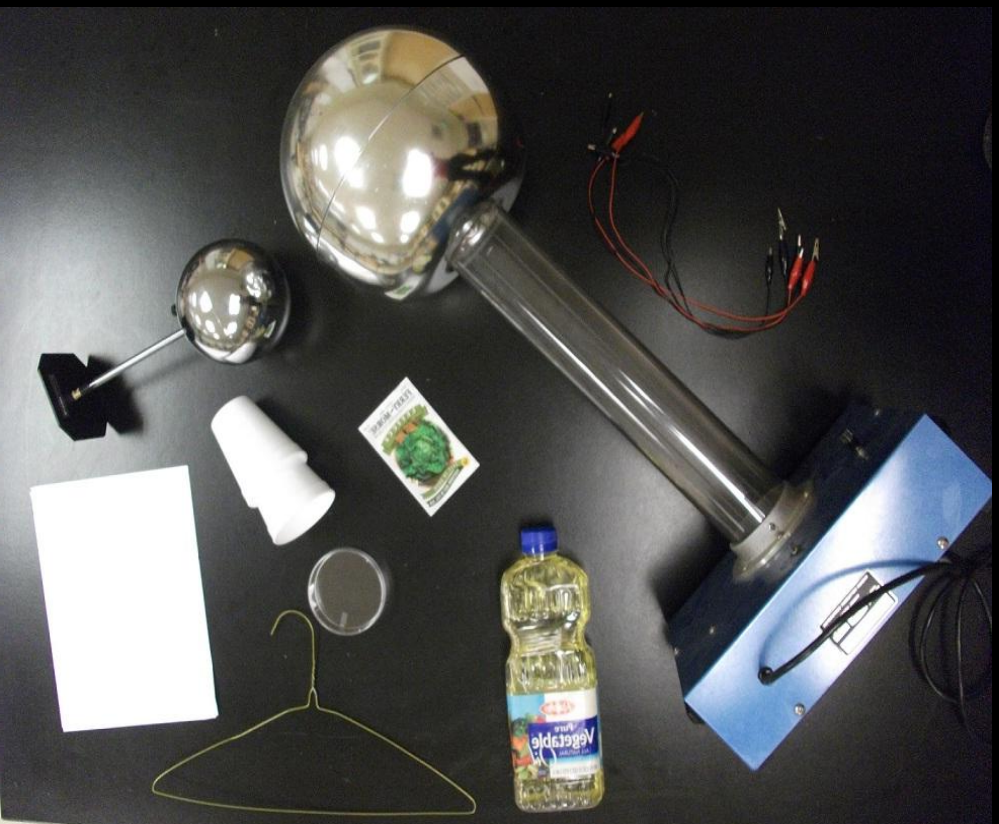
Build Your Own
Electric Field Demonstrator



