

GEANT4 Simulation of the Time-Resolution of a Fast Scintillation Detector Read-out by a G-APD

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We have recently published [1] a time resolution study with a plastic scintillator read out by a Geiger-mode Avalanche Photodiode. Time resolution of $\sigma = 18/(E^{0.5})$ ps*MeV^{0.5} was measured. The work presented here aims to simulate that experiment using the Geant4 toolkit, and to identify the parameters which have the largest effect on the total time resolution. We also compare different timing definitions - e.g. leading edge discrimination and constant fraction discrimination.

[1] A. Stoykov, R. Scheuermann, K. Sedlak; Nucl. Inst. and Meth. in Phys. Res. A – in press; <http://dx.doi.org/10.1016/j.nima.2011.11.011>

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