The OLYMPUS Trigger System

Recent status and discussion

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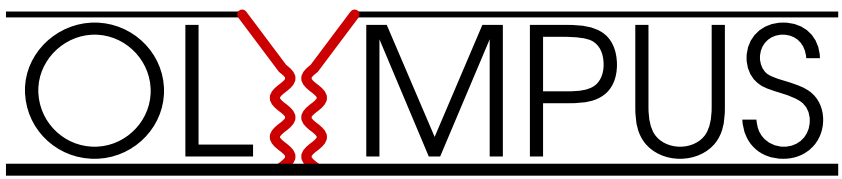
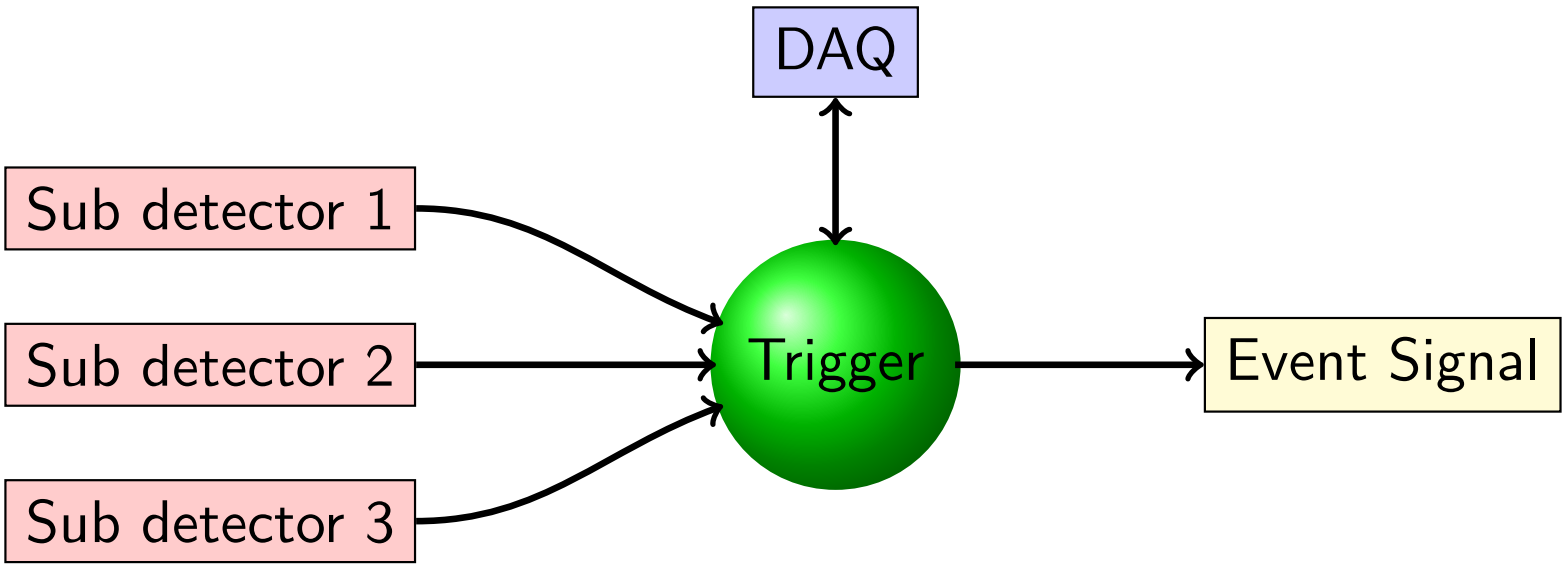


Outline

1. Recent Status of Trigger System
2. Discussion about Trigger Features
3. Roadmap

What is the trigger?