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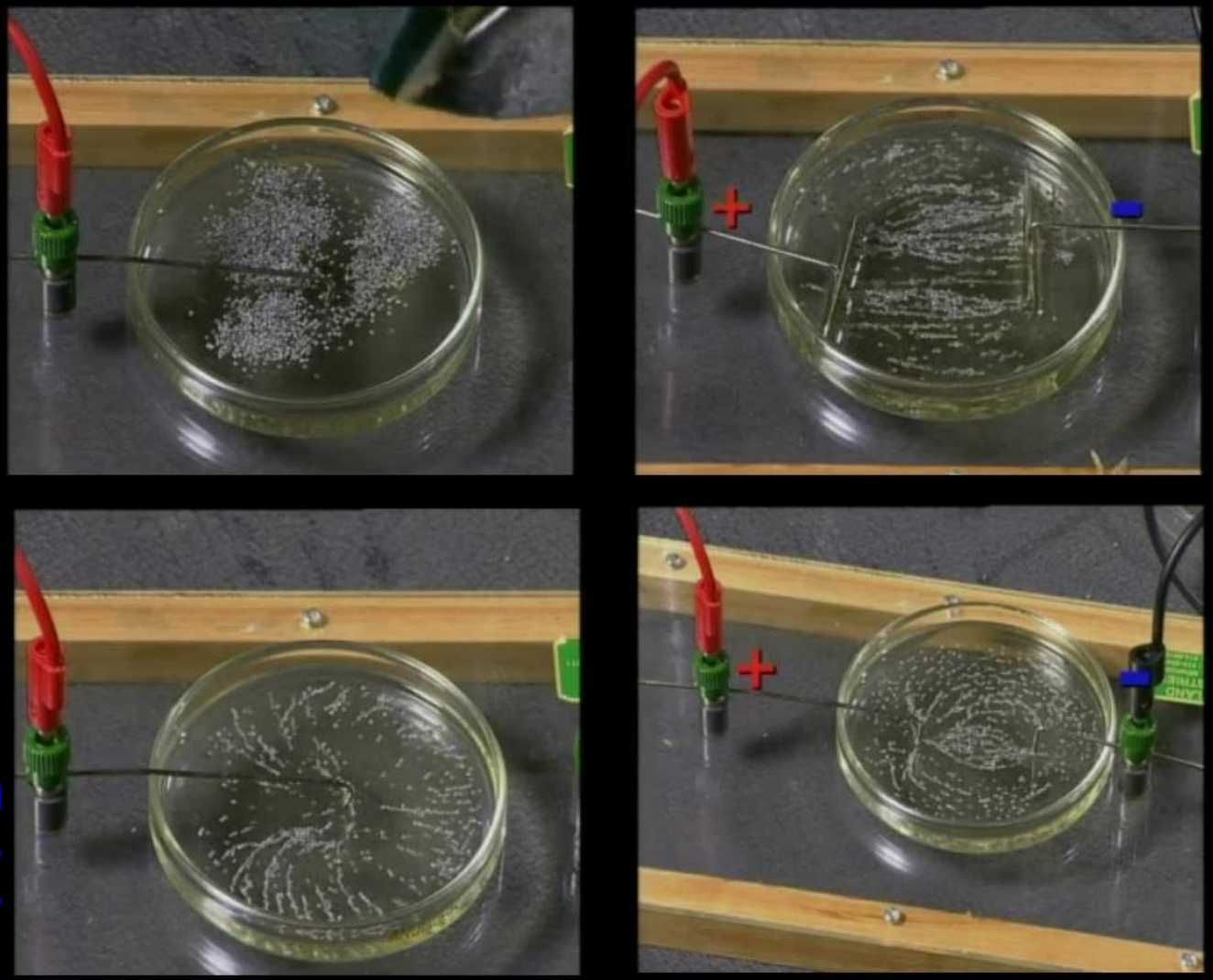
Abstract

I have reviewed some of the methods surrounding the "Grass Seeds in Mineral Oil" Electric Field Demonstration and am advocating for a simpler, user-friendly, inexpensive method that enables a more interactive and engaging demonstration.

I have also focused on utilizing freely available materials so that this apparatus can be produced with likely zero additional cost to the teacher.



Some Grass E-Field Images (these ones are in vegetable oil).

Introduction & Motivation

Despite having taught physics for several years previous, I had neither performed nor witnessed live the Electric Field Visualization Demonstration.

I have long known from text book images and catalogues that such a demonstration existed, but resisted in attempting it because I had thought that the demo involved some fancy equipment or techniques.

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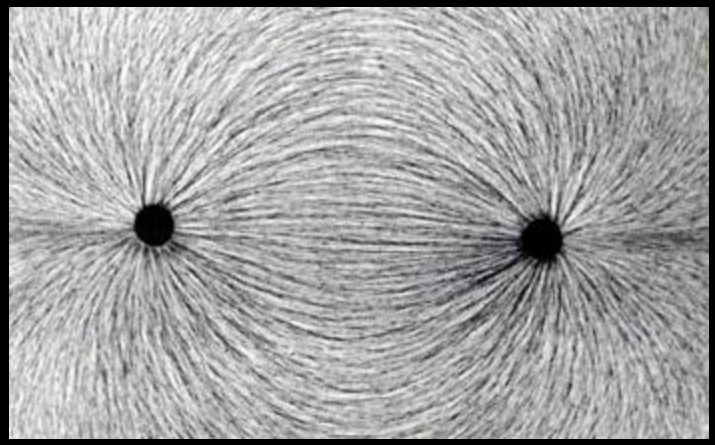
Introduction & Motivation

Upon purchasing one of the E-Field Demonstrators, I found that the demo enriched my instruction and improved my students' visualization of the Electric Field.



I also realized that this exciting demo could have been easily constructed with materials I already had lying around the classroom.

