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Procedure for the alignment of the Mean Timer signals of the FINUDA time of flight system

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Abstract

This note describes the new program developed to read time intervals on a selected channel of a CAMAC TDC module with a resolution of about 50 ps. It can be used to align the mean-timers' signals of the FINUDA time of flight (TOF) system.

1 Introduction

FINUDA trigger system is based on the Mean Timer (MT) signals coming from the TOF detector. Therefore, to have an efficient and reliable trigger it is critical to align at best theese signals. This note describes the program I developed to perform this task. It enstablishes a connection with a CAEN C211 interface [1] using its IP address. In this way the program gets in contact with the TDC placed in a CAMAC crate. Then, it reads the delay between start and stop on a selected channel. For this purpose, some functions from Jenet's Library are used. Finally the program displays an histogram of the read values and a frequency vs values graph.

The source code has been written in C++ with some calls to Jenet's and ROOT's libraries.

2 Program's details

The program is placed in the following folder:
`frc@fndgeb:/home/frc/CAMAC/MT_ALL`
The source file **main.cxx** can be found in the subfolder *src*. If you change the CAMAC interface (we used a CAEN C211 module) you will have to modify its IP address (crate_id=CROPEN("new IP address")). If you change the interface model this program could not work because it has been written using Jenet's library. In that case you would have to check new interface's functions and modify the code. You could also have to change the position of the TDC inside the crate. In this case you will need to change the slot number (crate_op.N=new position, default is 4) in all the operations' settings.

3 How to run the program

From the program folder type the command *./MT_TOF_Alignment* to start the application. Then the program will ask for the number of the channel on which the delay has to be read. Then the user has to insert the number of desired reads. At the end the program will show in the shell all the read values (with frequency informations) and will open a ROOT's canvas. There the histogram and the frequency vs values graph will be plotted. At the end of the plot operations all ROOT's GUI instruments are avaible in the active canvas.

4 TOF alignment procedure

This program has been created to align mean-timers of TOF. This is done by using as common start the signal coming out from the photodiode (which sees the laser light spot) and having as stop the output from TOFINO or TOFONE Mean Timers.

The time resolution of this program has been tested working with different time ranges. I've measured a precision of about 40,4 ps. I suggest to make a calibration before taking data (you can add a known delay to your stop signal and calculate in this way the value of the time resolution). In this way you will be sure about the precision of the reading operation in the range you are working on.

References

[1] Manual of CAEN C211 interface

[2] Guide of JENET C LIBRARY API ver. 2.07.

[3] R. Brun and F. Rademakers, "The ROOT System", http://root.cern.ch.