

POSTER 228

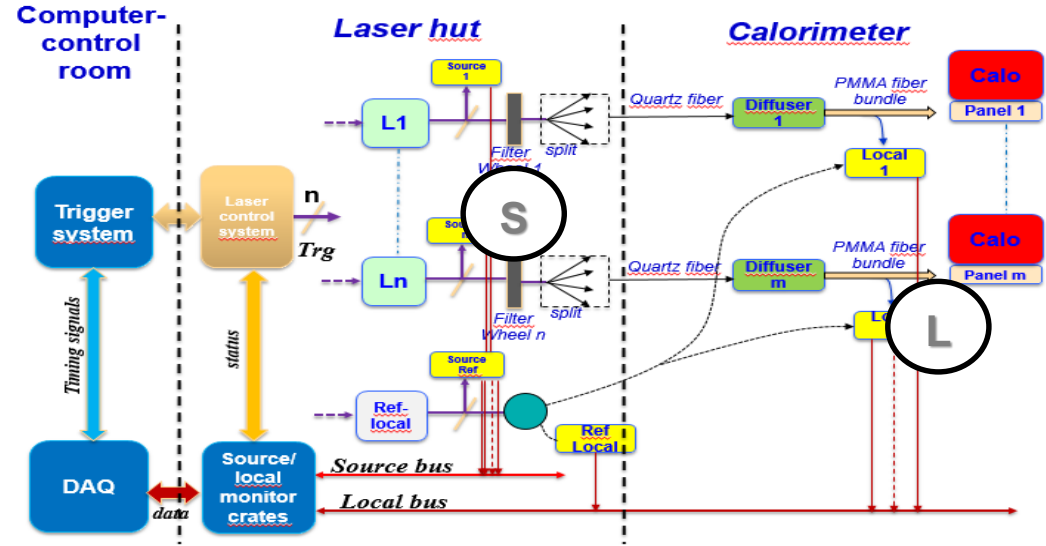
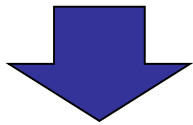
The monitoring board for the calibration system of the g-2 experiment

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The Calibration System for g-2 experiment

Calorimeter gain fluctuations and monitoring at the 10^{-4} level (both during in-beam & out of beam)



Calibration system: diode Laser and distribution system transmission

- 6 lasers Picoquant (750 pJ @ 405 nm) / Average Power (@ 40 MHz): 28 mW
- 24 diffusers
- Monitor system

- S** Source monitor (signal input: ~ 150 pJ/pulse $\sim 3 \times 10^8 \gamma$)
 - 2 PIN diodes and readout electronics
 - 1 PMT with Am/NaI pulser
 - Light mixing chamber

- L** Local monitor (signal input: ~ 0.01 pJ/pulse $\sim 10^4 - 10^5 \gamma$)
 - 2 PMT



Required value at the output of each crystal
0.01 pJ/pulse (el. 2 GeV)

Systematics are measured with reference to a Am/NaI “pulser” with rate of ~ 10 Hz \rightarrow need ~ 3 hours for 0.01% statistical accuracy

Source Monitor electronics

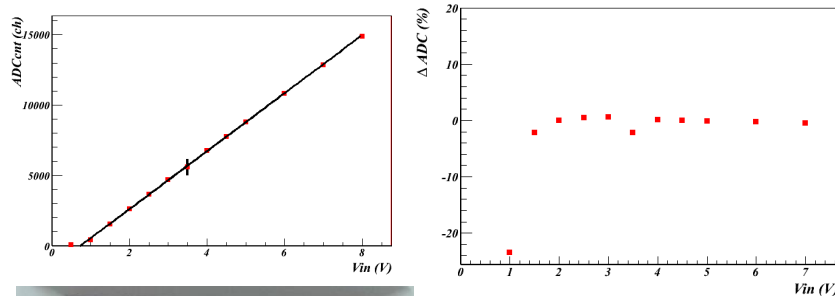
CSP board:

- charge sensitive preamplifier with 800mV/pC and a noise of 0.7 mV FWHM
- charge injection electrode for test purposes
- temperature sensor at 0.1° C

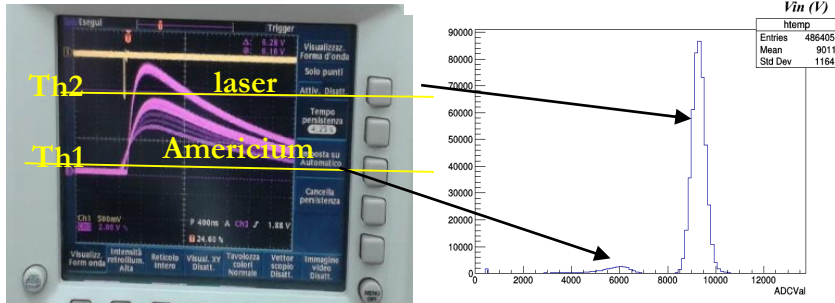
MB board:

- power supplies with EMCO modules & feedback
 - ✓ Bias for PIN diodes /PMT
- stabilize the sensors (PIN/PMT) and electronics
- provides the calibration signal (DAC)
- time measurements for each pulse
- charge converted with 14 bits ADC

Test results



Linearity: $V_{in} > 2V \rightarrow \Delta ADC < 0.5\%$



Laser/Am discrimination

Conclusions

- The Source Monitor system allows the containment of the systematic contributions due to gain fluctuations at sub-per mil level on the beam cycle.
- The presence of a CSP board guarantees an high flexibility and it can be customized for PIN/PMT readouts
- The MB module builds a frame for each channel and sends it to the following DAQ level
- Linearity tests have been done; temperature and bias measurements are used for corrections
- Self-calibration and efficiency measurements can be done by a charge injection