DAQ Update - CM39

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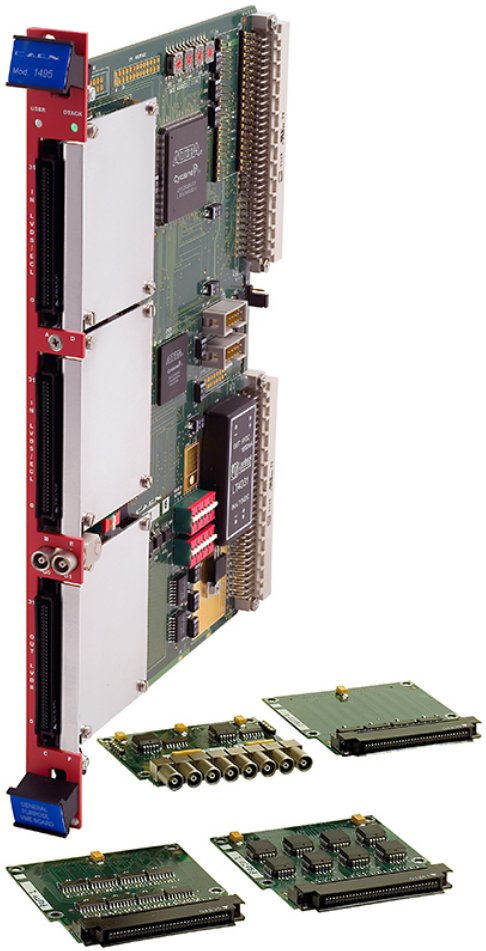
June 25, 2014

New trigger system for MICE based on CAEN V1495

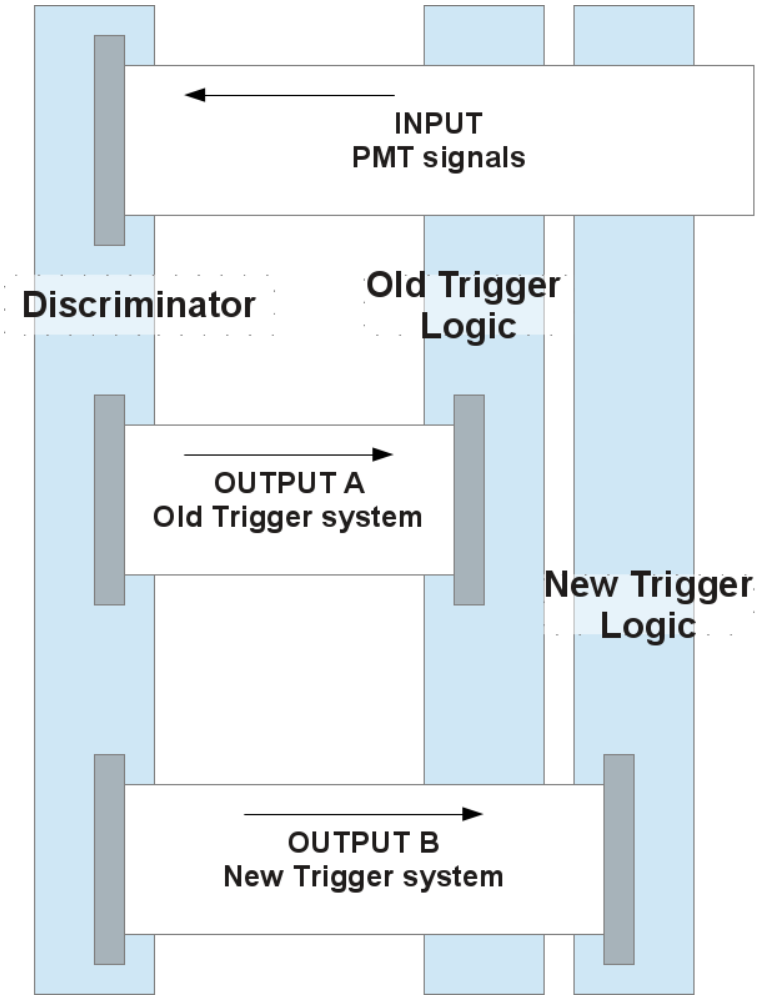
CAEN V1495 - General Purpose VME Board



1. Spill gate generator
   - All parameter are controlled by the user.
   - Possible to enable/disable all type of events (Start of spill, End of Spill, DAQ event and Calib. event)
2. Particle trigger generator
   - Trigger condition controlled by the user;
   - Trigger condition masks controlled by the user;
   - Pulser trigger with constant frequency;
   - Pulser trigger frequency controlled by the user;
   - Randomly generated pulser triggers.
3. Data recording
   - Trigger pattern and time recorded in a FIFO;
   - FIFO readout through the VME bus.

