

Gain Stabilization of SiPMs and Afterpulsing

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The gain of silicon photomultipliers increases with bias voltage and decreases with temperature. To operate SiPMs at stable gain, the bias voltage can be readjusted to compensate for temperature changes. We have tested this concept with 30 SiPMs from three manufacturers in a climate chamber at CERN varying the temperature from 1 degree C to 48 degrees C. We built an adaptive power supply that is based on a linear dependence of bias voltage versus temperature. With one selected dV/dT value, we stabilized four SiPMs simultaneously. We fulfilled our goal of stabilizing most SiPMs with gain changes of less than $\pm 0.5\%$ in the 20-30 degree C temperature range. We studied afterpulsing of SiPMs at different temperatures for different bias voltages.

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