Global Muon Trigger
Global Trigger

http://wwwhephy.oeaw.ac.at/p3w/cms/trigger

Vienna Group

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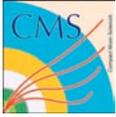
Presented by
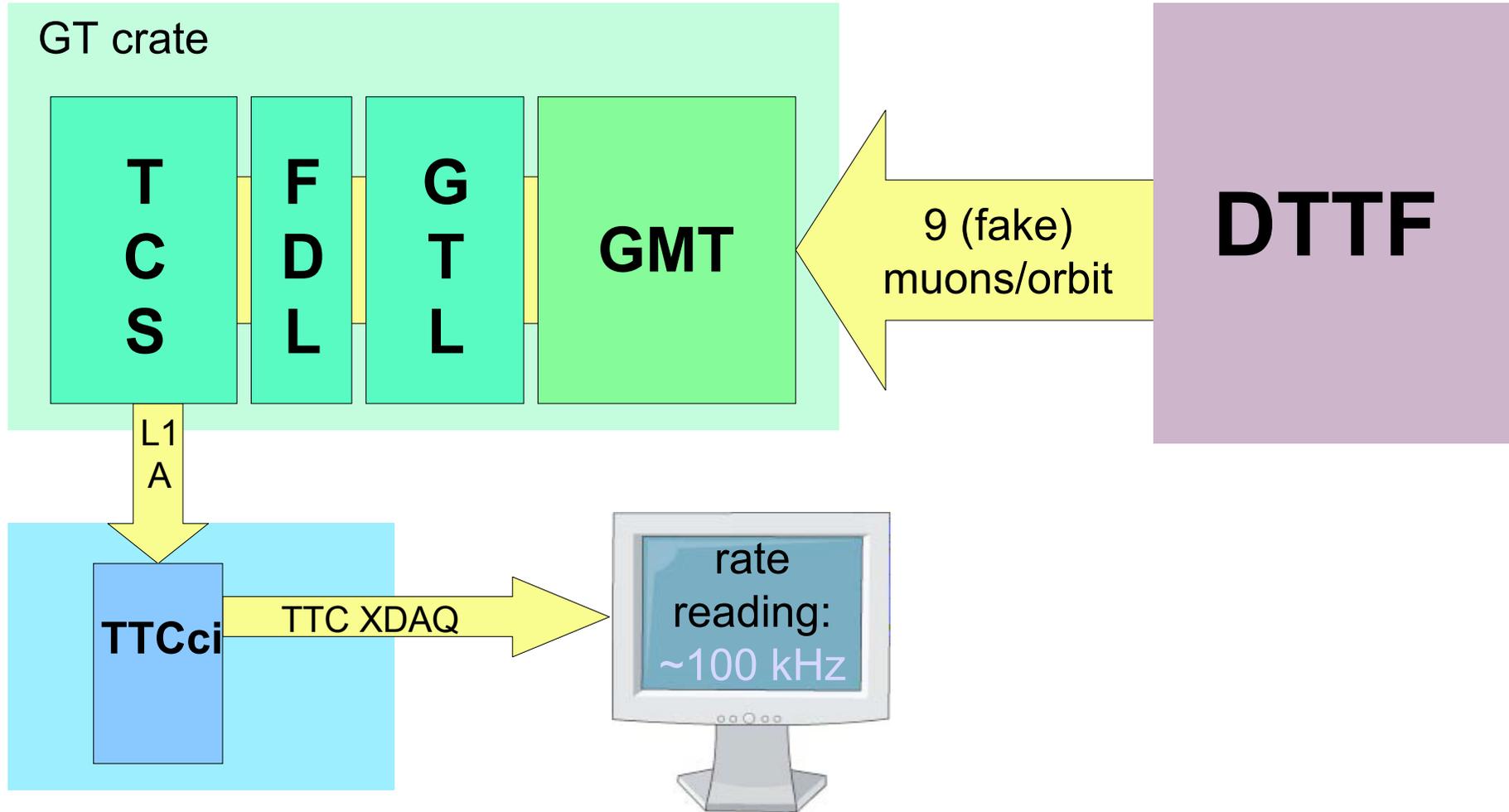**Claudia-Elisabeth Wulz**