DAQ test - 6th April 2014

Test of a new trigger system for MICE, based on a programmable FPGA logic



Goal: create a setup in which the old and the new system will work in parallel and compare the output of the two systems.

- The first output of the discriminators feeds the old trigger logic (unchanged).
- The second output of the discriminators, which originally goes to the TDCs has been connected to the new trigger logic.
- Outputs (Particle Trigger and Particle Trigger request signals) of the both systems are connected to a TDC for time measurement.

Results of the test:

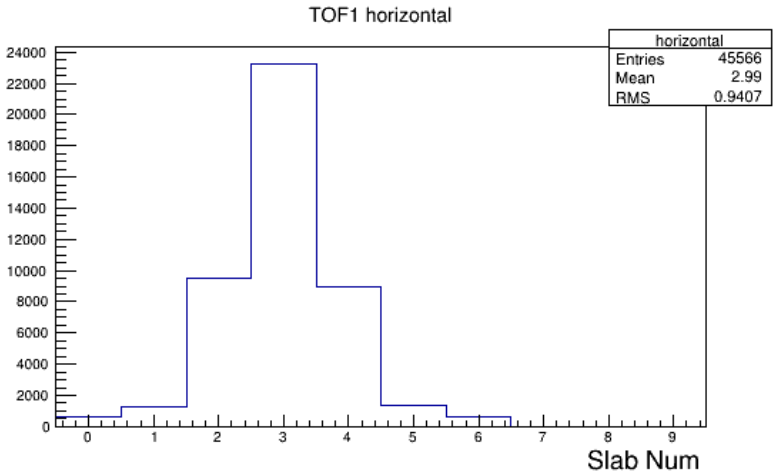
- The integration of the new board into the MLCR DAQ has been tested;
- All triggers generated by the old system are presented also in the output of the new system.
- The new system generates $\sim 10\%$ extra triggers, which are not register by the old system.

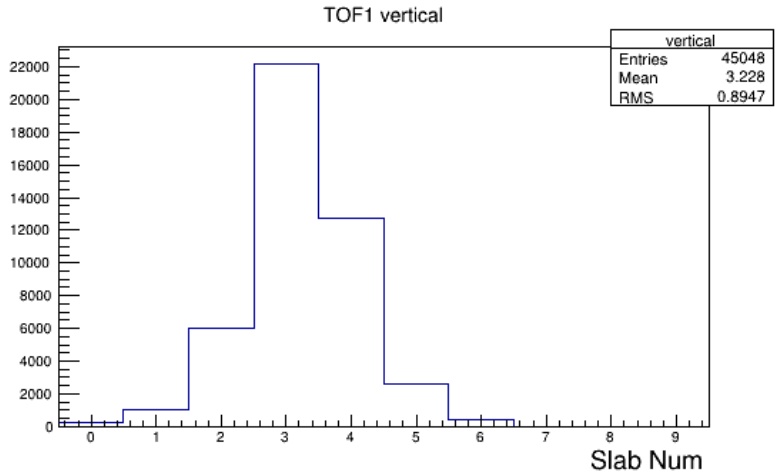
Current status:

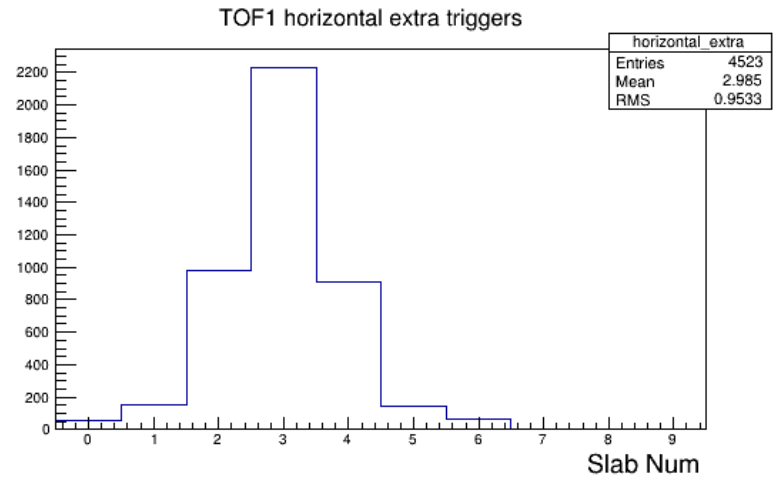
- The old trigger system is still in place;
- Switching between the old and the new system is quite trivial and takes $\sim$20 min.
- Final test of the new trigger system is scheduled for June 29th. This test will include a data taking with the full MICE DAQ and new TOF calibration.

