

Lab 3: Applied & Induced Charge Distributions

Due Date: March 04

Challenge

Devise *two* ways to measure the charge on a metal ball.

Available materials:

aluminum foil	string	grounding wires & wrist strap
rod + fur scraps	protractor	your phone's camera
ring stand with clamps	mass scale	charge sensor
metal pail & metal cage	ground plate	<i>Logger Pro</i> software

Technical details

Before attempting to measure the charge on a metal ball, familiarize yourself with the Vernier equipment and *Logger Pro* software. For example, measure the net charge created by rubbing a rod against fur.

Lab report considerations

Include a computation of the ratio of the ball's net charge to the total charge due to electrons in the ball. [No uncertainty needed here in your calculation!]

For this lab you should compute the *error* on the metal ball's charge as the percentage difference for the two experimental techniques. The lab report should state the *average error* along with its *uncertainty*, where the *uncertainty* is computed in the usual statistical way that incorporates the standard deviation from N trials. This final result should appear in both the abstract and results/conclusions sections. Note that the individual *errors* do not need *uncertainties*!

In addition, remember that each number throughout the lab report should have an *uncertainty* attached to it, including those presented in tables. Uncertainties can be measured statistically via multiple repeated measurements, or by quantitatively gauging the limitations in the equipment.

A photo of the lab setup must be included (plus a fun AI-generated picture!).

Teacher approval of your game plan

Please get either Prof. Dale or a TA to approve your experimental and theoretical plans. These approvals are worth 4% of the lab grade and help to promote a successful experience.