Trigger Meeting
CERN, 18 July 2006

GMT/GT status

- **GMT/GT has been moved to Point 5 end of June.**

- **The equipment has been set up and self-tested.**

- **Muon cables from DTTF and CSCTF to GMT were put into place.**

- **A test, sending generated patterns from DTTF was performed successfully involving the whole chain up to L1A generation: DTTF-GMT-GTL-FDL-TCS-TTCci.**
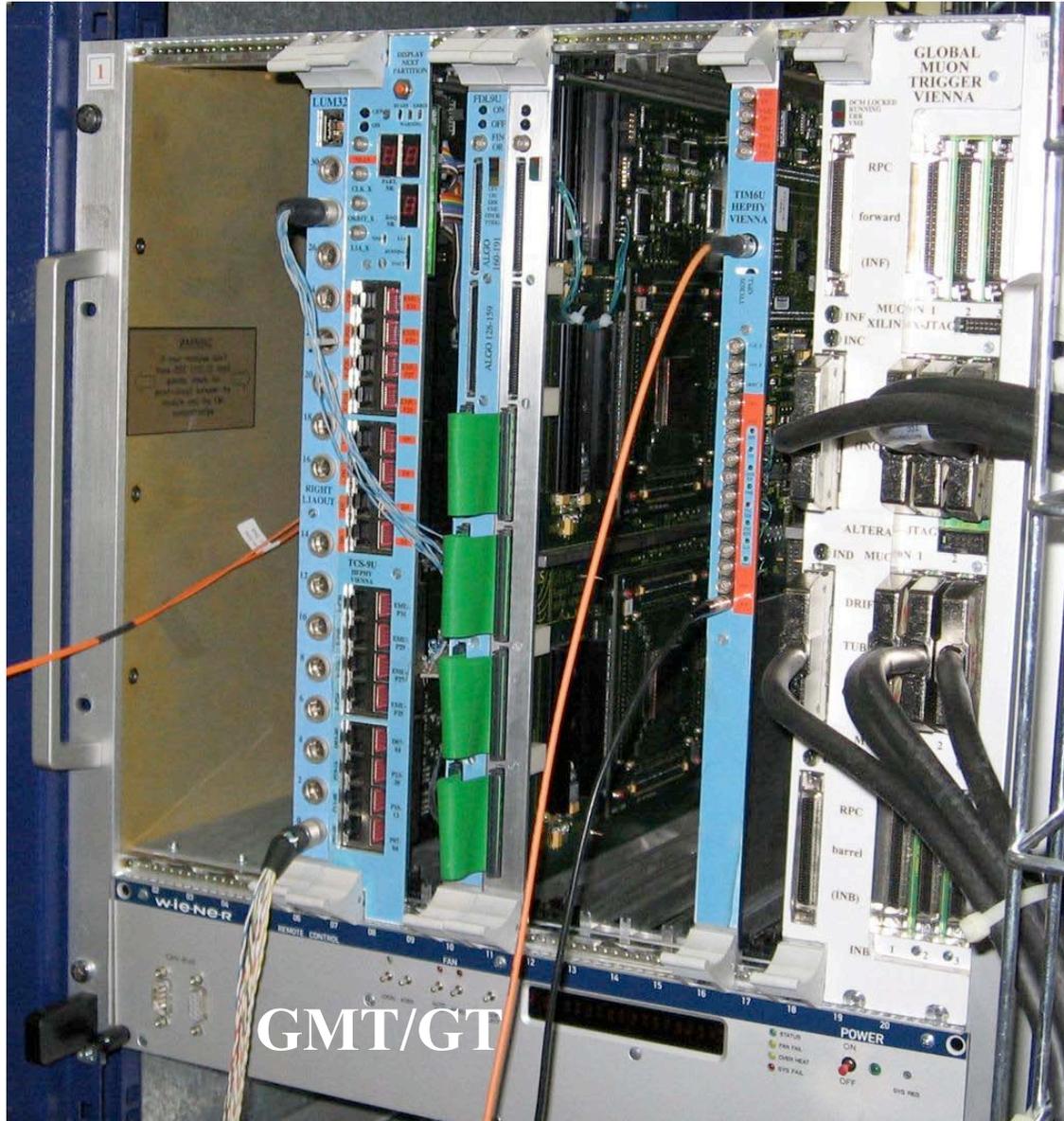
I. Mikulec, M. Jeitler, J. Erö