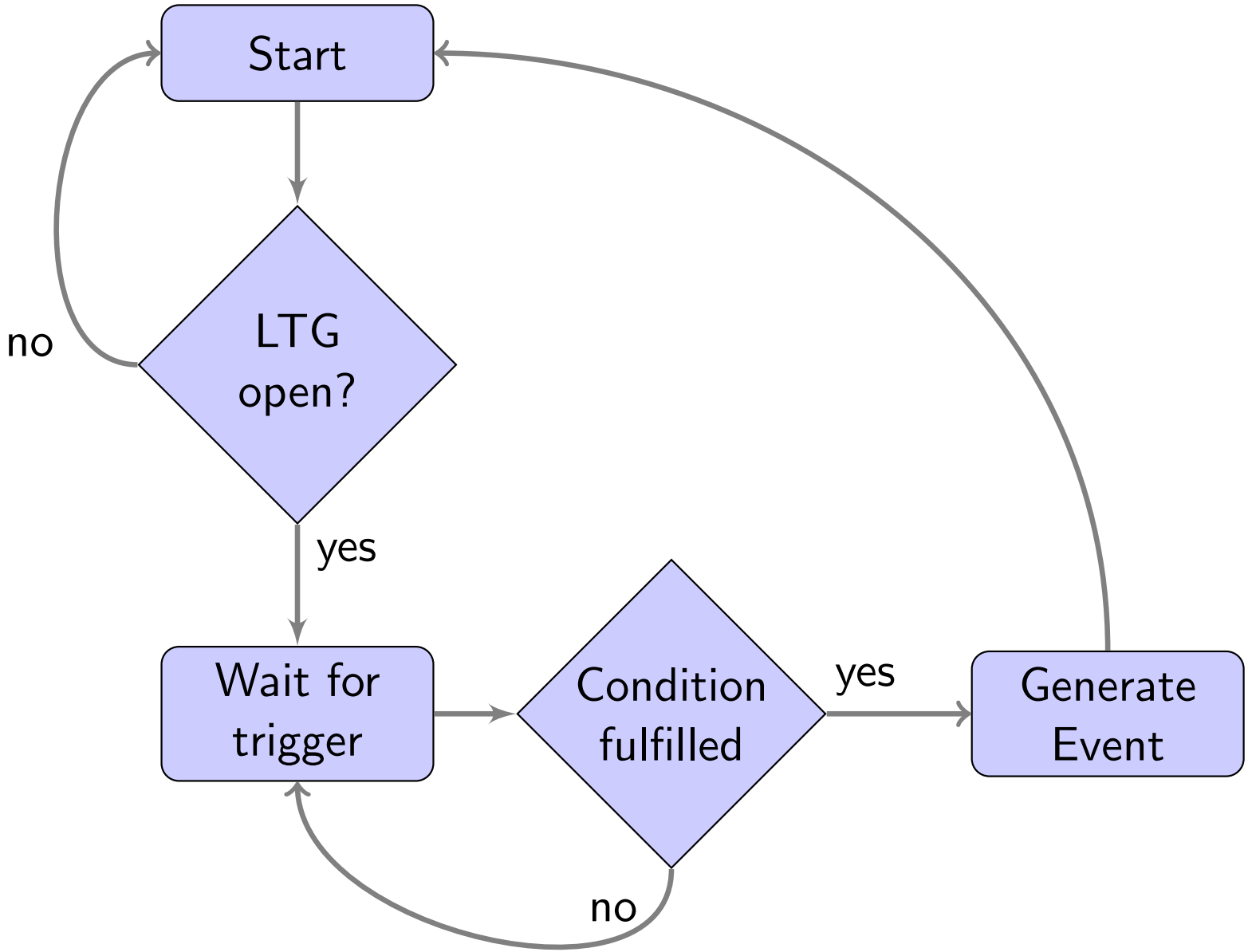
Task: Generate Event signal if conditions are fulfilled.

How is the trigger realized?

Trigger module

- Logic implemented in FPGA using VHDL
- VME interface for DAQ
- 16 NIM inputs for trigger signals
- 8 NIM outputs for event signal etc.

Trigger strategy



Clocking and re-timing

Synchronos (clocked) implementation of FPGA trigger logic.
$\Rightarrow$ 10 ns jitter between hit and event signal (100 MHz clock)

Option 1

Bunch clock on TDC

- relative TDC times
- larger ADC gate
- APV clocked 20/40 MHz

Option 2

Re-timing event signal

$\Rightarrow$ Chance of wrong re-timing or dead lock

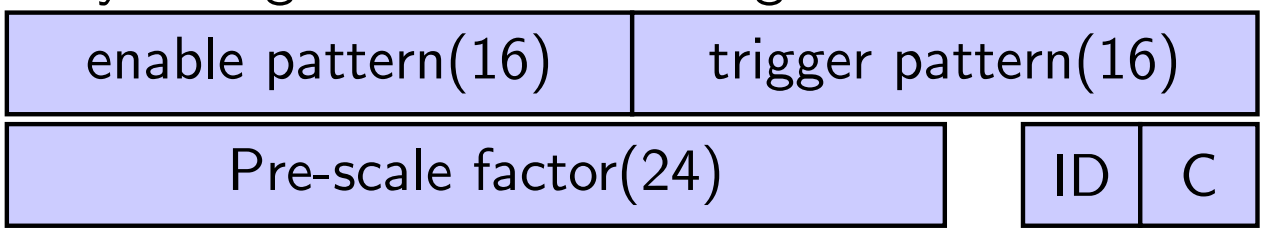
- Sharper prompt peaks

Bunch timing uncertainty 2 ns due to 60 cm long target

$\Rightarrow$ No hardware re-timing needed!

