MWPC Drift Time Studies

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Outline

Drift Time Studies

- Experimental Setup
- Measuring the Drift Time
- Results

Drift Time Studies

What is the time it takes for ionized charge to reach the anode for a given gas mixture?

The different gas mixtures tested:

1. Ar:CO_2 in an 80:20 ratio
2. Ar:CO_2 in a 90:10 ratio
3. Ar:CO_2:CF_4 in a 88:2:10 ratio

Cosmic rays were used as the ionizing source for these tests.

Experimental Setup

- NaI PMT
- MWPC
- Coincidence Trigger
- ScopeOut

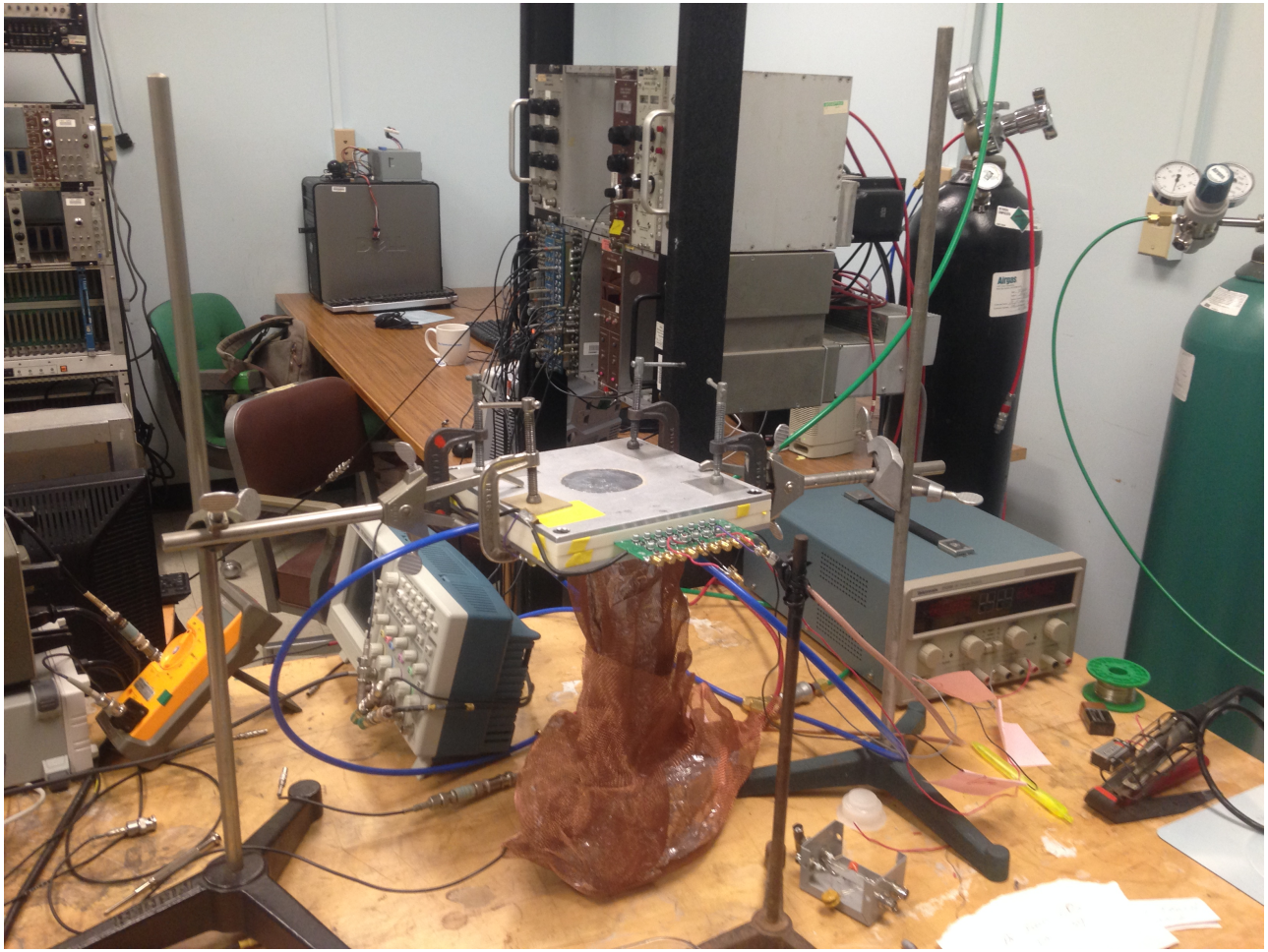


Figure 1: MWPC suspended above PMT

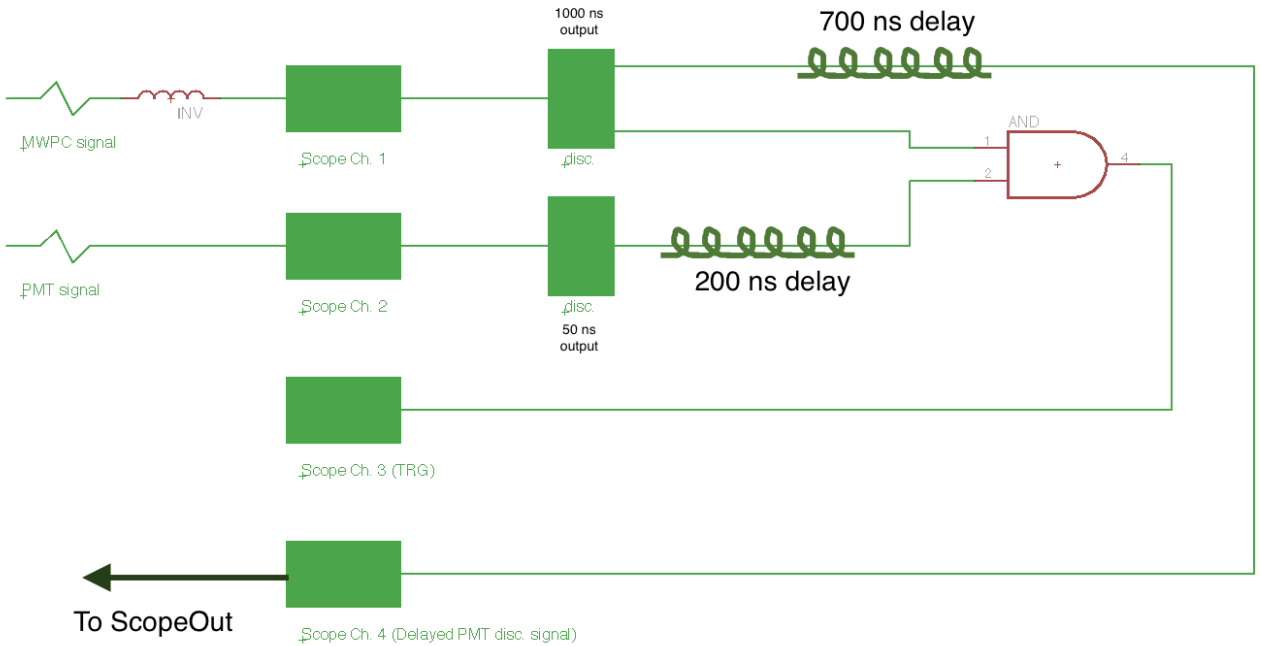


Figure 2: Trigger Logic

