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Nuclear Pulse Charge Measurement with a Method of Time over Linear Threshold

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Time over dynamic threshold (TODT) method, proposed in our previous work, has been successfully used for nuclear pulse charge measurement in PET detectors. It has advantages of strict linearity, large dynamic range, and better energy resolution, but requires a relatively complex circuit to generate specific dynamic threshold. In this paper, we propose to replace the dynamic threshold by a simpler linearly increasing threshold (called as TOLT method) with the aim to simplify the threshold generation circuit meanwhile maintaining its high energy resolution. Mathematical analysis on this replacement and the related realization circuit are presented. By energy spectrum measurement of PET detectors, the method is evaluated. The energy resolutions of PET detectors, composed of a PMT coupled with LYSO and LaBr₃ crystal, are measured as 12.54% and 5.18% respectively, which is equivalent to the result obtained by TODT method. The test results show that the TOLT method is more practicable for charge measurement of nuclear detectors.

Minioral

Yes

Description

Analog Method

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