

DAQ status - A brief report

Stefano Piacentini - 22/09/2022

DAQ report

- **Integration** of the **trigger module** in the **MIDAS** framework
 - ➔ the module has been **tested** with different input/output and it's working fine
 - ➔ a code to **preliminary** allow **communication** between the DAQ **server** and the module is already working.
 - ➔ some of the work on the frontend has been done, but to complete it we have to finalize the **C++ driver** to interface the module with MIDAS

DAQ report

- Design of a **strategy** to **reduce dead time** and optimize the trigger-to-acquisition process
 - ➔ We already have a preliminary version of the code based on the **acquisition of two contiguous pictures**, but we are not satisfied:
 - ▶ it relies on the **assumption** that the PC never takes more than 1 exposure time to ask the VME about its DataReady flag
 - ▶ although unlikely, such possibility cannot be excluded a priori and we want a more solid solution

DAQ report

- Design of a **strategy** to **reduce dead time** and optimize the trigger-to-acquisition process
 - ➡ We think that we can change our approach:
 - ▶ **continuously** acquire a certain number **N** of **pictures** ignoring the trigger, and **keep the timestamp** of each **picture**
 - ▶ in the same time window, **acquire all** the PMT-triggered **waveforms** from the digitizer, and **keep the timestamp** of each **trigger signal in relation to the picture number**
 - ▶ Reconstruct “a posteriori” the events by knowing when both the picture and the trigger signals were acquired
 - ➡ We need this to be implemented **via hardware**, to assure the correct timing of all the steps. Our first idea is:

Let's try to do it with the trigger module!

DAQ report

PRELIMINARY

- Design of a **strategy** to **reduce dead time** and optimize the trigger-to-acquisition process

Let's try to do it with the trigger module!

➡ What we think we need the FPGA should be able to do:

- ▶ generation of periodic signals (to trigger the continuous camera acquisition)
- ▶ keep track of:
 - * the number of signals sent to the camera
 - * the number of triggers from the PMTs
 - * the relation between the two (we want to be able to know, for each trigger "i", the number "j" of photos acquired up to now)
- ▶ Dedicate a certain number of registers to the communication with the raspberry (i.e. to do checks, exchange infos in general)

Plans

- In this days we will try to finalize the integration of the current “version” of the module in the MIDAS framework
- We are planning to change the way in which we acquire the events:
 - The FPGA of trigger module could be used for it
 - We need to design a new firmware and we can do it with our Brazilian colleagues next week
 - **This is very preliminary and any comment/suggestion is very welcome**