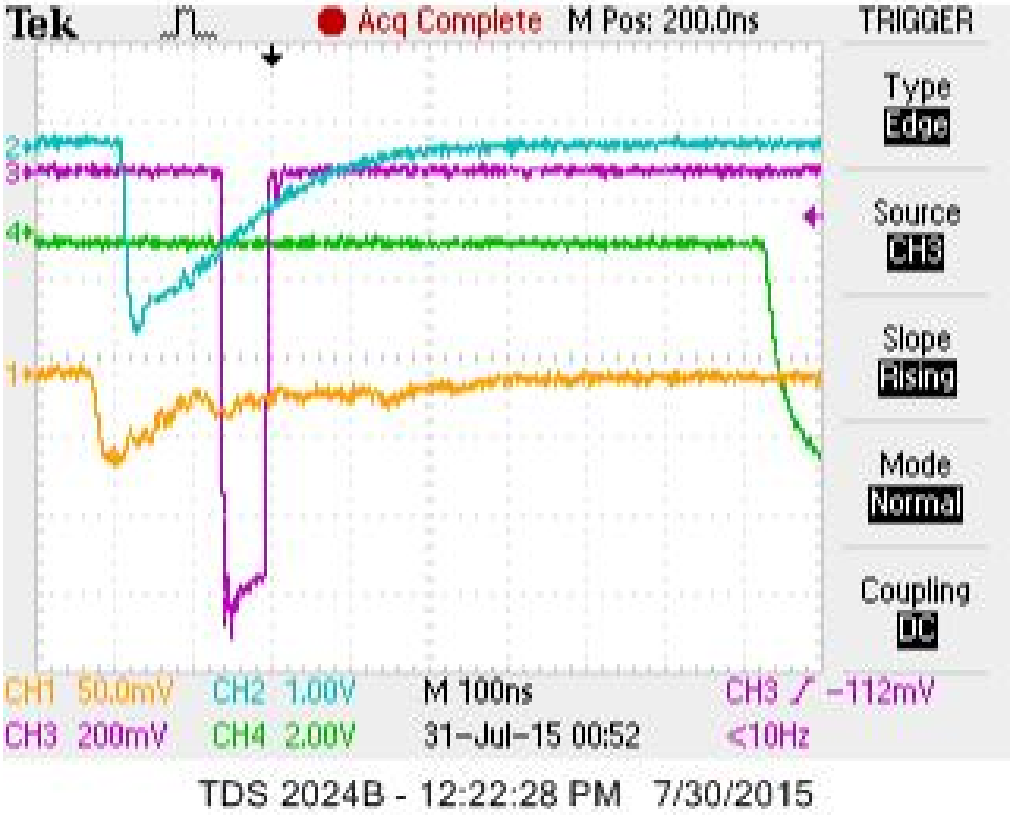
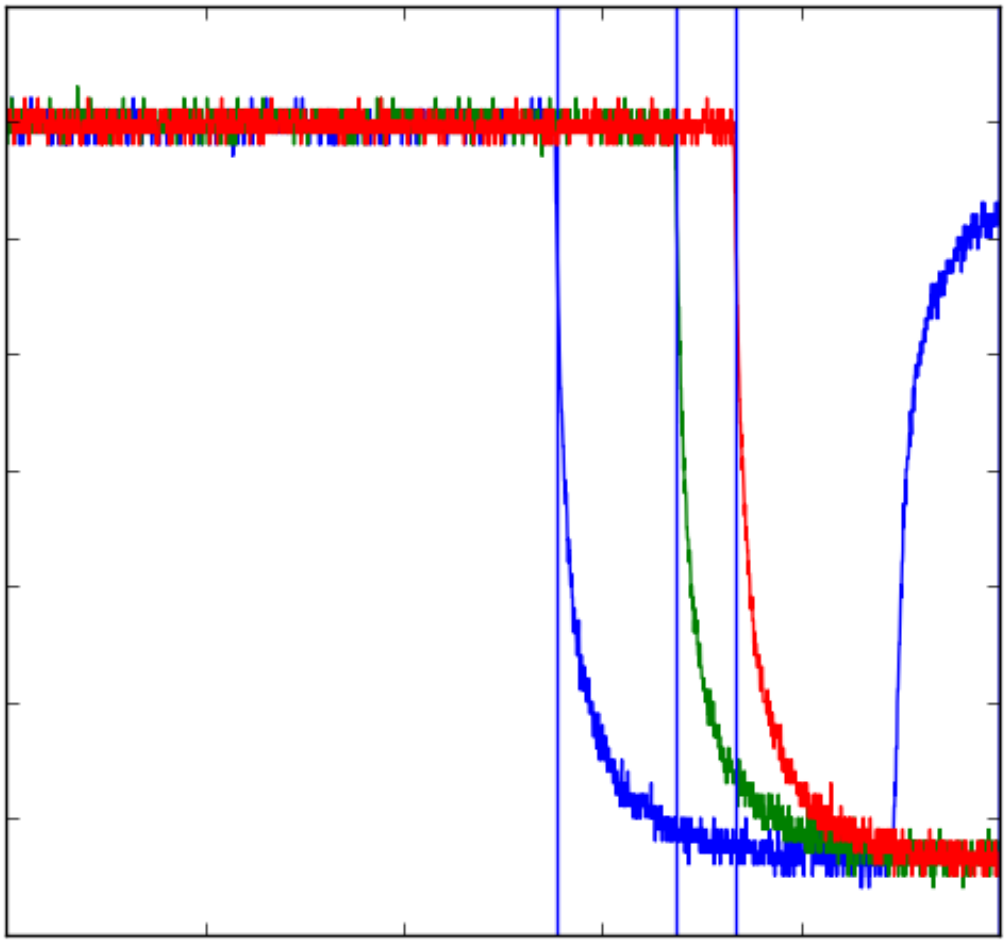


Figure 3: Scope capture of the 4 channels.

Measuring the Drift Time

By measuring the spread in the delayed PMT signal's arrival, we can extract the drift time.

MWPC Studies



MWPC Studies

The voltages to achieve 10^5 gain for the gas mixtures tested:

1. $Ar:CO_2$ 80:20 @ 2000 V
2. $Ar:CO_2$ 90:10 @ 1800 V
3. $Ar:CO_2:CF_4$ 88:2:10 @ 2100 V

Results

MWPC Studies

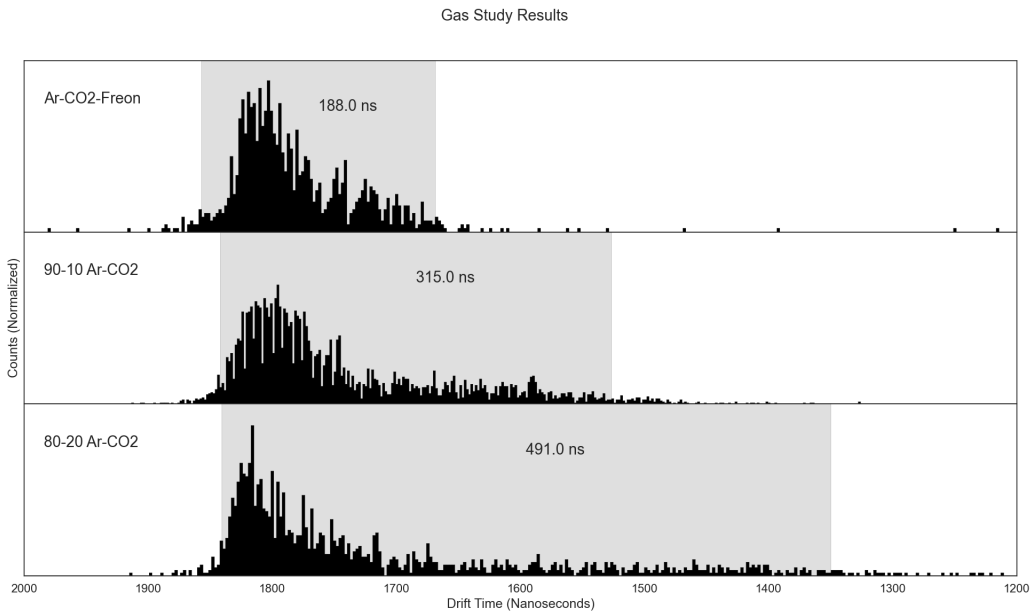


Figure 4: Drift time for the three mixtures.

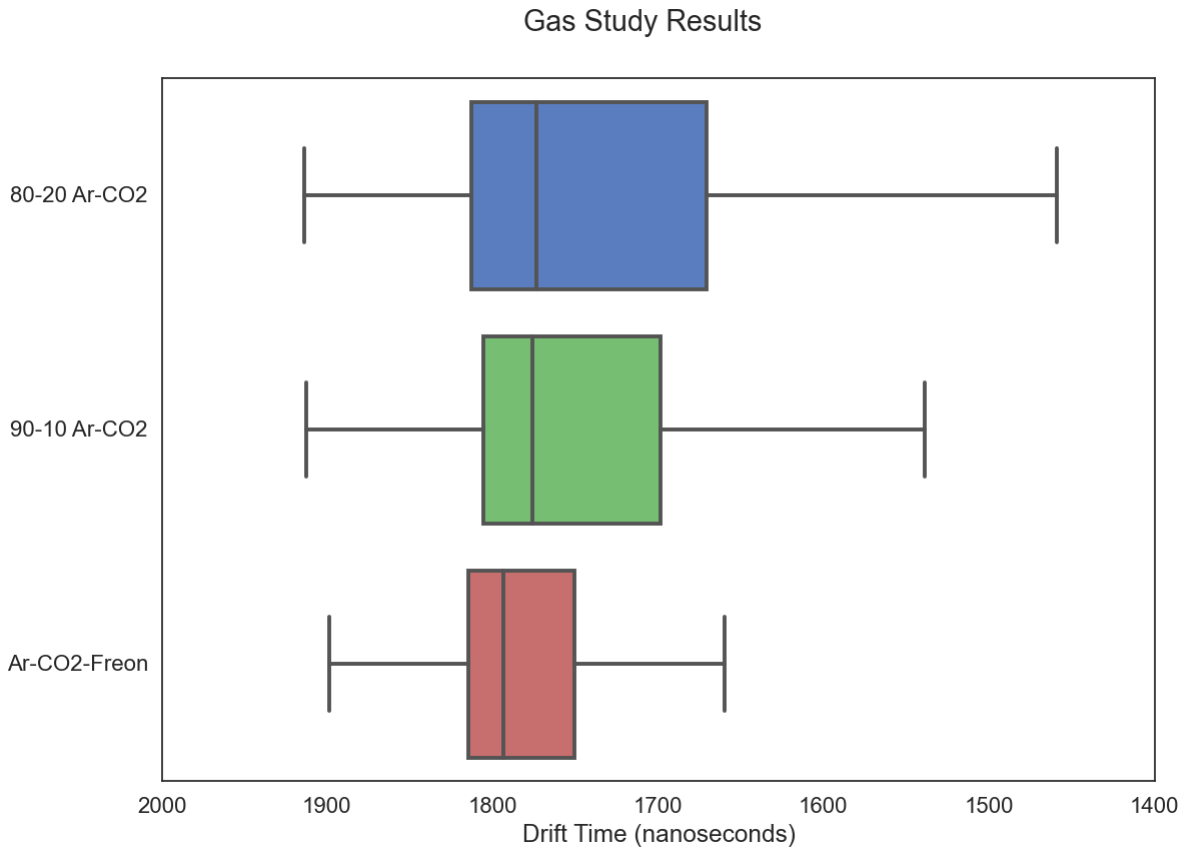


Figure 5: Box and Whisker plot