

The new PETsys TOFPET3 ASIC

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A new PETsys ASIC in the TOFPET series, named TOFPET3, has been developed aiming at high performance PET applications. The new chip has a 64-channel analog front-end with baseline stabilization, pulse tail cancellation, dark noise rejection and gain configuration. In each channel, three 10-bit digitization of pulses above a configurable threshold are performed (2 TDC, 1 QDC). The maximum event rate per channel is 500 kHz, and the output bandwidth is 3.8 Gb/s matching the input rate. The new timing and energy circuits have outstanding performance: 1) the TOFPET3 contribution to CTR is 24 ps FWHM, implying that a CTR=80(120) ps due to crystal and SiPM, increases to 83(123) ps with TOFPET3; 2) the contribution to 511 keV photopeak resolution is 1.1% and the deviation to linearity is $\pm 1\%$ in the range 3000 p.e for SiPM gain 3.5×10^6 . Charge integration of single photons is possible with S/N=12. The chip includes four additional channels with sums of 16, 32 or 64 cannels (configurable) suitable for light sharing applications, as well as advanced triggering features allowing the selective readout of a group of channels triggered by the energy of one channel. The power consumption is 8 mW per channel. We present simulation results of the chip performance.

Field

Detectors and electronics

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