

Performances of silicon detectors for the SiliPET project: A Small Animal PET Scanner based on Stacks of Silicon Detectors

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In this paper we propose a new scanner for small-animal positron emission tomography based on stacks of double sided silicon detectors. Each stack is composed of 40 planar detectors with dimension $60 \times 60 \times 1$ mm³ and 128 orthogonal strips on both sides to read the two coordinates of interaction, the third being the detector number in the stack. Multiple interactions in a stack are discarded by an exclusive OR applied between each plane detector of a stack.

In this way we achieve a precise determination of the interaction point of the two 511 keV photons. The reduced dimensions of such a scanner also improve the solid angle coverage resulting in a high sensitivity. A proof of principle has already been performed with the MEGA prototype tracker demonstrating the underlying idea.

We report on the spatial resolution, imaging, spectral and timing performances obtained with double sided silicon detectors, manufactured by ITC-FBK, having an active area of 3×3 cm² and a strip pitch of 500 microns. Two different strip widths and two thicknesses of 1 mm and 1.5 mm, with orthogonal strips on opposite sides, were read out with the VATAGP2.5 general purpose ASIC.

We will present the improvements made on a new compact version of the board containing the control signals, ASIC control voltages, interface isolator and ADC. We will use a new version of the VATAGP with 50 ns peaking time to reduce time walk. Timing performances obtained with 2 layer stacks will also be presented.

Summary (Additional text describing your work. Can be pasted here or give an URL to a PDF document):

<http://www.fe.infn.it/u/zavattin/ViennaSiliPET%202010.pdf>

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