Constant fraction discrimination analysis of hexagonal counters under beam conditions

Matías Tobar Toledo

Millennium Institute for Subatomic Physics at the High Energy Frontier & Universidad Andrés Bello Interships SAPHIR-UNAB and SAPHIR ARM 2025

Abstract

This work evaluates the response of the detector under beam conditions for future Time of Flight (ToF) of advSND configurations. For this purpose, Pions@180GeV from SPS in H4 beam line through three planes of 10 mm EJ-200 (B,C) and EJ-204 hexagonal shaped





scintillators. Constant The Fraction (CFD) method Discriminator used, was employing two approximations to investigate baseline variations and timing jitter.

Configuration

Seven hexagonal shaped hodoscopes were arranged in three honeycomb pattern planes to obtain spatial information of the particles crossing them. Each hexagonal scintillator was conically drilled using a CNC machine and is attached to a SiPM of 3x3mm² sensitive area. The data analysed in this poster was taken with an oscilloscope.



CFD Method algorithm

The principal advantage of the CFD is that eliminates amplitude-dependent time walk for signals having consistent rise times. The main signal is positive with baseline substracted and starts at time-zero (blue one). The attenuated signal (red) is the main multiplied by attenuation and shifted backward by delay. The CFD signal (green) is calculated as main minus attenuated and triggers on the zero-line crossing



Results and/or Prospects

Improvements on the detector design are needed in order to collect amplitude data without saturation. The difference between the two timing discriminators yields the optimal configuration for CFD: 3 ns of delay and a attenuation of 0.3.



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