Determining speed of electron drift in argon gas

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To determine the speed of electron drift, we used detector as shown on fig. 1. Distance between every two detectors is known.

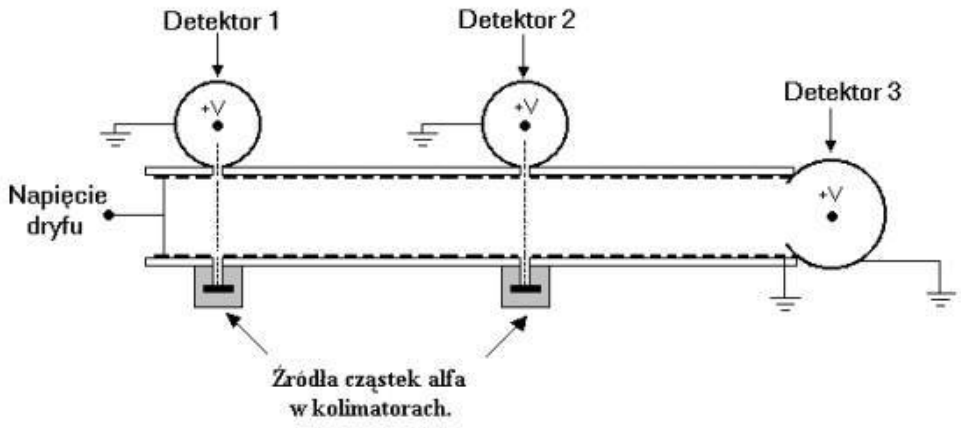

Figure 1: Blueprint of used detector. Ignore the polish text, this part isn't too relevant.

A measurement can be made between detectors 1 and 3 or 2 and 3. However to stay in the region of homogeneous electric field, we will later use both available paths to determine the speed between detectors 1 and 2.
The gas used is a mix of 87% argon and 13% carbon dioxide. This and other information, like expected models, are irrelevant for coding so let's not waste time talking about it.

An exemplary measurement was shown on fig. 2. First peak (blue) corresponds to electron creation, second one (red)–to detection on detector 3.

