POSTER 227

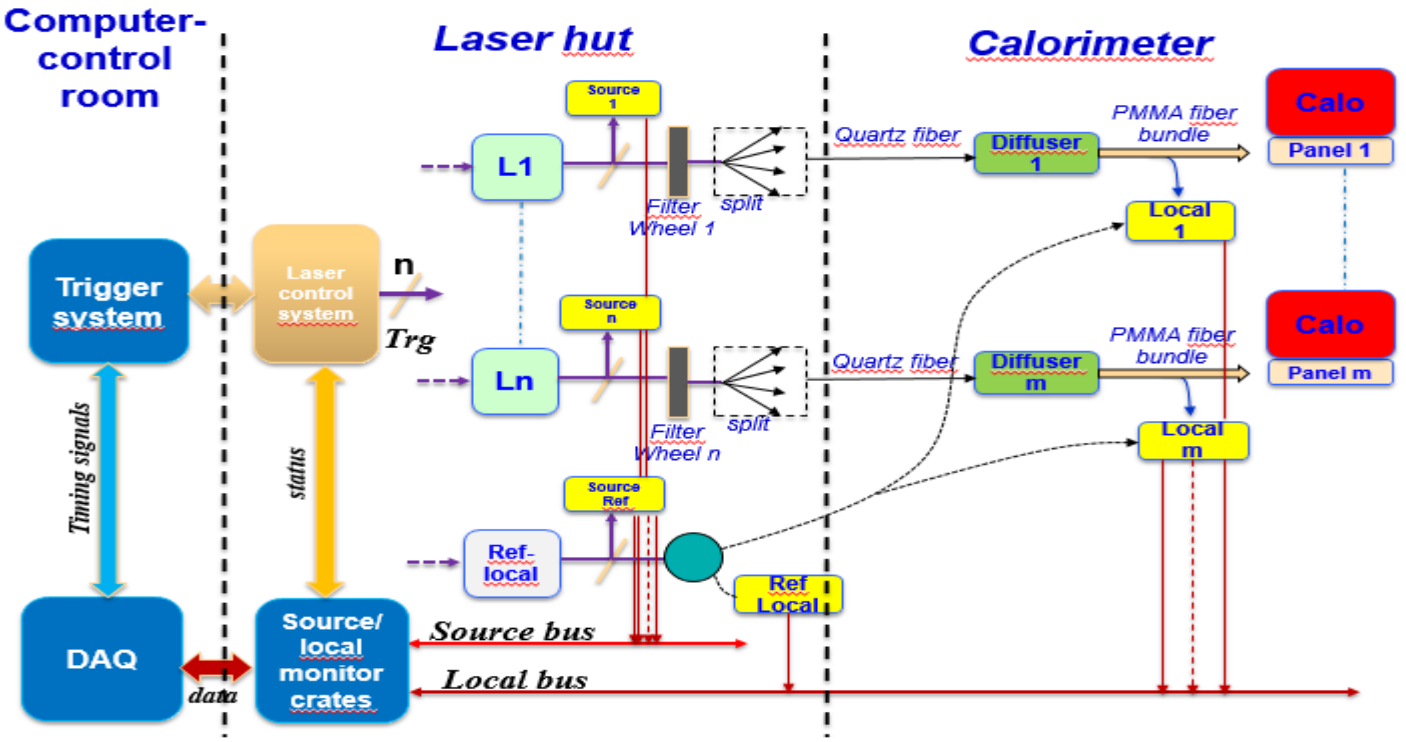
The laser control system for a calibration facility of light detector

S. Mastroianni[a], R. Di Stefano[a,c], O. Escalante[a,b], F. Marignetti[a,c] , M. Iacovacci[a,b]

[a]INFN Napoli, [b]Università ''Federico II" di Napoli, Italy,
[c]Università di Cassino, Italy

Laser Calibration Scheme

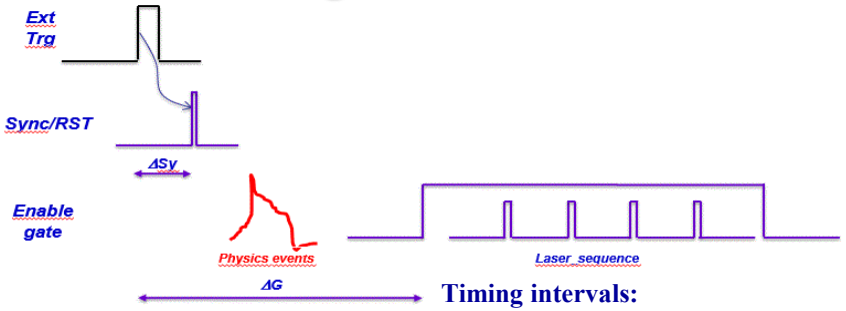
- Diode Laser
- Distribution system



The functionalities

- *Interface with the Trigger system and local DAQ*
  - *Light pulse synchronization with an external trigger*
- *Provides the calibration pulses according the following modes:*
  - Detector and electronics synchronization (Sync/RST)
  - Light pulse generation at programmable frequencies
  - Light pulse generation according a defined function to simulate physics events for electronics/DAQ test and characterization
  - Filter wheels managing for SiPM calibration:dynamic ~ 5
- *Interface with the monitor system electronics*