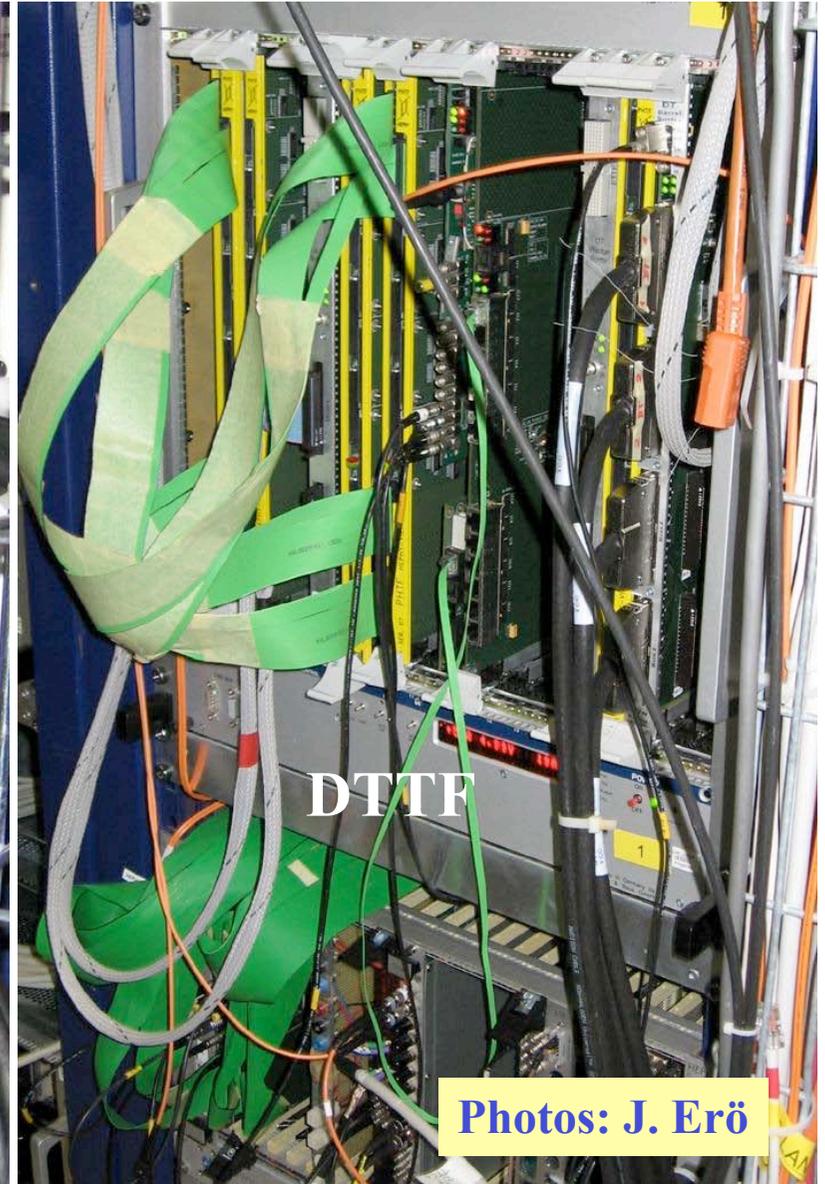# First DTTF-GMT-GT test at Point 5

GT crate

T C S | **F D L** | **G T L** | **GMT**

DTTF

9 (fake) muons/orbit

L1 A

TTCci

TTC XDAQ

rate reading: ~100 kHz

GMT/GT

DTTF

GT/GMT production and testing status

Name	CMS	At CERN	Missing at CERN / foreseen	In Vienna	Firmware	Production chain
Crate+ backplane	1	1 + 1spare		1 test crate	--	1 empty backplane
TCS	1	1		1 spare	new version to be done	NEW: 1 board assembled, but not yet tested
L1AOUT	2	1	Sept 2006	1 to be finished	--	3 empty boards
CONV6U	4	4		2 spares	--	2 empty boards
TIM	1	1 + 1spare		NEW: 3 tested (1 signal on TIM chip has problems)	final	For DTTF+spares NEW: 8 in assembly
GTL	1	1		0	final	NEW: 3 boards in assembly
FDL	1	1		1 testing	new version to be done	NEW: 1 assembled, not tested; 2 empty boards
GTFE	1	0	Oct 2006	1 to be tested	to be finished	3 empty boards
PSB	7 (4) *(4 needed when no GCT)*	2	2 when required	2	final	NEW: 2 assembled and tested (1 has transfer error on one channel), 4 new version boards ordered
GMT	1	1		1 testing	final	NEW: 2 partly assembled

