1.3 Muon Physics

First Pre-Lab:

* Background Information:

(content in Second Pre-Lab)

* Task:

1) Follow TA’s instruction and understand the equipment used in the experiment

2) Get familiar with using the software

3) Setup the equipment as description in the manual

4) Finish task1 and task2

In the lab session, we used zoom meeting to finish the experiment.

Procedure:

* To finish task1, first, we connected the power supplies of detector and electronic box and switched on them.
* Then connect the voltage meters to detector and electronic box.
* Connect electronic box with computer via usb port
* Connect PMT OUTPUT of detector and oscillator via BNC cable
* Set HIGH VOLTAGE ADJUST to -8V, then we obtained a figure (figure I) like figure8 in lab manual
* Connect PMT OUTPUT to PMT INPUT, adjust the discriminator to 200mV, and the green LED flashed, indicating that muons are detected.
* By connecting AMPLIFIER OUTPUT and DISCRIMINATOR OUTPUT to oscillator, then we obtained a figure (figure II) like figure9 in lab manual but with different scale
* Set wave function generator as100kHz and 100mV pk-pk sine wave, connect with PMT INPUT of the electronics box and obtain the figure (figure III). From the figure, we could point out that the output sine wave’s pk-pk voltage is 52mV with frequency 100.09kHz. The ratio:

Multiply by the factor, the new ratio is: 0.52\*21=10.92

* Then apply the same sine wave to the electronic box and test the discriminator threshold. We obtain this figure (figure IV). The output of discriminator is like square wave and it remain at such level while the input voltage is overwhelmed. It will also drop to zero if the input voltage over the threshold.

Summary:

This is the first lab, so we just start to measure the equipment and learn how these devices work in the experiment. With the results, we could recognize that the devices are nearly perfect with small system errors. Then we will deal with muons in the next lab session.