Trigger conditions (Clocked Trigger Logic Block)

- 16 parallel CTLBs (*OR* of conditions)
- Fully configurable via VME registers



INPUT & enable pattern = trigger pattern ?

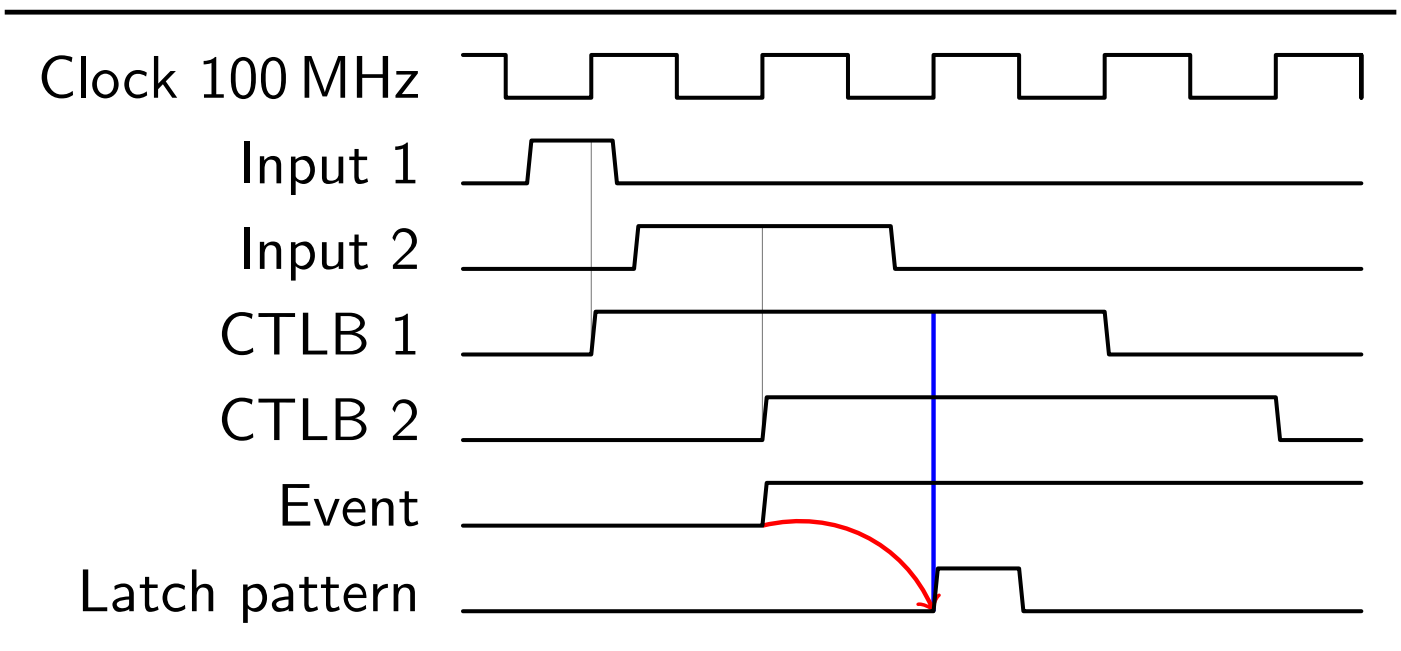
→ Bits: required (11), don't care (00), veto (10)

- Individual scaler for each CTLB
- Special CTLB: Scaler event with 32 bit pre-scaler (T ≈ 42 s)

Trigger pattern

- Output: Pre-scaled trigger signal and direct trigger signal

→ CTLB bits latched into trigger patterns. **NOT the inputs!**



Trigger signals from sub-detectors

Signals from TOF

- OR_left
- OR_right
- TopBottomCoinc_left
- TopBottomCoinc_right
- Forward_left
- Forward_right
- Backward_left
- Backward_right

