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The PETsys TOPET2 ASIC, a dedicated ASIC for TOF PET applications.
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The SiPM technology is today a mature technology and in the near future all PET scanners will be based on SiPMs. The main advantages of SiPMs is that they allow a better time resolution, that they are easily subdivided in small pixels and that they only require a few 10 volts to operate. A SiPM based PET scanner will provide better performance than a PMT based PET scanner at a lower cost.

However, to take advantage of the SiPM technology in PET one needs dedicated readout electronics that can cope with the large number of channels at an affordable cost. That requires a dedicated and highly integrated ASIC.

The PETsys TOFPET2 ASIC is a 64-channel mixed-mode ASIC developed in standard CMOS 110nm technology. The new ASIC has several important improvements compared to the TOFPET1 ASIC. The TOFPET2 ASIC uses a low threshold for timing and a high threshold for accepting the event. Both thresholds are separately configurable for each channel. Every time one of the 64 channels exceeds the high threshold a record is created giving the channel number, the time and the charge of the event. Activity in one channel does not cause any dead-time on the other channels.

The maximum rate per channel is 480 kcps. The ASIC has 30 ps time least count, and provides linear amplitude measurement by charge integration in the full dynamic range of input pulse charge (1500 pC). The power consumption is 6 mW/ channel.

We will report the results of on an extensive test program with the TOFPET2 ASIC.