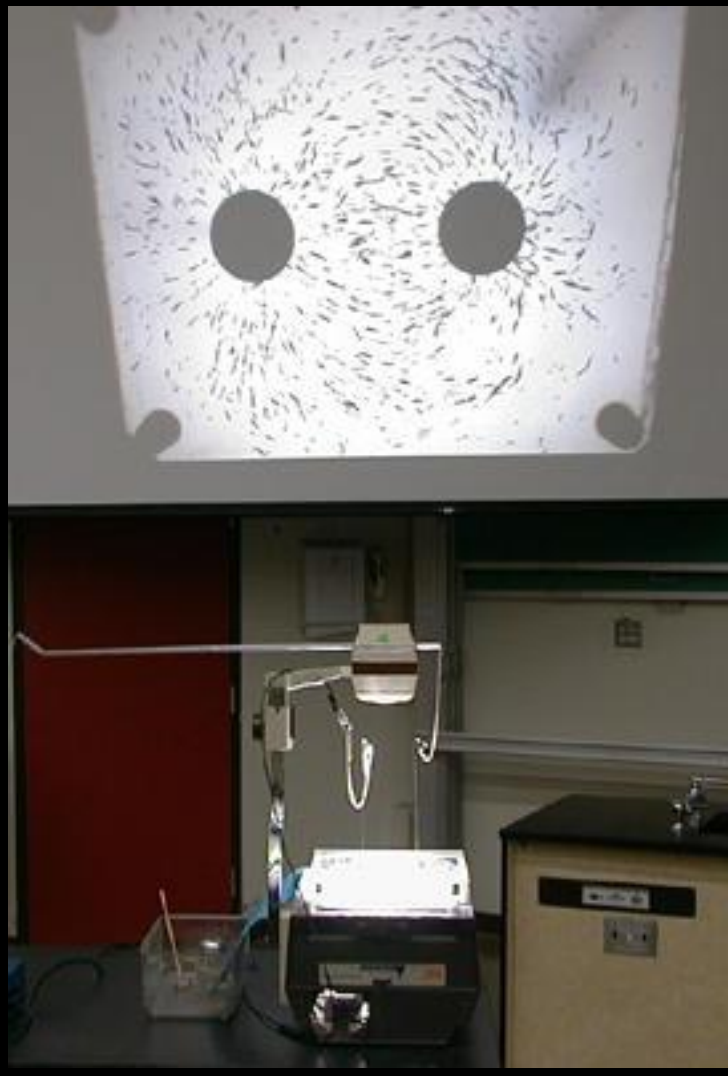
Therefore, with a little advice, I will show that one can easily replicate the same results as the catalogue ordered design.

Also I have some TIPS for how to get the best results.

Past Methods vs. Updated Methods

Past Methods

- *Grass Seeds (grey dots)*
- *Mineral Oil (clear)*
- *HV Source or Wimshurst or HV Gun*
- *Overhead Projector*

