CTP Simulation

DESY ATLAS Meeting

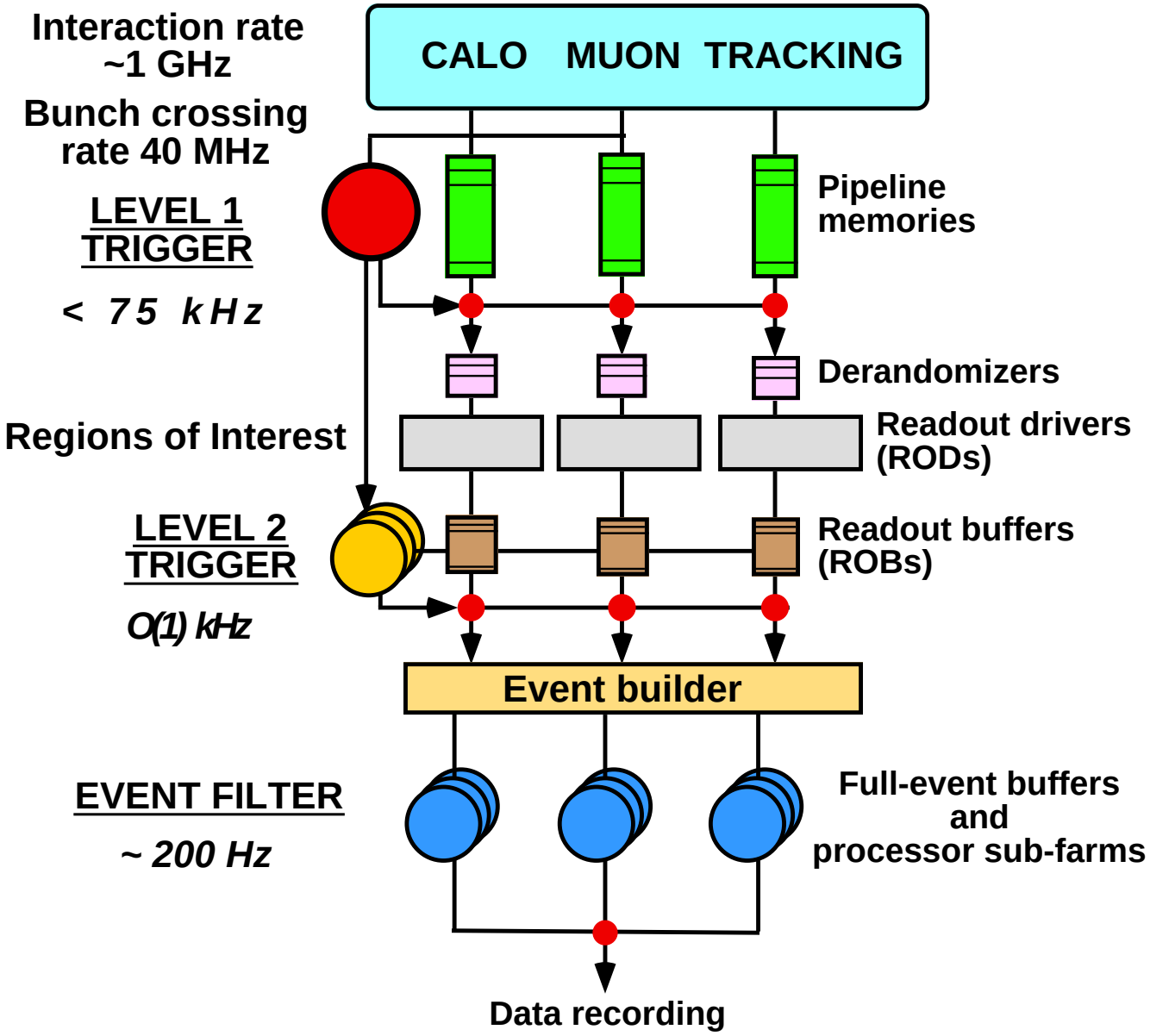
Wolfgang Ehrenfeld

DESY - Hamburg

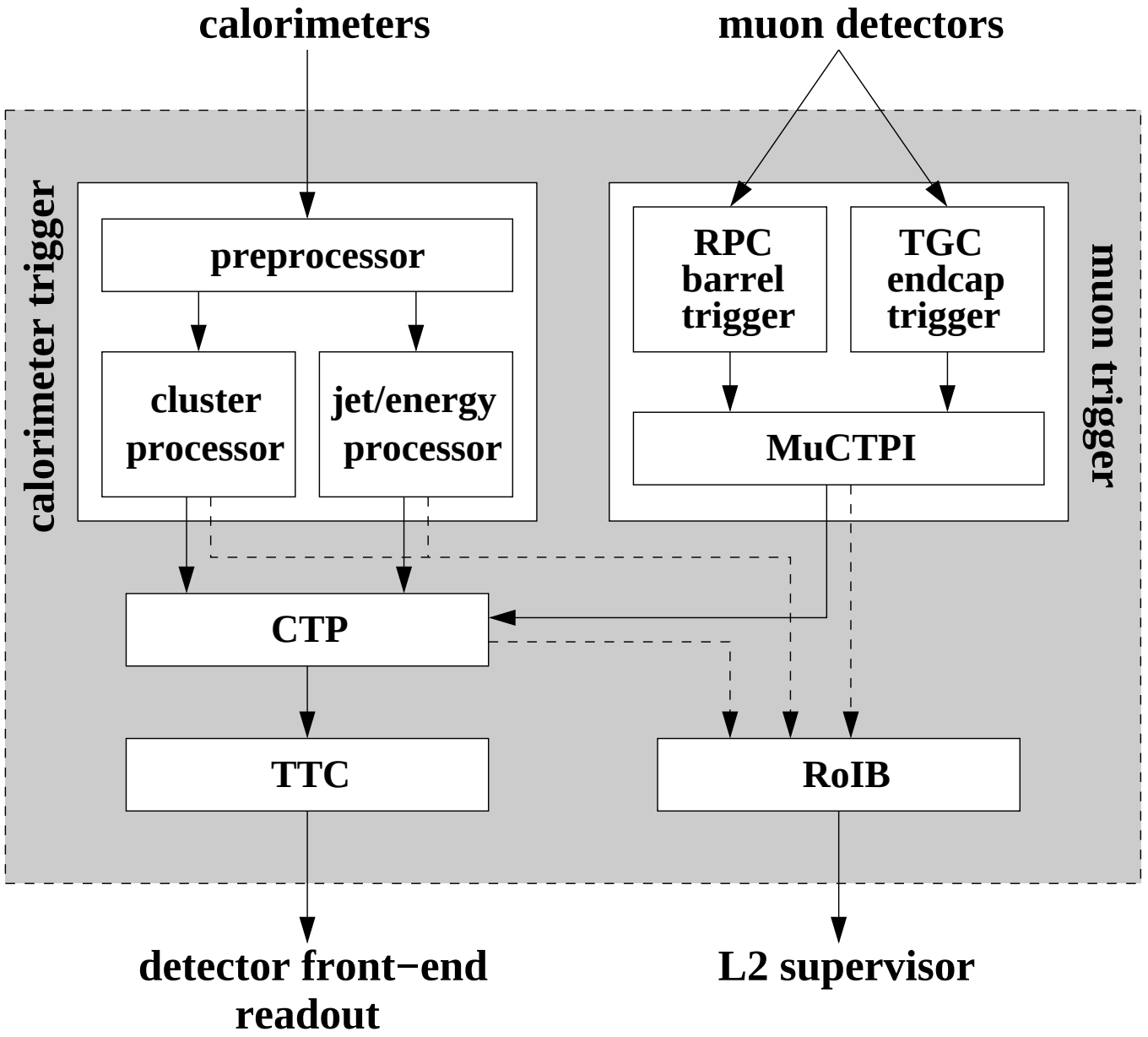
25. August 2006

- **Trigger System**
- **CTP Simulation**
- **Status and ToDo**

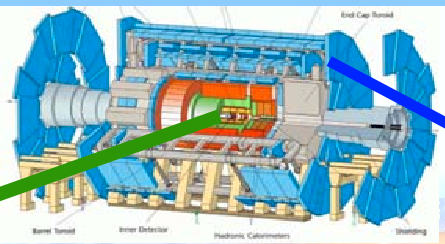
Atlas Trigger System



Level 1 Trigger System



LVL1 Trigger overview



Calorimeter trigger

Pre-Processor (analogue → E_T)

Jet / Energy-sum Processor

Cluster Processor (e/γ, τ/h)

Muon trigger

Muon Barrel Trigger (RPC)

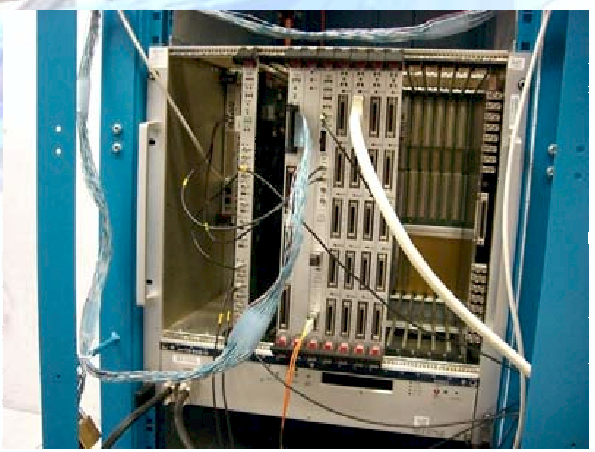
Muon End-cap Trigger (TGC)

Muon-CTP Interface (MuCTPI)

multiplicities of e/γ, τ/h, jet for 8 p_T thresholds each; flags for ΣE_T, $\Sigma E_T^{\,j}$, E_T^{miss} over thresholds

Central Trigger Processor (CTP)

multiplicities of μ for 6 p_T thresholds



CTP: (one 9U VME64x crate, FPGA based)

