

Investigation on Timing Performance of Cherenkov TOF PET Detector with Bismuth Germanate Scintillators and Segmented SiPMs

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This study investigates the potential of utilizing a BGO crystal coupled with a segmented SiPM detector. Recent findings suggested the viability of BGO as a cost-effective option for TOF-PET detectors when employed as a hybrid scintillator/Cherenkov radiator. The OctaSiPM, featuring a pixel active area of $\sim 2.5 \times 1.4 \text{ mm}^2$, was employed in a 2×4 array configuration with a $3 \times 3 \times 15 \text{ mm}^3$ BGO crystal. The study emphasizes the advantages of segmentation and explores the utilization of multiple timestamps from a gamma-ray event. Coincidence measurements with back-to-back 511 keV gamma rays demonstrated improved timing resolution with an adaptive timestamp pickoff method. Systematic analysis of trigger time differences and initially detected photon count offer insights into event classification and holds promise for Cherenkov TOF PET imaging with BGO crystals, emphasizing the potential for future optimization using OctaSiPMs.

Field

Detectors and electronics

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