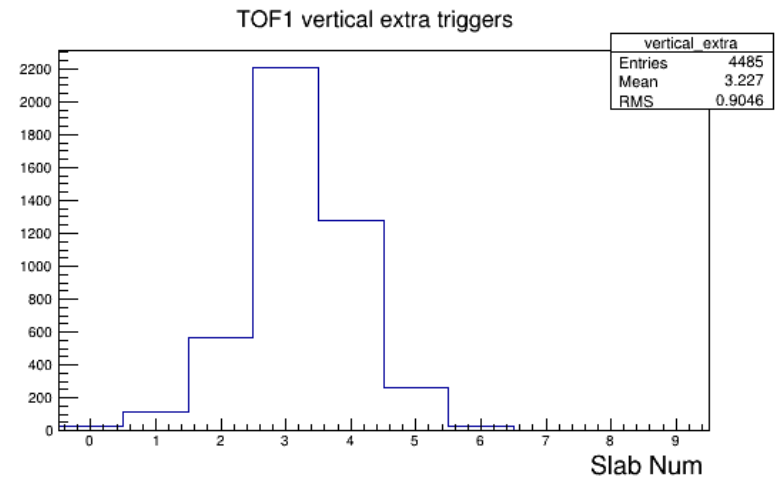
Beam profile comparison - All triggers vs. extra triggers.

Beam profiles



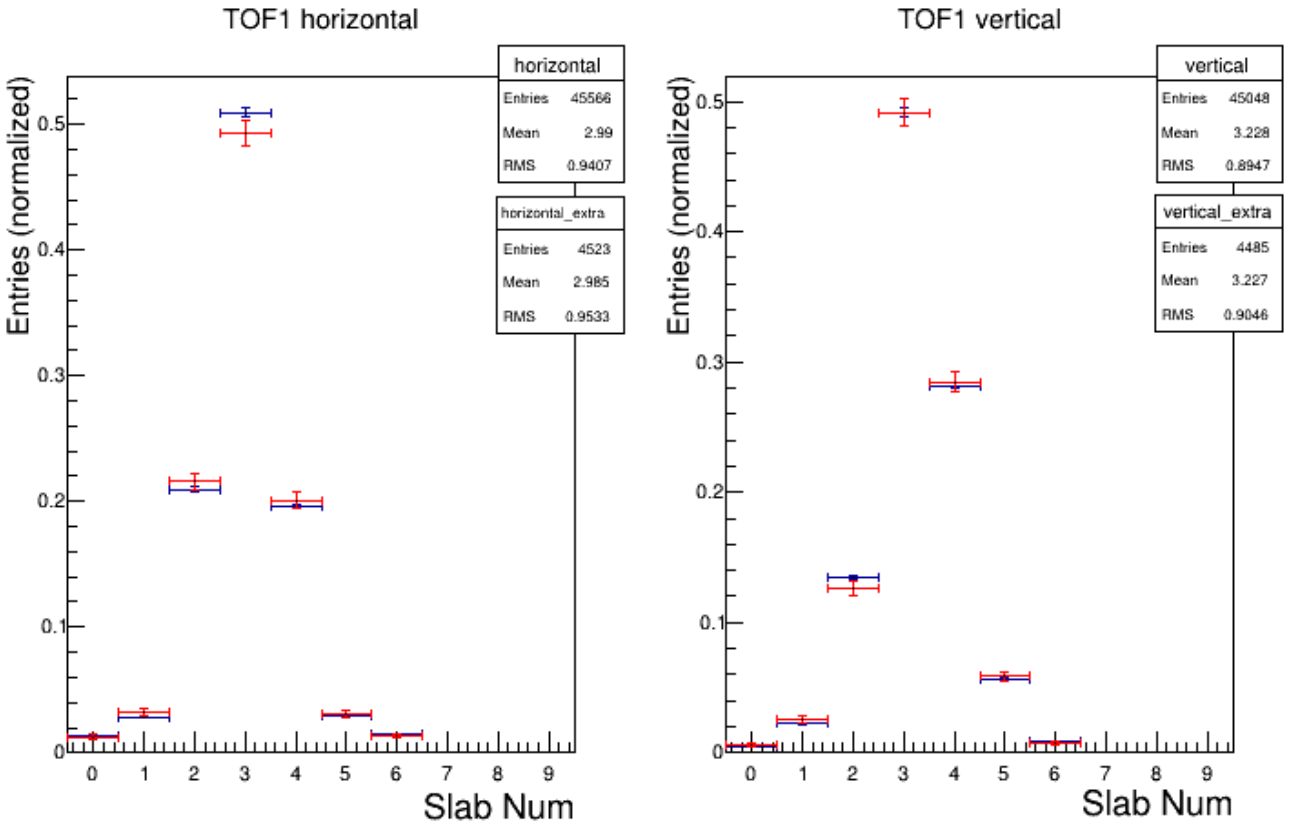






Beam profile comparison - All triggers vs. extra triggers.