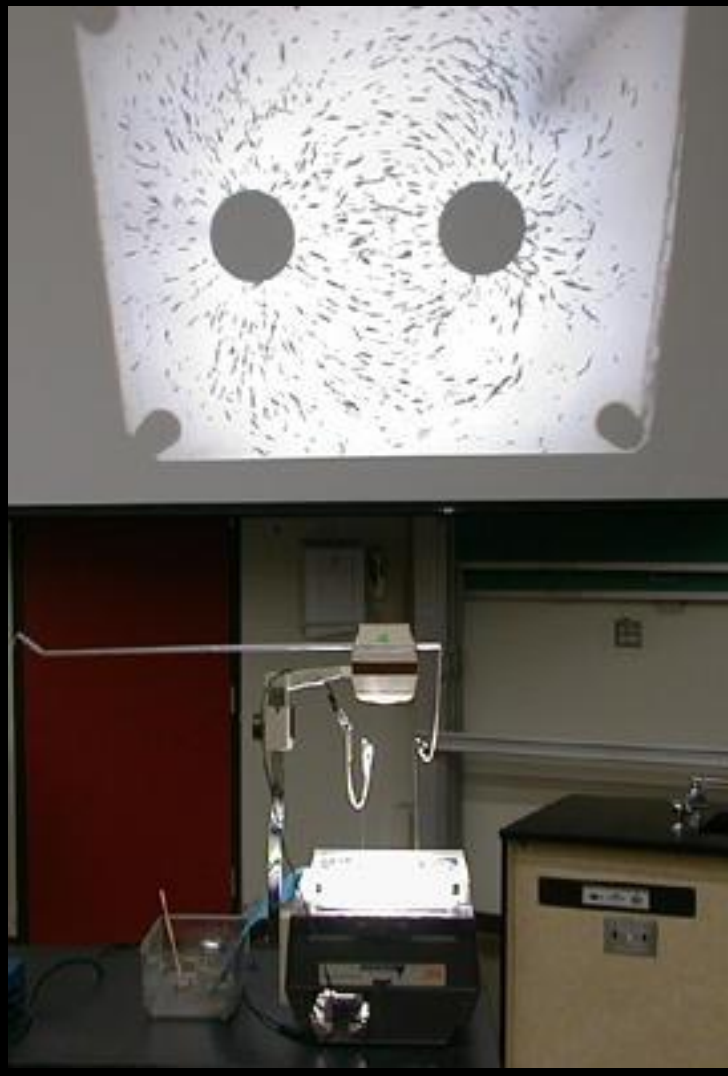


Past Methods vs. Updated Methods

Past Methods

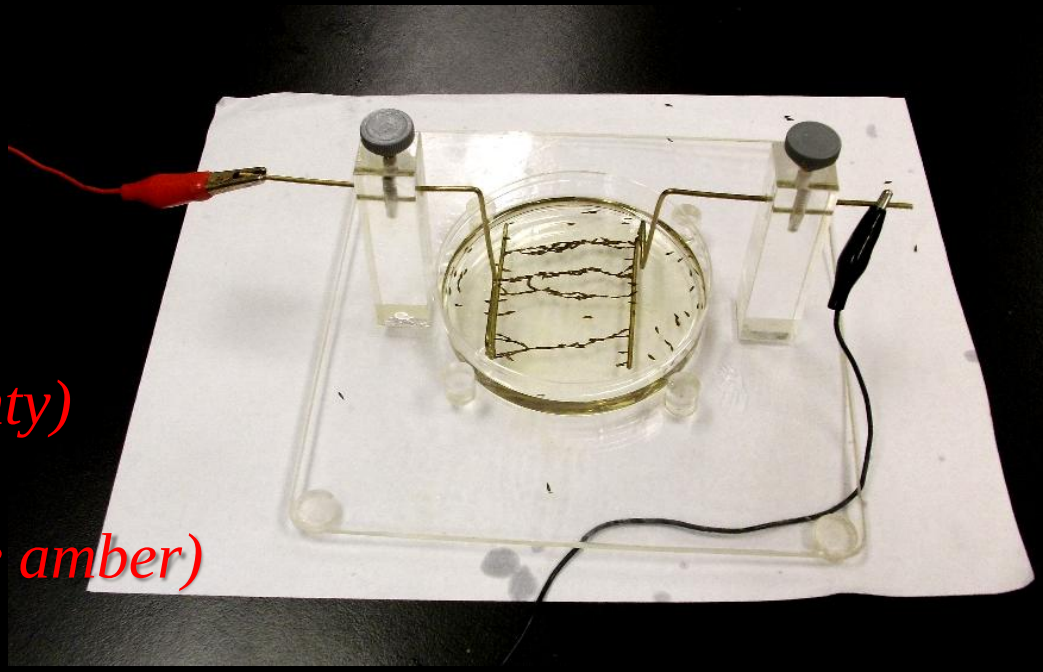
- *Grass Seeds (grey dots)*
- *Mineral Oil (clear)*
- *HV Source or Wimshurst or HV Gun*
- *Overhead Projector*