GT/GMT installation and commissioning plan

No change since Annual Review in June 2006.

Name	CMS	At CERN	Installation	Commissioning	Remarks
Crate+ backplane	1	1 + 1spare	asap		
TCS	1	1	asap		New firmware version will control 8 daq partions. Actual version controls 4 partions.
L1AOUT	2	1	Sept 2006	Sept 2006	Only the front panel connectors have to be mounted on missing board.
CONV6U	4	4	asap		
TIM	1	1 + 1spare	asap		
GTL	1	1	asap		
FDL	1	1	asap		New firmware version will contain some 32 bit counters.
GTFE	1	0	Oct 2006	Oct – Nov 2006	
PSB	7 (4)	2	asap	Will be done with 4 PSB boards	*Full set of PSBs will be commissioned when GCT becomes available*
GMT	1	1	asap		1

GT and GMT Emulators

V. Ghete (GT), I. Mikulec (GMT)

See also Vasile's talk at 17:00 on 19 July 2006
in the Online Selection Meeting for details.

Status of GMT Emulator

- A standalone **GMT emulator exists in CMSSW** CVS.

- **NEW since June Annual Review:** The **LUT generation feature** was implemented in the CMSSW version of the GMT emulator.

- The emulator has **bitwise HW compatibility.**

- It has been **tested** with pre-generated muons from ORCA. The results are identical to the results with ORCA and the HW itself.

- Adjustment of the **interfaces** might be needed as other systems commit their code.

- Implementation of the **database** communication will be done coherently with other L1 subsystems.

L1GlobalTriggerProducer

- Produce: L1GlobalTriggerReadoutRecord

  - Information needed for the <u>emulator</u>

  - Use classes from DataFormats/L1Global* for trigger objects:

    - muons:
      - L1MuGMTCand
    - calorimeter trigger objects:
      - L1GctEmCand;
      - L1GctJetCand;
      - L1GctEtTotal; L1GctEtHad; L1GctEtMiss;
      - L1GctJetCounts
  - Give access to raw values (get/set methods)

    - physical representation to be moved to another producer

Class L1GlobalTriggerReadoutRecord

- Relocated:
  - moved from DataFormats/L1Trigger to DataFormats/L1GlobalTrigger

- Updated to the latest GCT DataFormats classes (V02-01-01)

- Committed for nightly and CMSSW_0_9_0_pre1 releases

- Get/set methods:
  - exist for all trigger objects
  - no methods yet for DAQ, EVM words, other hardware-related words
  - no bunch-crossing dependence yet – to be agreed with GMT and GCT

