1 Connecting the Muon Detector
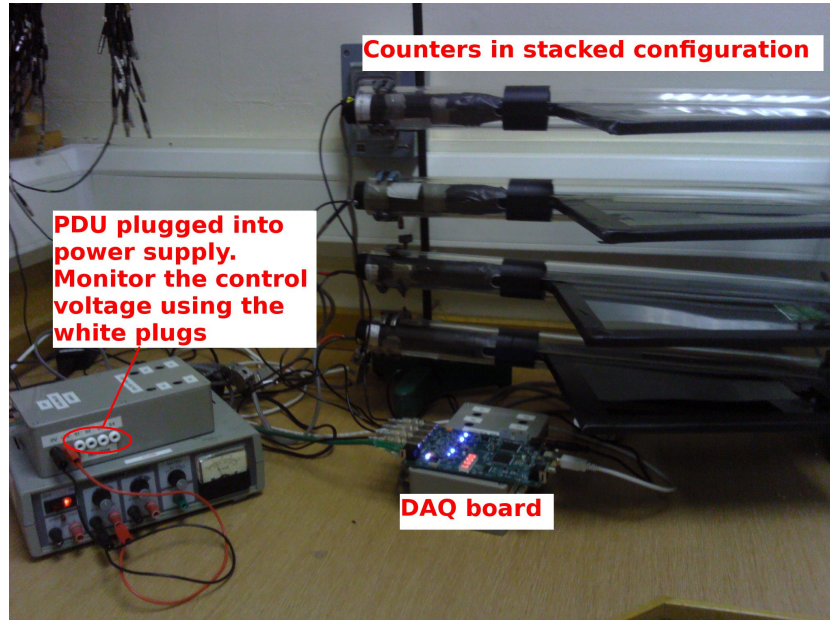

Figure 1: The setup for the muon detector.

1.1 Downloading Drivers

The first thing you need to do is to download the drivers for the Data Aquisition Board (DAQ). The driver can easily be dowloaded from
https://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx
Select the driver for the operating you are using and click the relevant link. The DAQ can now be used with the Hyperterm program, described in the next Appendix.
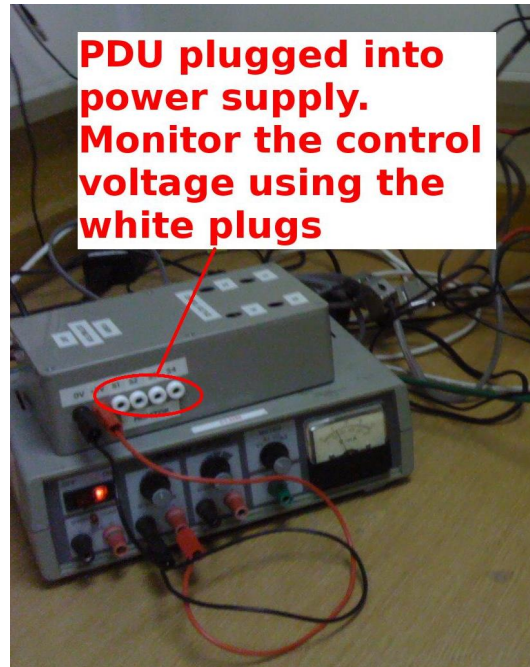
1.2 Positioning the Counters

The counters should first be positioned one on top of the other. This can be done using retort stands. Support the clear tubes at either end, with the scintillators flat and at $90°$ to the retort

stand. The counters should be around 30cm apart.

1.3 The Power Distribution Unit (PDU)

Connect the PDU to a power supply, as shown in the figure, and supply it with 5V. Note that supplying more than 5V can damage the PMTs. Connect the PMTs to the PDU via the 9 pin d-type connector. You can change the control voltage across the PMT by changing the variable resistor in the PDU. Use a digital voltmeter in the monitor points to test the control voltage on each counter. This should not go above 1.9V as it may damage the PMT.

1.4 The DAQ board
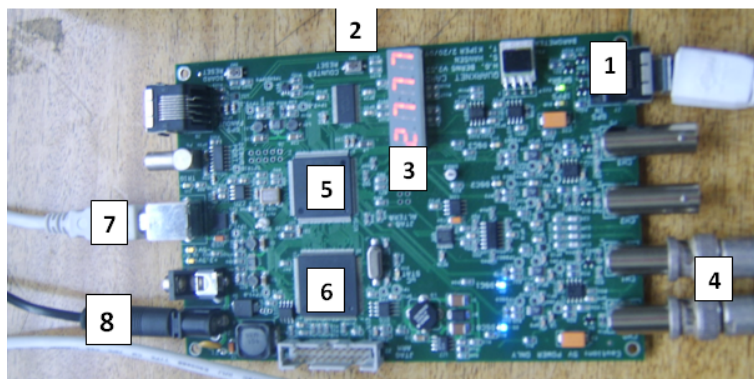
The figure above shows the function of each part of the DAQ board. The numbers correspond to the following:

1. GPS Input.

2. Board reset button.

3. Coincidence counter display.

4. Inputs for 4 counters (channels 0-3).

5. CPLD (programmable fast logic).

6. Time-to-digital converter (TMC).

7. USB port (output to PC).

8. 5V Supply Input

- Plug the 5V supply available for the DAQ board into point 8.

- Connect the ethernet cable from the GPS module to point 1, which is the ethernet slot next to the PMT inputs. Place the GPS antenna at a window with a good view of the sky. When the GPS module flashes green with no red night, then it has fixed onto a satellite. This could take up to an hour. While the GPS has not fixed a position, the red LED on the GPS module will flash. Once a position has been fixed, the green LED on the GPS module will flash. In both cases the number of flashes corresponds to the number of sattelites currently being used. You can also check the GPS status with the DG command through Hyperterm (see the worksheet 'Using Hyperterm').

- Plug the signal wires from the counters into inputs at 4.

- Plug the board into a USB port on the computer from point 7.

Make sure everything is plugged in and you are ready to detect cosmic rays!