***RESULT*: A stagnant, clear image**



Past Methods vs. Updated Methods

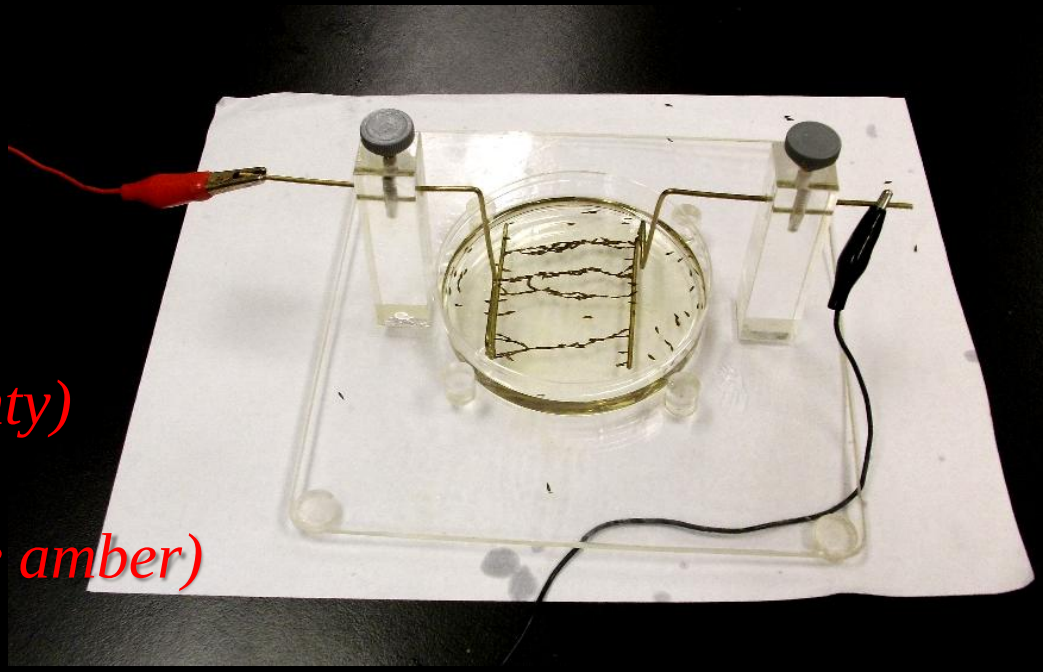
Updated Method



- *Lettuce Seeds (black, pointy)*
- *Vegetable Oil (yellow, like amber)*
- *Van de Graaff or Fun Fly Stick*
- *Microscope Cam & LCD Projector*

