years after(?)

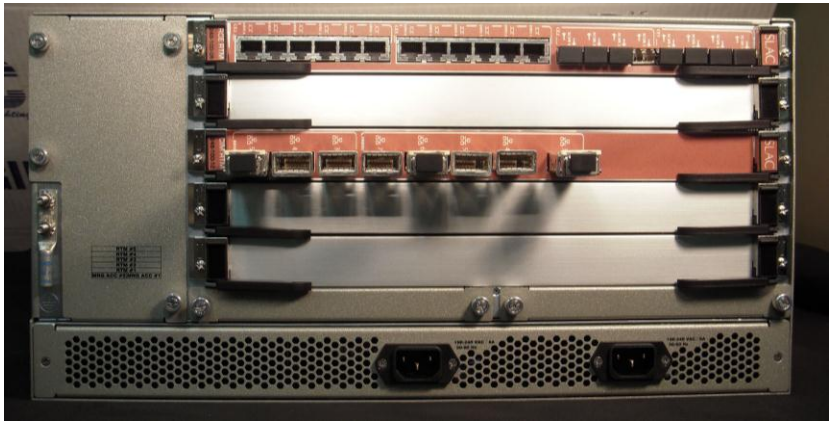
# On-going Projects (1)

- Developments at SLAC
  - Presented during TWEPP10 and last ACES
    - http://indico.cern.ch/event/twepp10
    - http://indico.cern.ch/event/ACES2011
- TTC included in new generations
- Used for reading out the new IBL0 pixel layer
  - Although the new ROD for IBL will be in VME

# GEN-I RCE board + RTM

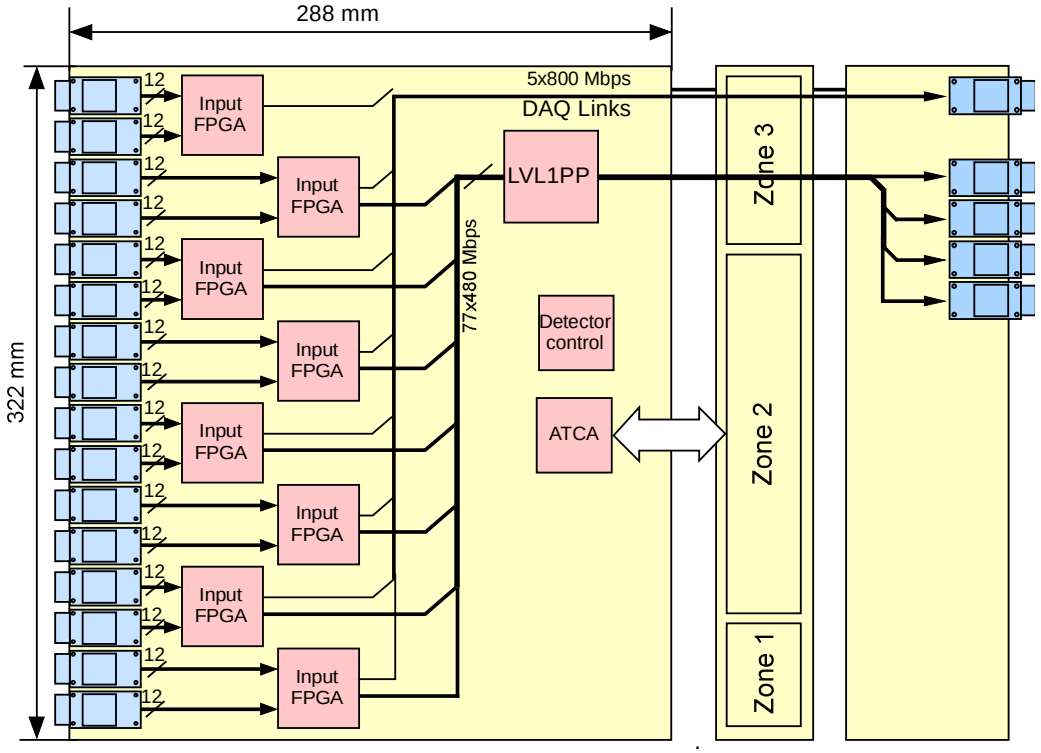






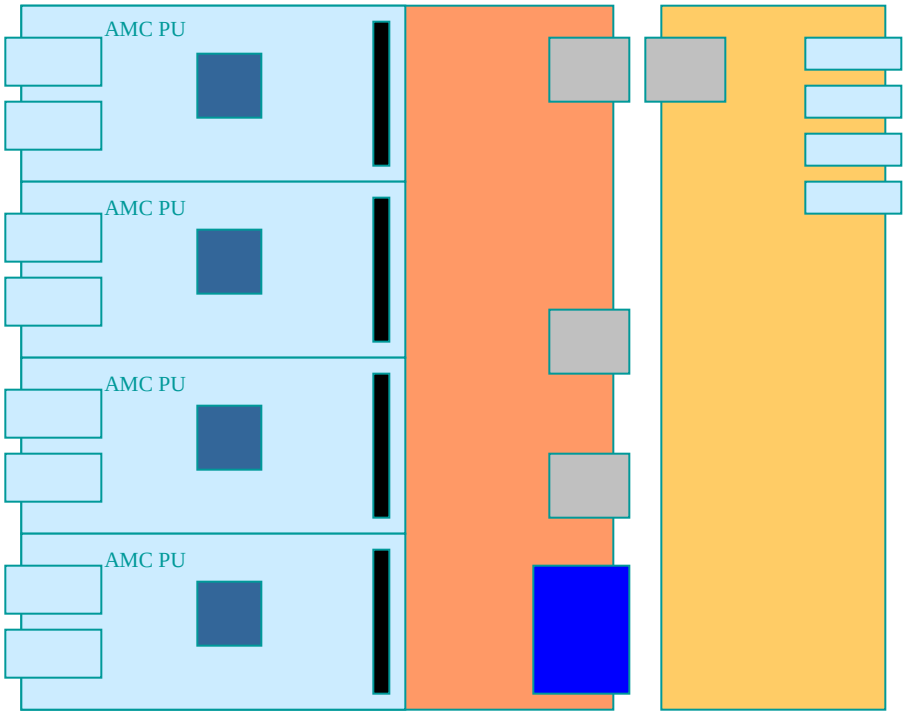
# On-going Projects (2)

- Tile Calorimeter
  - Development of mezzanines
  - Optical link card with SNAP12
  - GBT receiver



# On-going Projects (3)

- LAr calorimeter goal: 150 Tbps total system




- AMC cards are Processing Units
- ATCA Carrier board
- Controller mezzanine (presented this morning)

# Conclusions

- ATCA is a good candidate for the calorimeter RODs
  - High amount of data to be treated
  - High speed interconnections between board for Level1
  - Which redundancy do we require?
- No formal decision taken yet
- Must be easily included in current infrastructure
- Similar support as we have for VME would be required
  - Controller
  - Procurement and maintenance