

# CM 37 -DAQ report

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## Contents:

- Mostly description of the new trigger system.

# Progress since the last Collaboration meeting

## Software

- EMR readout is completed.
- Interface between the EMR readout and DATE is completed.
- EMR unpacking is completed.
- New InputCppDAQData for MAUS which uses the new Data Structure (not Json) - completed but still not in the trunk.

## Hardware

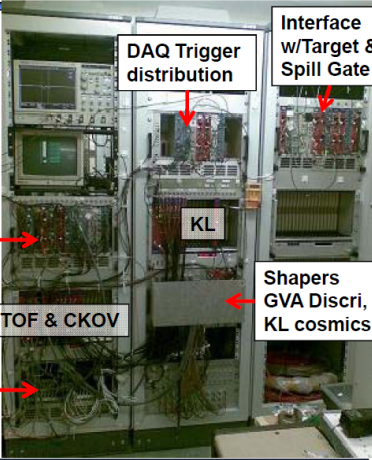
- We plan to replace the readout computers in MLCR (miceacqXX).
- Development of the new trigger system



## Trigger Status



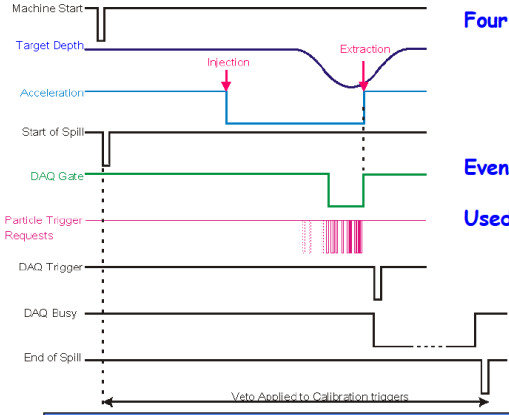
◆ **New Crate Layout**



# Development of new trigger system



## DAQ Trigger



Four types of DAQ triggers

- PHYSICS
- CALIBRATION
- Start of Spill
- End of Spill

Event Type is tagged in the data header

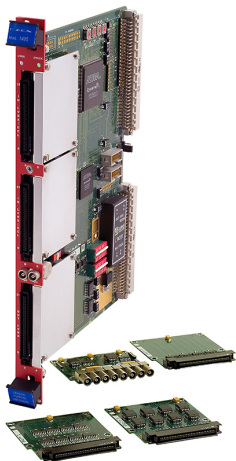
Used to impose a well-defined sequence of events and online check of synchronisation

# Development of the new trigger system - hardware requirements

We need:

- $40+28+40+1=109$  ECL inputs (TOF0/1/2 + GVE);
- 2 NIM inputs (Machine start + Calibration trigger);
- $4 \times \text{number of VME crates}$  NIM/ECL inputs ( $4 \times 5 = 20$  but can be reduced to 8 if some of the logic is done outside);
- 2 TTL inputs - Tracker veto signals;
- 12 ECL outputs - scaler;
- 6 ECL outputs - TDC configuration;
- 4 NIM/ECL outputs - Start of spill, End of Spill, DAQ trigger and Calib. trigger;
- 1 NIM outputs - Spill gate.

# Development of the new trigger system - hardware requirements



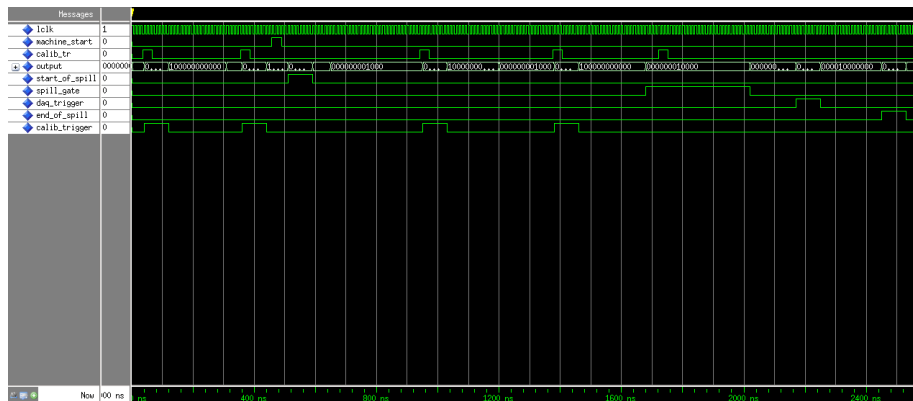
## CAEN V1495 provides:

- General Purpose VME Board;
- User customisable FPGA Unit;
- 64 inputs - ECL or LVDS;
- 2 inputs/outputs - TTL/NIM;
- 32 outputs - LVDS only;
- Possible to add up to 96 inputs/outputs (LVDS/ECL);

# Development of the new trigger system - firmware development

## 1. Spill gate generator - completed

Simulation - the worst case scenario.



# Development of the new trigger system - firmware development

- All parameter are controlled by the user (**new**).
- Possible to enable/disable all types of event (Start of spill, End of Spill, DAQ event and Calib. event - **new**)

## 2. Particle trigger generator - **completed**

- Trigger condition controlled by the user (**exists already**);
- Trigger condition masks controlled by the user (**new**);
- Pulser trigger with constant frequency (**exists already**);
- Pulser trigger frequency controlled by the user (**new**);
- Randomly generated pulser triggers (**new**).

## 3. Data recording - **under development** (**new**)

- Trigger pattern recorded in a FIFO **under development**;
- FIFO readout through the VME bus - **completed**.



# Conclusions

- Development of the software (C++ and VHDL) for the EMR DAQ is completed.
- EMR is integrated into the MICE DAQ system.
- Programmable logic for the trigger: Significant progress in the firmware development.
- Programmable logic for the trigger: the hardware is still problematic.
- PID DAQ project is very close to completion.