



Contribution ID: 439

Type: Oral presentation

## FPGA Based Pico-second Time Measurement System for a DIRC-like TOF Detector

Friday 15 June 2018 11:30 (20 minutes)

A prototype of DIRC-like Time-of-Flight detector (D<sub>TOF</sub>), including a pico-second time measurement electronics, is developed and tested preliminarily. The basic structure of D<sub>TOF</sub> is composed of a fused silica radiator connected to fast micro-channel plate PMTs (MCP-PMT), and readout by a dedicated FPGA (Field Programmable Gate Array) based front-end electronics. The full electronics chain consists of a programmable differential amplifier, a dual-threshold differential discriminator, and a timestamp Time-to-Digital converter. By splitting a MCP-PMT output signal into two identical electronics chains, the coincidence time resolution (CTR) of pure electronics was measured as 5.6 ps. By the beam test in H4 (150GeV/c, Muon) at CERN, the intrinsic CTR of the whole detector prototype reaches 15.0 ps without using time-amplitude correction. The test results demonstrate that the FPGA based front-end electronics could achieve an excellent time performance for TOF detectors. It is very compact, cost effective with a high multi-channel capacity and short measurement dead time, which is very suitable for practical applications of large-scale high performance TOF detectors in particle physics spectrometer.

### Minioral

Yes

### Description

Wilkinson ADC\_FPGA

### Speaker

Qiang Cao

### Institute

USTC

### Country

China

**Authors:** Mr CAO, Qiang (Department of Modern Physics, University of Science and Technology of China); Dr LI, Xin (Department of Modern Physics, University of Science and Technology of China)

**Co-authors:** Mr WANG, Liwei (Department of Modern Physics, University of Science and Technology of China); Mr KUANG, Jie (Department of Modern Physics, University of Science and Technology of China); Prof. WANG, Yonggang (Department of Modern Physics, University of Science and Technology of China); Prof. LI, Cheng (Department of Modern Physics, University of Science and Technology of China)

**Presenter:** Mr CAO, Qiang (Department of Modern Physics, University of Science and Technology of China)

**Session Classification:** Front End Fast Detectors 2