



Controls of the new lasers for run operation

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- Terminology
 - ECAL DAQ: DAQ part from Laser supervisor and upstream
 - Laser main control: application the ECAL DAQ communicates with and which controls laser switches, attenuator, Quantronix lasers: the GUI running on ecal-laser-room-02 PC.
- ECAL DAQ and the communication protocol with the laser main control was designed to support 4 wavelengths for two types of light sources, laser and LED.
 - ECAL DAQ selects the wavelength; selection of the laser that provides the requested wavelength (esp. between the two Quantronix lasers) is done in the configuration of the Laser main control.
 - Support the 4 wavelengths requires an upgrade of the laser main control
 - Currently green laser is working using the “IR” code, which has become a universal code (was used for the 2nd blue in 2011)
- Handshake between the laser main control and the ECAL DAQ was removed in 2010



- Communication protocol was including codes for two red lasers (codes “red” and “IR”):
 - The “IR” code is still used for the red laser
 - The former “red” code is used for the Photonics blue laser
- No change on ECAL DAQ side

- For an optimal stability the green laser is pulsed continuously
- A shutter is used to cut the beam when operating the switch
 - shutter operation time \ll 1 sec
 - the shutter is controlled by the ECAL DAQ (laser supervisor)
- A PIN downstream the shutter connected to the Ecal Monitoring Trigger Card (EMTC) is used to check that the beam is effectively cut. A discriminator and a latch is used in EMTC to catch the laser pulses.
- Monitoring region modus operandi:
 - On region change the EMTC disables the laser trigger
 - Close the green shutter
 - Reset the “light detection” flag in the EMTC
 - Wait for 50 ms
 - Check the “light detection” flag in the EMTC. If set, the green laser triggers will be skipped. An error message is written in the logs and email notification is sent to experts.
 - Send region change request to Laser main control
 - Wait for Laser main controls acknowledgement (handshake re-enabled for green laser only).
 - Re-enable laser trigger in the EMTC
- Currently green laser is not triggered during switch operation. Continuous trigger being commissioned



- Local controls needed only for experts. The configuration is kept after a power cycles.
 - Manual shutter operation
 - Attenuator operation
 - Temperature monitoring
- Command line program

- For blue and red laser sequence, 40% of the time is taken for monitoring region switching.
 - ~75% of the switching time is taken by the shutter operation
 - Shutter operation was originally introduced for the commissioning and was meant to be removed for normal operation.
- Region fibre selection switch operation using an independent GPIB-USB interface takes 0.5 sec.
 - This independent control can be integrated in the laser supervisor, which has also controls on laser trigger activation after a region change (see trigger auto-inhibit feature of EMTC). But it has no control on laser trigger when run in manual operation.
- During the green laser commissioning, it was taking 0.7 sec to change region
 - So we expect similar performance with the current system if the shutter is not used.
- The fibre selection switch operation manual does not mention any needs to cut the laser beam before changing the position
 - Could it be that we are taking extra-precautions and we are safer than needed?
 - Can this be checked with the switch manufacturer?