- See code in CVS repository

Global Trigger Configuration

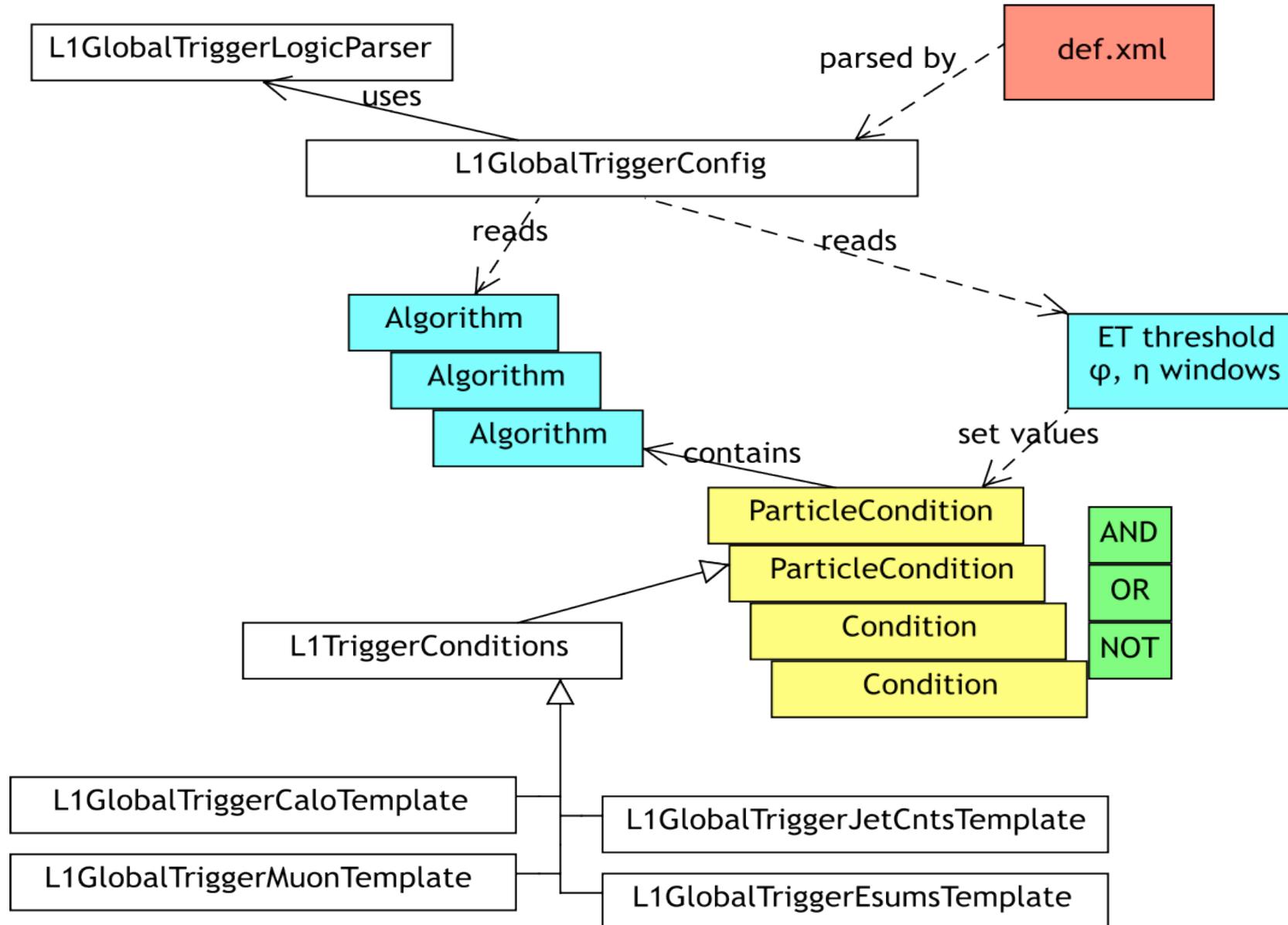- use the same configuration file for hardware and emulator