- central part of LVL1 trigger system
- calculation of trigger decision based on inputs from L1Calo and L1Muon

Basic Layout of CTP Simulation

start of run:

→ get trigger menu for LVL1

each event:

→ get input RDOs for μCTPI and CALO

→ build decision for each trigger item

→ apply prescale

→ apply deadtime

→ build L1A (level 1 accept)

→ write output RDO and L1A to RoIB

Status of Code

Already implemented by Attila Krasznahorkay:

- get trigger menu
- build decision
- output RDO

Need to be done:

- prescale
- deadtime
  - → 4 ticks after L1A
  - → low/high priority buckets
  - → really needed?
    special mixed MC sample correponding to data taking
- special triggers
  - → random (2x), prescale clock (2x), and bunch group trigger (8x)
- better RDO for RoIB (versioning, functionality)

Interaction with Rest of Trigger System

Configuration:

- CALO uses old configuration
- μCTPI uses old configuration

→ CTP supplies old configuration objects

Input RDOs:

- format fixed

CTP RDO:

- hardware output can be changed by firmware (flexible)

→ how do track different versions?

LVL2:

- need CTP RDO for start of chains

→ what functionality is needed?

ToDo

- implementation of missing features
- test of functionality
- real life tests:
  - → single muons, electrons, photons, ...
  - → mixed events
  - → physics events
- maybe trigger performance studies?

- rerun trigger simulation after digitization
  - → all LVL1: no problem
  - → CTP only: μCTPI and CALO inputs fixed, compatible trigger menu
  - → HLT: compatible trigger menu
  - → how to store LVL1 master key in simulation

- use simulation for hardware testing