Experiment 1
Electrostatic potential

Introduction

- Begin with experiment’s objectives
- Give physical background:
  - Describe investigated/used phenomena e.g. Gauss’s law,

  field lines, equipotential lines.
  - Do not copy text from a textbook/manual
- Provide equations *you used*
  - Identify all symbols

Method

- List all equipment used
  - Provide parameters as detailed as possible: masses, frequencies, etc.
- Report what YOU DID to achieve experimental goals:
  - Do not use *imperative clause*
  - Use *first person narrative* or *passive voice*
- Based on this section you should be able to reproduce your results without a manual

Results:

Part I

- Linearized equation: provide all parameters e.g. variables, slope, intercept, etc.
- Linear graph: add trendline, provide fitting parameters (slope, intercept)
- Give values A and B obtained from the graph and measured directly
- Use Linest to find uncertainties

Part II

- Provide graph from the template
- By hand draw field lines, show charge distribution, etc.
- Provide the explanation, calculations, answer questions in Discussion.

Results: general requirements

- Should be a *coherent* text
- Present all data and calculations with words. Examples:
    - “Row data for free-fall acceleration measurements is given by Table 1.”
    - “In order to find the acceleration we plot doulbed distance as a function of time squired as is shown by Figure 1.” or “To find the acceleration we linearize Equation 1 as $d(x)=ax$, where $x=t^2/2$ and plot it on Figure 1”.
    - “The slope of the graph corresponds to the acceleration and can be found along with the uncertainty using LINEST(see Table 2)”
    - “The uncertainty in distance is calculated as $\delta d=\delta x+\delta y$”
    - “Finally, the acceleration due to gravity is $9.81\pm 0.03\ m/s^2$ ”
- All figures and should have label and caption (e.g. “Figure 1: position as a function of time during free fall”).
- Use scientific notation (10^3, not 1E3) and appropriate significant digits

Results: graph requirements

- Use scatter plot
- Do not use gridlines
- Axis should have labels with units
- Add trendline as dashed line
- Add trendline equation
- Title is not necessary
- Label and caption are necessary
- Change axis limits to center the data

Example of a graph

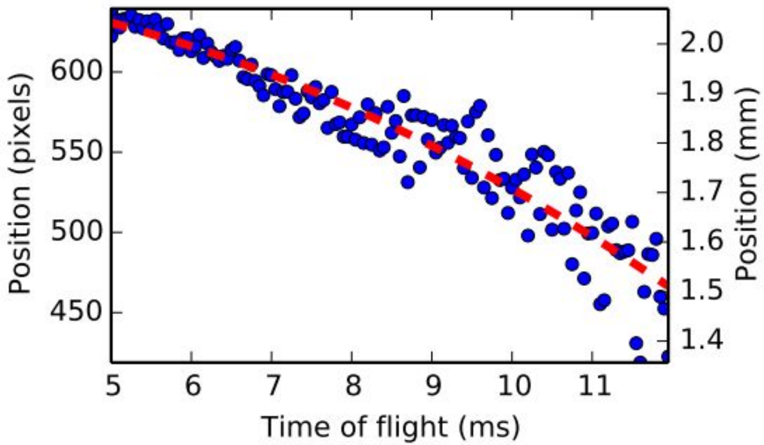

Figure 3.11: Position of the center of mass of the cloud released from a magneto-optical trap as a function of time. The dots correspond to the measured data, while the dashed line represents a quadratic fit. We start measuring at 5 ms of the flight, since this is how long it takes to open a shutter for the imaging beam. The acceleration is found to be -3000000 ± 700000 pixels/s^2, which gives an effective pixel size of 3.2 ± 0.8 μm.

https://sites.ualberta.ca/~ljleblan/tretiakov_mscthesis_2016.pdf

Discussion

- Compare your values from Part I with each other. Do they agree with error?
  - x agrees with $y \pm \delta y$ within error if $y - \delta y \leq x \leq y + \delta y$
- Explain any discrepancies
- Answer all questions from Part II

Conclusion

- Should be self-sufficient (makes sense without the rest of the report)
- Briefly describe what was investigated and found
    - Don't forget to include $A \pm \delta A$, $B \pm \delta B$ and say if it agrees with expected values
- Identify any difficulties