

Abstract Submitted  
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**Waveform digitizing electronics for time-of-flight detectors<sup>1</sup>**

OLIVIA DICKENS, Howard University, MICKEY CHIU, Brookhaven National Laboratory — Cosmic rays are particles which travel through space at nearly the speed of light. When cosmic rays enter the Earth's atmosphere they collide with molecules in the air and produce charged pions; which eventually decay into muons. The experiment that I assisted with at Brookhaven National Laboratory used the muons produced from cosmic ray interactions to test the timing resolution of a cost efficient time-of-flight detector. The two detectors used were a Multigap Resistive Plate Chamber (mRPC) and a Microchannel Plate Photo Multiplier Tube (MCP-PMT). My portion of the project focused on the effect the electronics had on the timing resolution between the mRPC, MCP-PMT, and the data acquisition program for each. This was done by using a pulse generator to send signals through a cable to the wave form digitizer electronics. The timing difference between the signals was used to determine the amount of time the electronics added to the overall timing resolution of each detector. Based on the collected results, the root-mean-square value for the timing resolution was 22.89 picoseconds, which is too slow for the digitizing electronics to be used for an efficient detector.

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