Normalized beam profiles

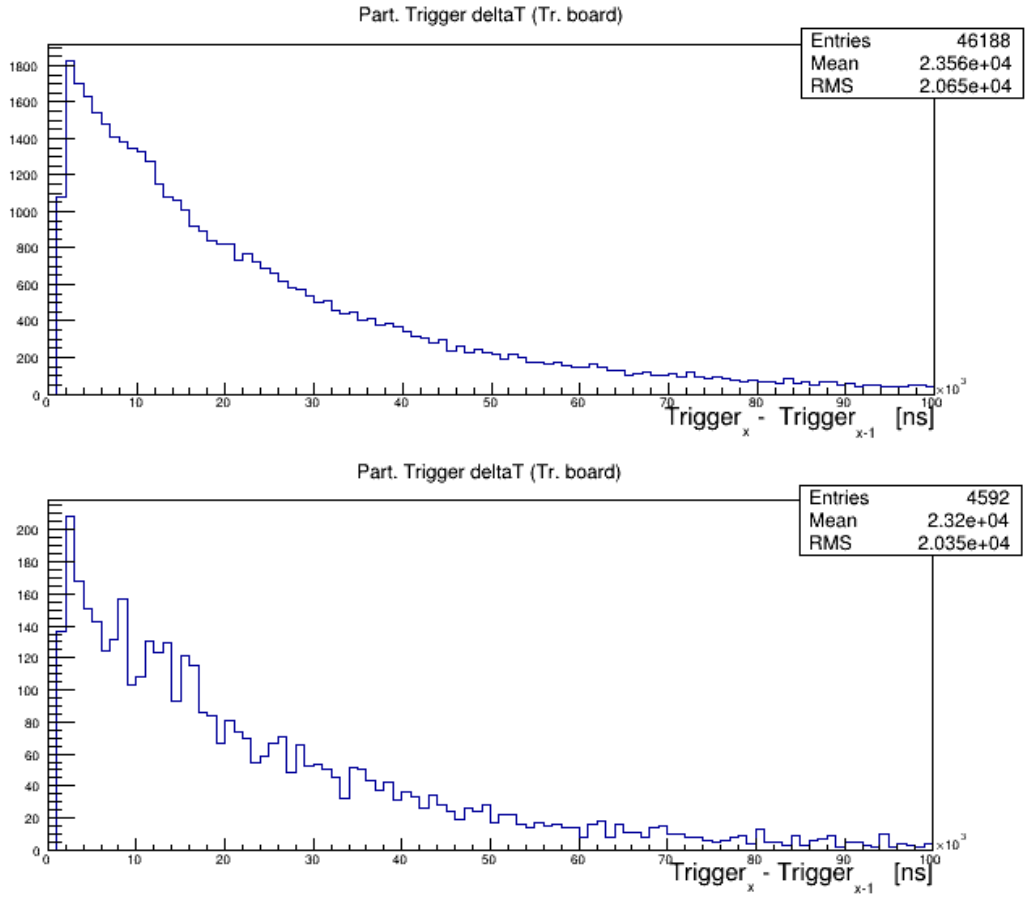


All triggers

Extra triggers only

Time comparison

Time between triggers ($Trigger_x - Trigger_{x-1}$).



Top: all triggers

Bottom: extra triggers only

Conclusion & Plans

1. The new trigger system is ready to be used
2. Documentation is 90% completed
3. Inefficiency in the old trigger system has been revealed
4. The reason for this inefficiency is not clear
5. The final test of the new trigger system is scheduled for June 29th

DAQ Hardware Upgrade

- Replacement of the DAQ readout computers (miceacqXX) - We never had any problems with these computers, but they are quite old and we decided to replace them.
- Replacement of the EMR VME crate - the EMR readout system is not stable over a long period of operation. The old VME crate has been incriminated for this.
- Removal of the old trigger system.

The upgrade is scheduled for mid October (will happen together with the EMR upgrade).