

Lab 4: Capacitance

Scenario

You shipwreck on a coral reef next to an uninhabited island. Being the brilliant leader of the surviving group, you assert that a good way to flag down a passing ship is to run a large, brief current through some conducting filamentary wire to create a momentary but bright flash of light. So you set out to construct some capacitors with the materials that washed ashore with you.

Challenge

1. Construct three capacitors with paper dielectrics. Measure their capacitances and infer the paper's dielectric constant in each case. Compare the estimated paper's dielectric constant to accepted value(s).
2. Place the capacitors in series and quantify how well the measured equivalent capacitance matches the expected value based on the results from Part 1.



Available materials:

aluminum foil
wooden dowel

paper
multimeter & probes

scissors
tape

ruler
caliper

Technical details

Beware measured capacitances of 1nF, as this is the lower limit of the multimeters' abilities. Multiple trials should be pursued.

Lab report considerations

Use the dataset to report both an average *error* on the estimated dielectric constant and its *uncertainty*. A photo of the lab setup must be included.

Teacher signatures

Please get your TA to sign off on your experimental plan, the pre-lab equipment practice, and the completion of the lab. These signatures will be worth 4% of the lab grade and will help to promote a successful experience.

<https://www.youtube.com/watch?v=WC2sZ5iJ7gQ>

A duck goes into Radio shack to buy a capacitor.

"Charge it?" asks the clerk?

"Nah, put it on my bill." says the duck.