  - def.xml produced by GTgui

    - define algorithms, conditions
    - set ET thresholds, η and φ windows

| Trigger Menu | → | GTgui | → | def.xml |

VHDL
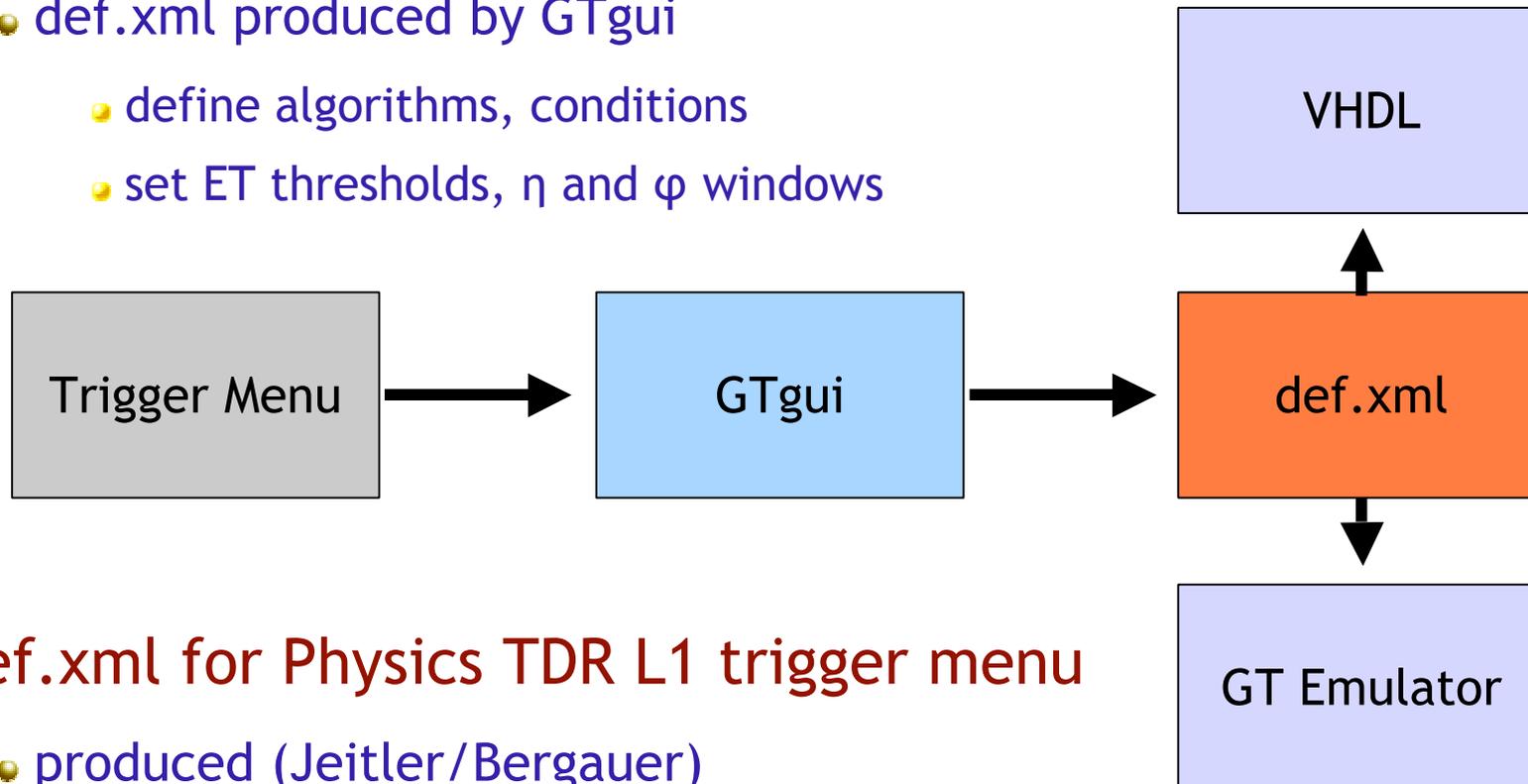
GT Emulator

- def.xml for Physics TDR L1 trigger menu

  - produced (Jeitler/Bergauer)

Status of GT Emulator

- ## Classes for GT configuration: mostly ported

  - trigger menu read from file(s) in L1GlobalTrigger/data directory

    - move later to EventSetup

  - need validation and CMS coding rules, streamline the code

- ## Data Flow:

  - started porting what exists in (private version of) ORCA

  - change later to fit emulator needs

- ## L1GlobalTrigger producer

  - get the stuff working

  - validate (using file input)

  - integrate with GCT and GMT
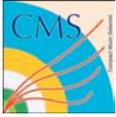
GT/GMT Software

No significant change with respect to June Annual Review (see J. Varela's transparencies).

- Configuration-DB-driven configuration operations implemented (incl. firmware loading)

- DB schema updated to be suitable for offline SW

- First working Configuration-DB entries generated, tools developed for transfer of HW configuration to DB

- Basic control & diagnostic functionality implemented in Trigger Supervisor cells

- Self-/Interconnection test routines being implemented /improved

GT/GMT plans for MTCC

- **In the second phase (August) of the MTCC the central LTC trigger should be replaced by the Global Trigger.**

- **Timing and synchronization must be established.**

- **The GT chain including the TCS but excluding the readout board is available. It should be completely tested with real data.**

- **The DTTF-GMT chain is also available and will be tested with real data. CSC and RPC should be added.**