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

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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

Source monitor (signal input: ~150 pJ/pulse~3\times10^8 \gamma )
- 2 PIN diodes and readout electronics
- 1 PMT with Am/NaI pulser
- Light mixing chamber

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

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

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

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