Past Methods vs. Updated Methods

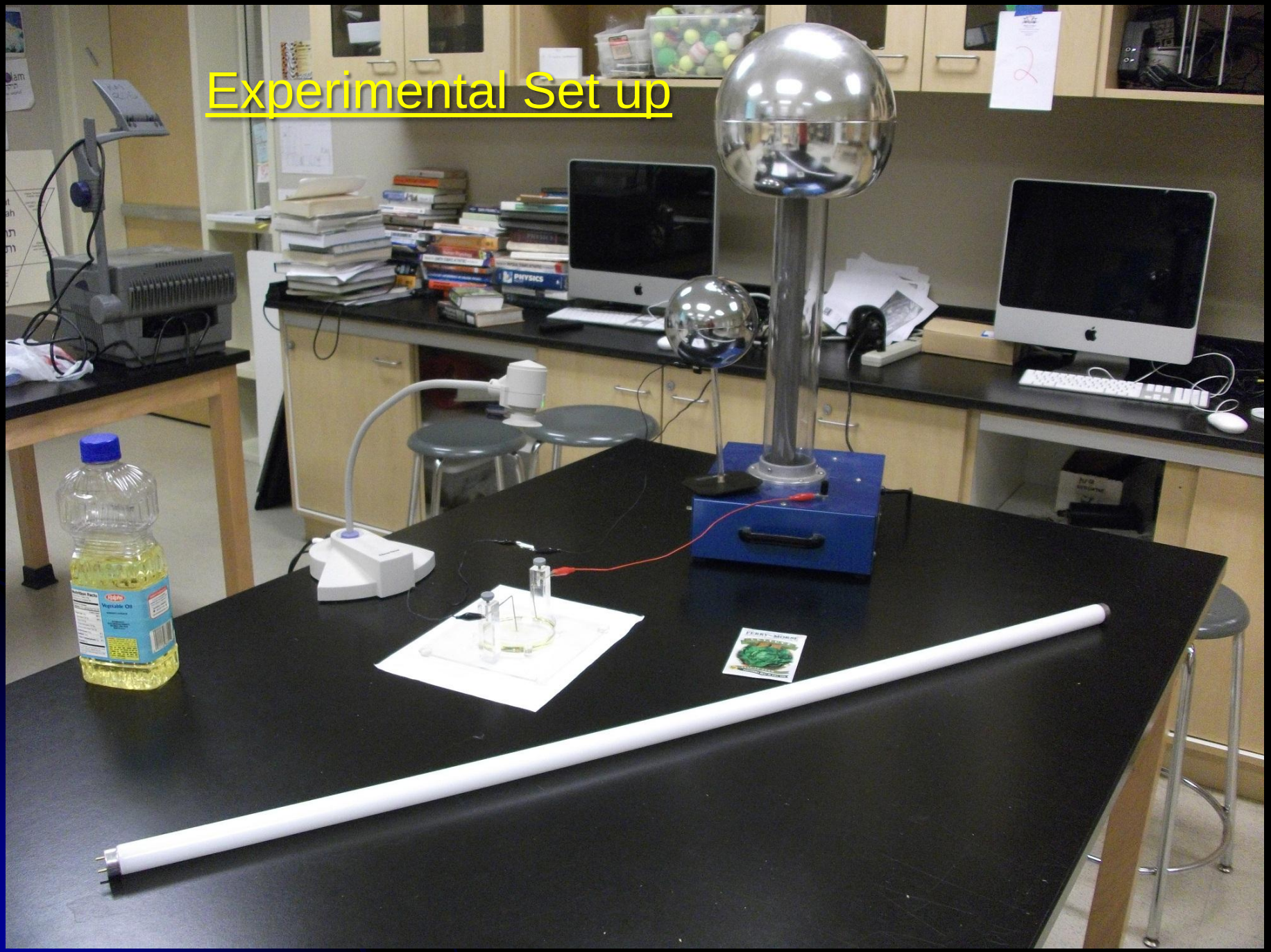
Updated Method



- *Lettuce Seeds (black, pointy)*
- *Vegetable Oil (yellow, like amber)*