Timing scheme

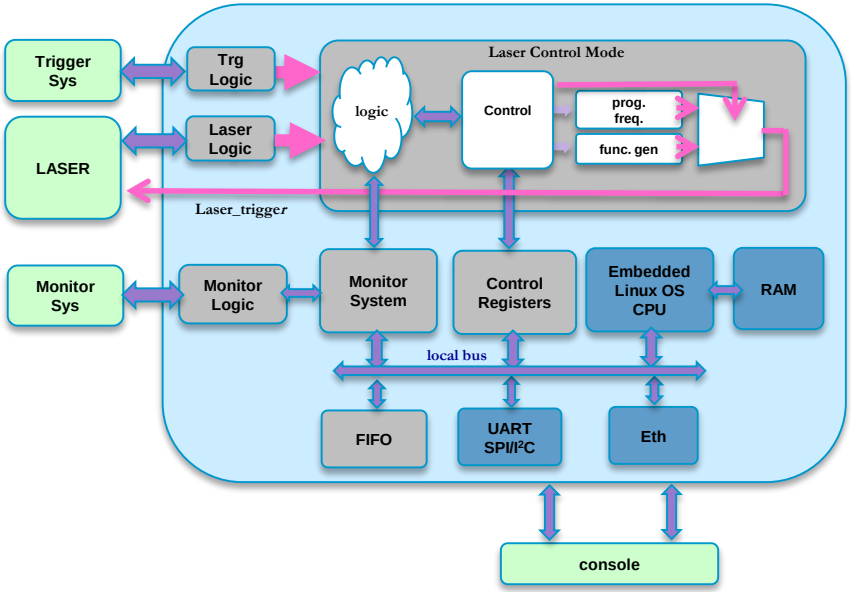


Timing intervals:
- Sync/RST delay
- laser sequence delay

other config parameters

fully configurable by software

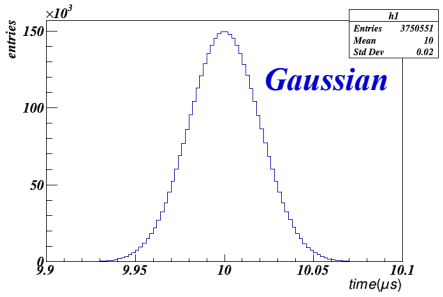
The architecture

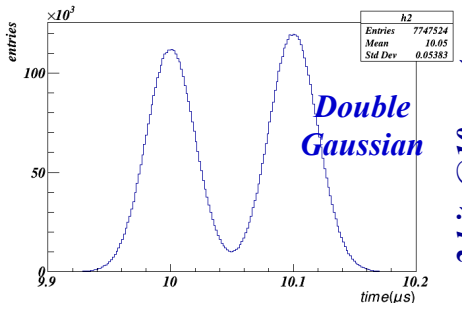


- The Laser Control System is based on a hybrid platform by using an FPGA and an ARM processor.
- An high level Linux OS runs on the board allowing the setup configuration and the complete monitor and control during the operations.
- The modes in the Laser Control Mode block:
  - ❑ pulse generation with programmable frequencies is completely managed by the hardware
  - ❑ special patterns generation defined by software program running on the processor; the shot's patterns are registered in the RAM and then sent to the FPGA via SPI

Generated distributions

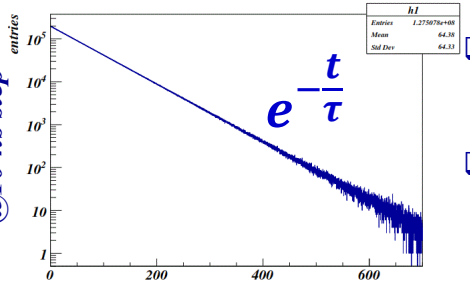
1 hit @10 ns step





2 hits @10 ns step

up to 128 hits @10 ns step



- ❑ The single and double Gaussian distributions → detector/electronics tests
- ❑ The $e^{-t/\tau}$ distribution→ to simulate the physics event for the g-2 experiment

Conclusions

The high precision time control and monitor of the light source for a Laser Calibration system of photo-detectors are mandatory.

The Laser Control System has been designed to distribute trigger pulses to a light detector calibration facility:

- It operates continuously during the data taking of the experiment
- The control and monitor activities allow a smoothly data taking
- The system realization is based on an hybrid platform with high performance through the use of the FPGA device and a very useful flexibility intrinsic in a Lynux OS