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The Role of FPGAs and Reconfigurable Acquisition in Future PET/SPECT Systems

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Abstract. The advent of digital SiPMs has brought new opportunities to the field of PET and SPECT but also new challenges. Digital SiPMs deliver more detailed spatial and temporal information of the photon showers originating from Gamma events, but the bandwidth of this data can be very large. On the other hand the structure of the data can be used to perform compression and filtering in situ. The information rich dataset generated by digital SiPMs poses new challenges also at the system level. Thus, in many cases, reconfigurable architectures may be preferable to ASICs in that they enable the evaluation of the readout chain in various feasible variants. In this context, we present a novel sensor-network based architecture that is fully scalable to various system configurations targeting preclinical, clinical and brain PET, all at once. A study of the trade-offs between FPGA and ASIC based readout architectures will also be presented

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