- *Van de Graaff or Fun Fly Stick*
- *Microscope Cam & LCD Projector*

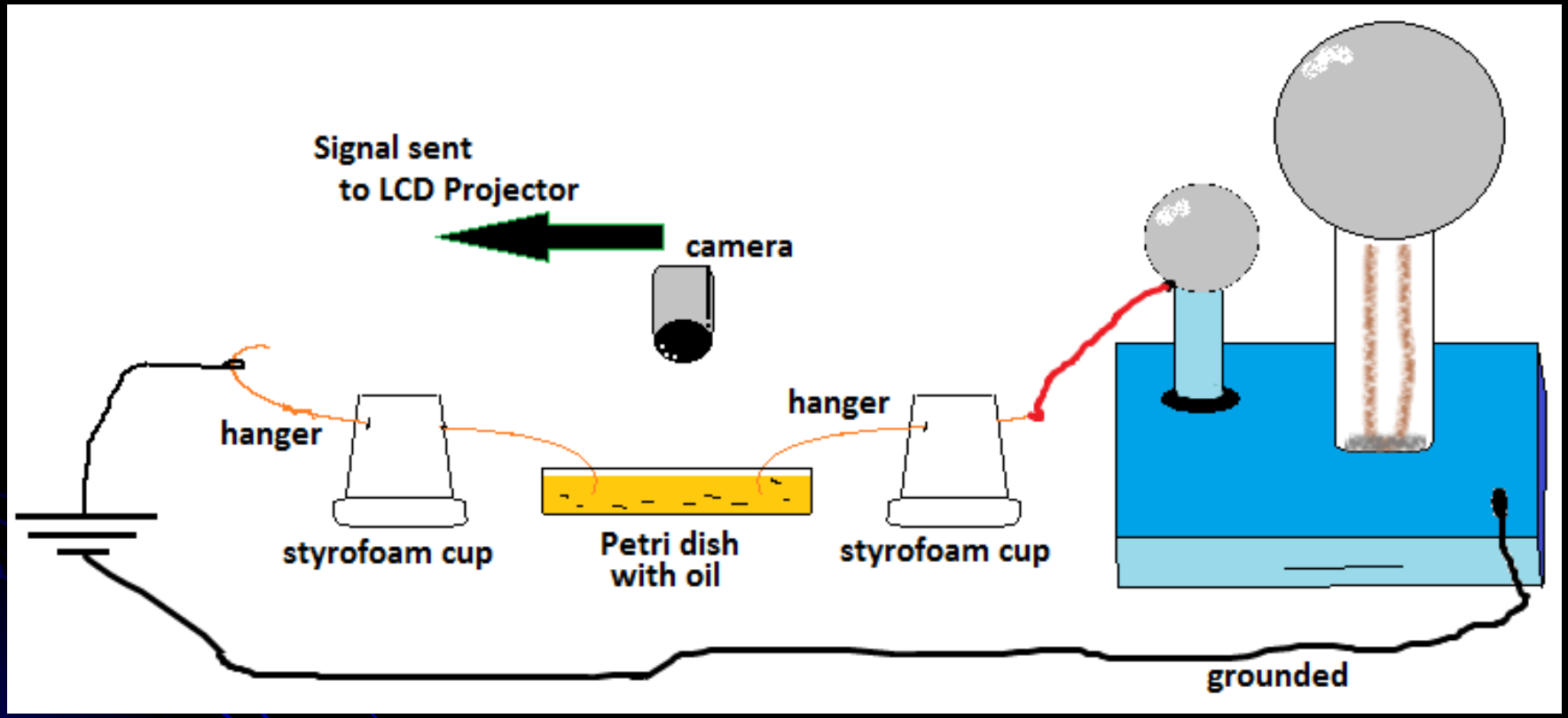
***RESULT*: A moving, interactive image**