Signals from Lumis

- GEMs_left
- GEMs_right
- Scintillator_left
- Scintillator_right

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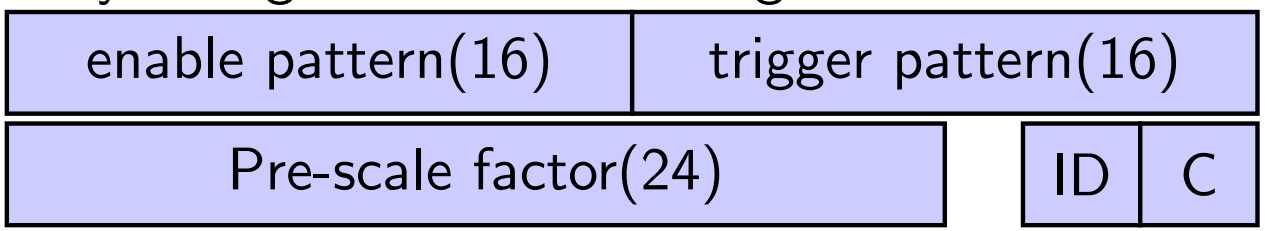

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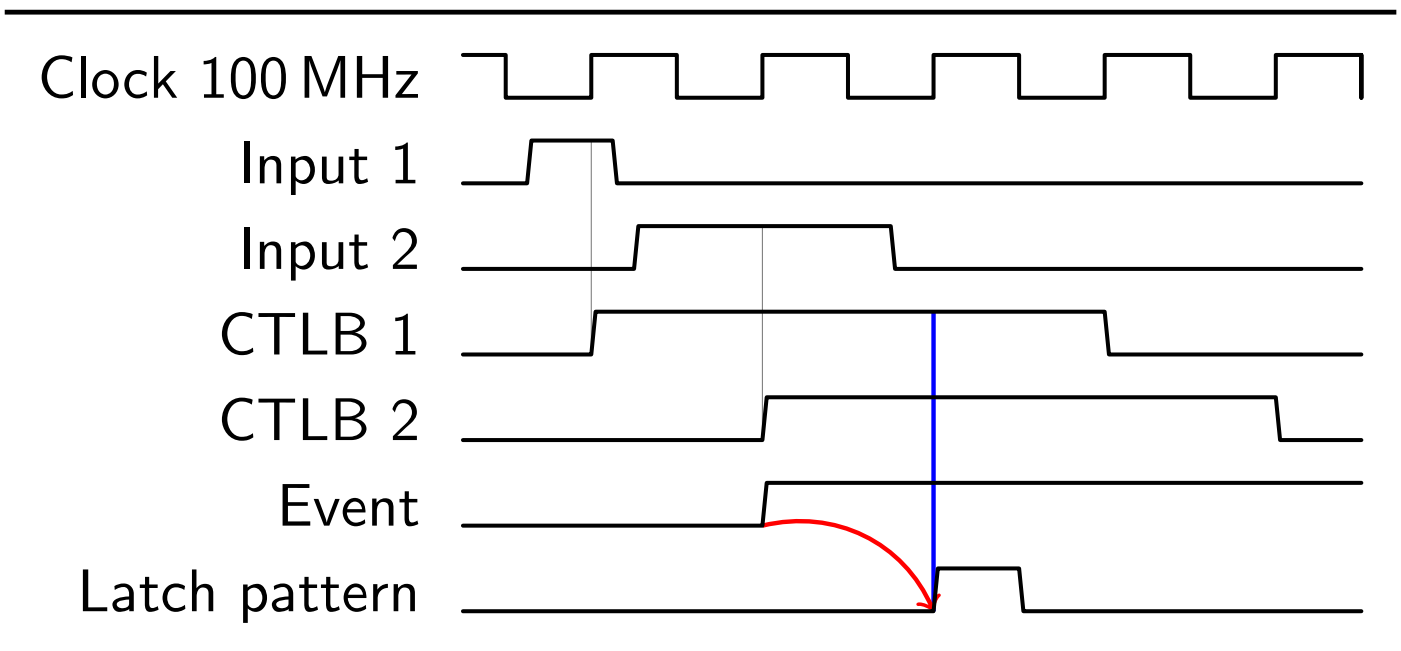

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Roadmap

1. Prepare sub-detector trigger signals
2. Obtain countrates during commissioning
3. Simulate trigger efficiency and pre-scaling factors
4. Generate list of trigger conditions
5. Verify trigger contributions

3 and 4 need input and support from collaboration
$\Rightarrow$ Special trigger meeting!