



Sample Project: Readout system of the timing detectors of the CMS Precision Proton Spectrometer

Code	PH1126
Programme	TRAIN-PTES
Department	PH
Responsible	18888 - Prof. Joao Varela
Created by	
Updated by	110035 - Ms. Laura Saulnier
Date Created	16-MAY-07
Date updated	15-JUL-14

Title

Readout system of the timing detectors of the CMS Precision Proton Spectrometer

Description

A high precision proton spectrometer (PPS) is under development by the CMS experiment. It uses a timing detector, the quartz timing counter (QUARTIC), coupled with silicon photomultipliers (SiPM), in order to measure the time of flight (ToF) of the two forward protons produced in the interaction point in the CMS detector. Considering central exclusive production processes ($p+p \rightarrow p+X+p$), 10 picosecond time resolution would provide 2.1 mm spatial resolution on the vertex position and improve by a factor of about 25 the background pile-up suppression

QUARTIC is a timing detector exploiting Cherenkov light. Cherenkov counters are well suited detectors for time measurement, since the Cherenkov light is promptly produced. Fused silica (SiO₂ or quartz) has been chosen as radiator, since it allows total internal reflection for the Cherenkov light in some condition. The photodetectors studied for QUARTIC bars are the Silicon Photomultiplier (SiPM) and micro-channel plate photomultiplier (MCP-PMT).

The subject of this project is the development of the readout system of the PPS high-performance timing detectors. Using available integrated circuits, electronics boards to process and digitize the input signals, and to transmit the data in high speed optical links, will be developed.

Background required:

Basic training in electronics and digital processing in Field Programmable gate Arrays (FPGA).

Skills

Networks and Systems: Integrated circuits, Microprocessors. Theory of Electrical Engineering: Signal processing

Disciplines

Experimental Applied Physics, Electronic Engineering

To edit this project go to https://hrapps.cern.ch/auth/f?p=131:4:::::P4_ID:1126