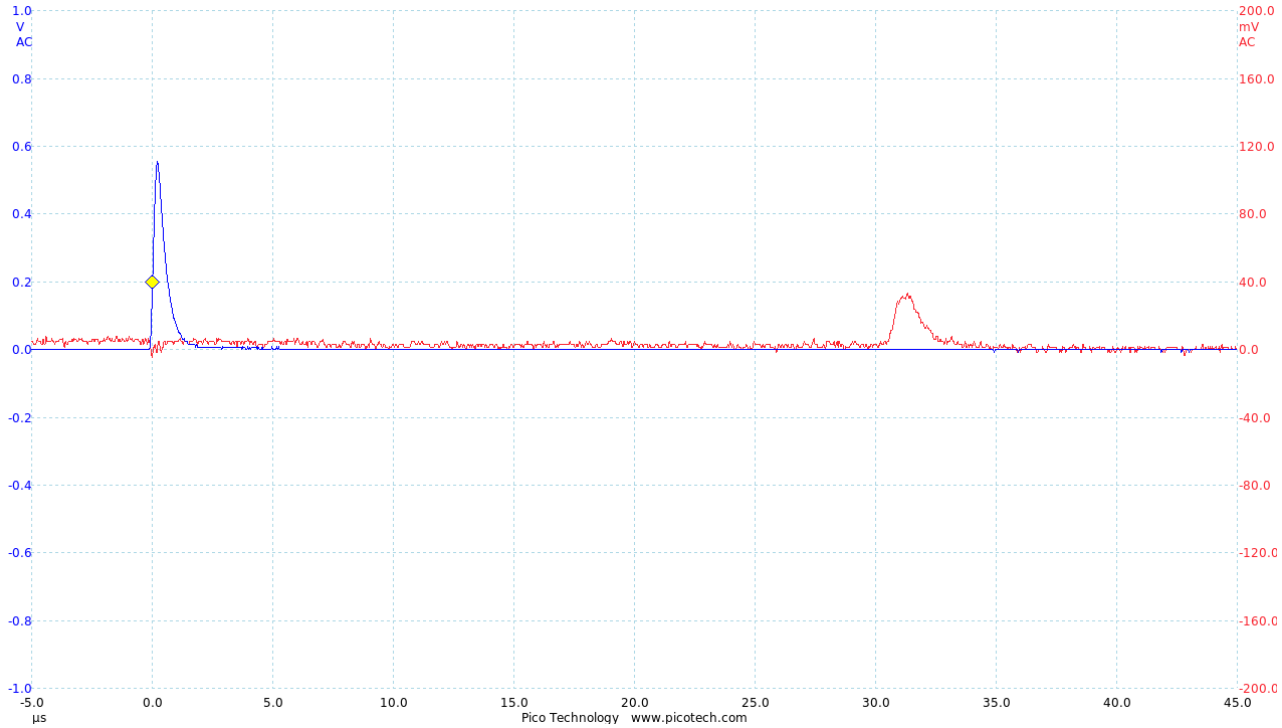

Figure 2: Example of a single measurement. y axis - voltage, x axis - time

To determine the speed of drift we should now find what time has passed between electron creation and detection, and divide distance by it. The easiest method would be to find the time between maximum points of both peaks, however it is not a precise one. To find the velocity with smallest error possible we will do the following.
To each peaks left slope we shall fit a straight line. Next we will find the points at which those lines meet the mid value lines (straight lines described by equation y=const. where const.= peaks max value divided by 2). The time between points found this way is the time we were looking for in the first place. Whole process has been shown on fig. 3.

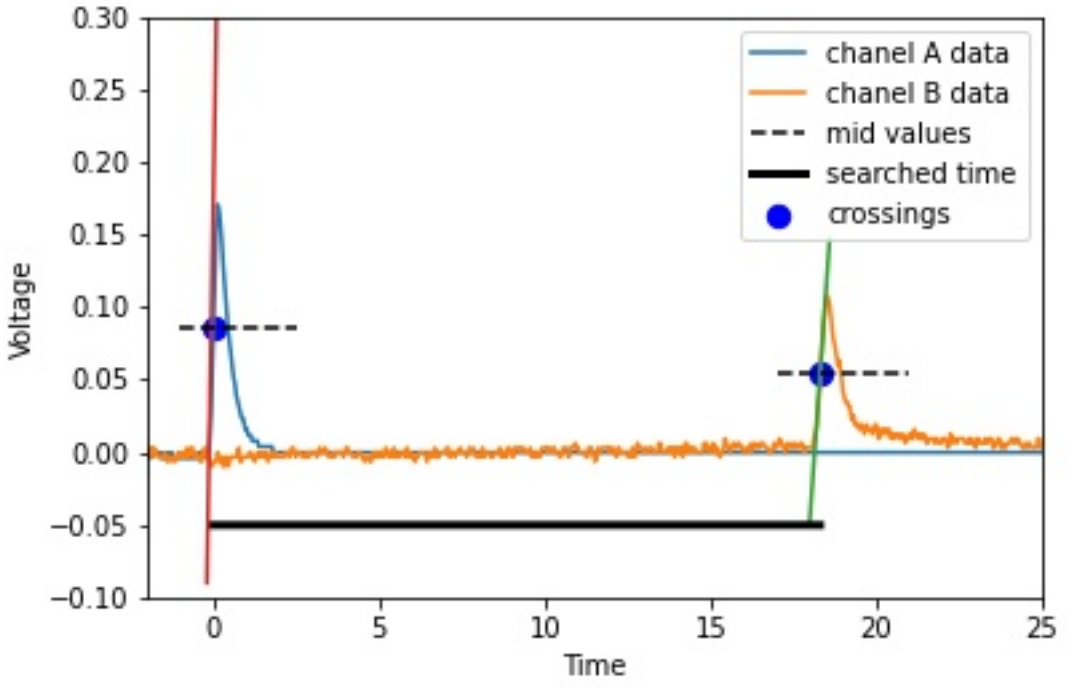

Figure 3: Depiction of analysis process. Chanel A/B is the data from detectors. Red and green lines are the lines fitted to peaks' slopes.

A total of 25 voltages were used on 2 paths respectively (between detectors 1 and 3, 2 and 3). For every voltage a series of 20 measurements was taken. This means there is a 1000 measurements to check, hence the need for programming. The greatest flaw of such code is that it won't run without the data, which is too big to upload to github. So if you wish to see the results, send an email and I'll try to provide the data.