The Barrel Time-Of-Flight Detector

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January 20, 2021

Aim of the Document

The aim of this document is to give a broad overview of the detector summarizing and expanding on the established Technical Design Report written by K. Suzuki et al.

Contents

1 Introduction

The B-ToF detector is a scintillating tile hodoscope which used to be referred to as the *SciTil*. It fulfills many functions to support the successful operation of the $\overline{\text{P}}$ANDA detector. It provides:

I information for particle identification at low momenta (below the Cherenkov threshold)

II position resolution for track seeding

III timing information to separate individual events in the stream of data

2 The B-ToF Detector Hardware

3 Infrastructure

4 Capabilities

The content of this section is mainly based on work done by Dominik Steinschaden. irrelevant

The presented capabilities are all based on performance simulations using PandaRoot. The timing based analysis of this detectors data combined with momentum and track information from other detectors allows the B-ToF detector to contribute two main features; event building and particle identification.

4.1 Event Building

Since $\overline{\text{P}}$ANDA will not be equipped with a start time detector, the first challenge will be to group relevant hits into single events. This will have to be done before any further analysis of the data stream is possible. For this it is both important to capture all relevant hits and exclude all hits from other events.

For this step the time resolution of the respective detector is the qualifying factor. With average event rates in the high luminosity mode of up to 20MHz.

5 Performance Validation

6 Calibration

6.1 Ongoing Performance Monitoring

To ensure hardware component issues are detected early the system is supposed to be monitored by small LED's mounted in between the SiPM's.

6.2 Position Calibration

6.3 Time Resolution Expectancy along the Board

6.4 Signal delay along the Board

6.5 Amplitude drop along the Board

7 Readout

Foreseen is a readout with the TOFPET ASIC by PETsys Electronics.

Todo list