Experimental Set up

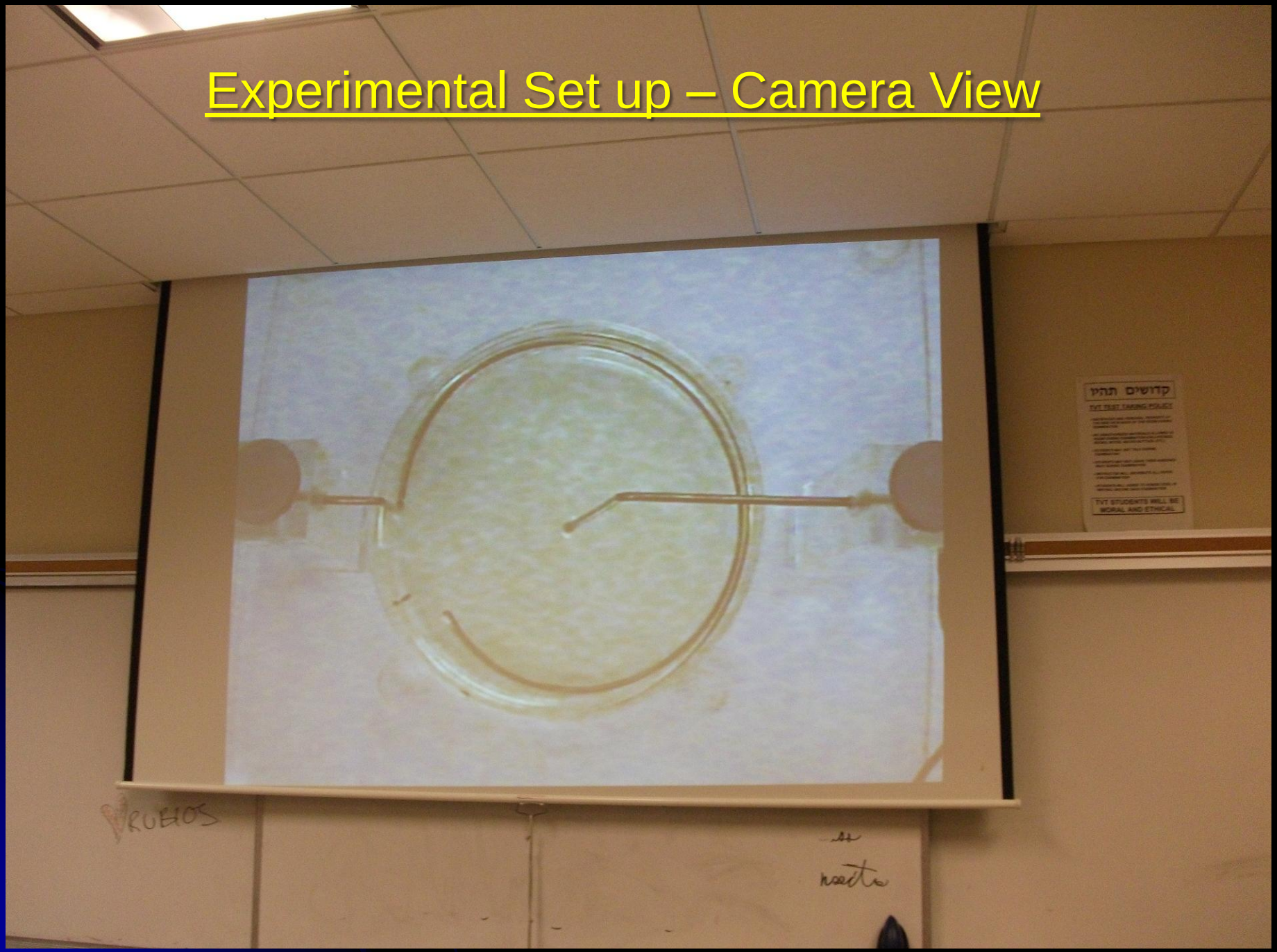


Experimental Set up - Detail

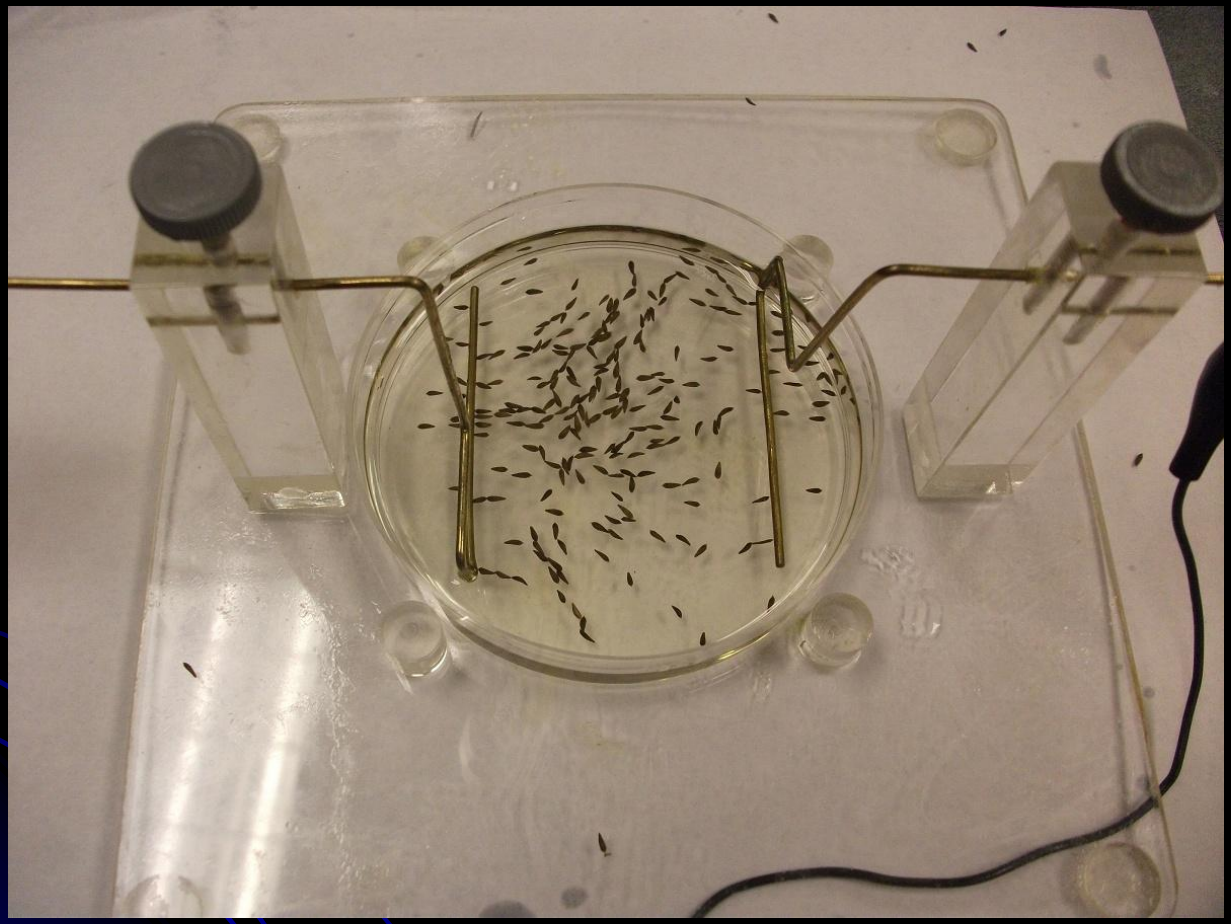
Experimental set up: Home-Made Version



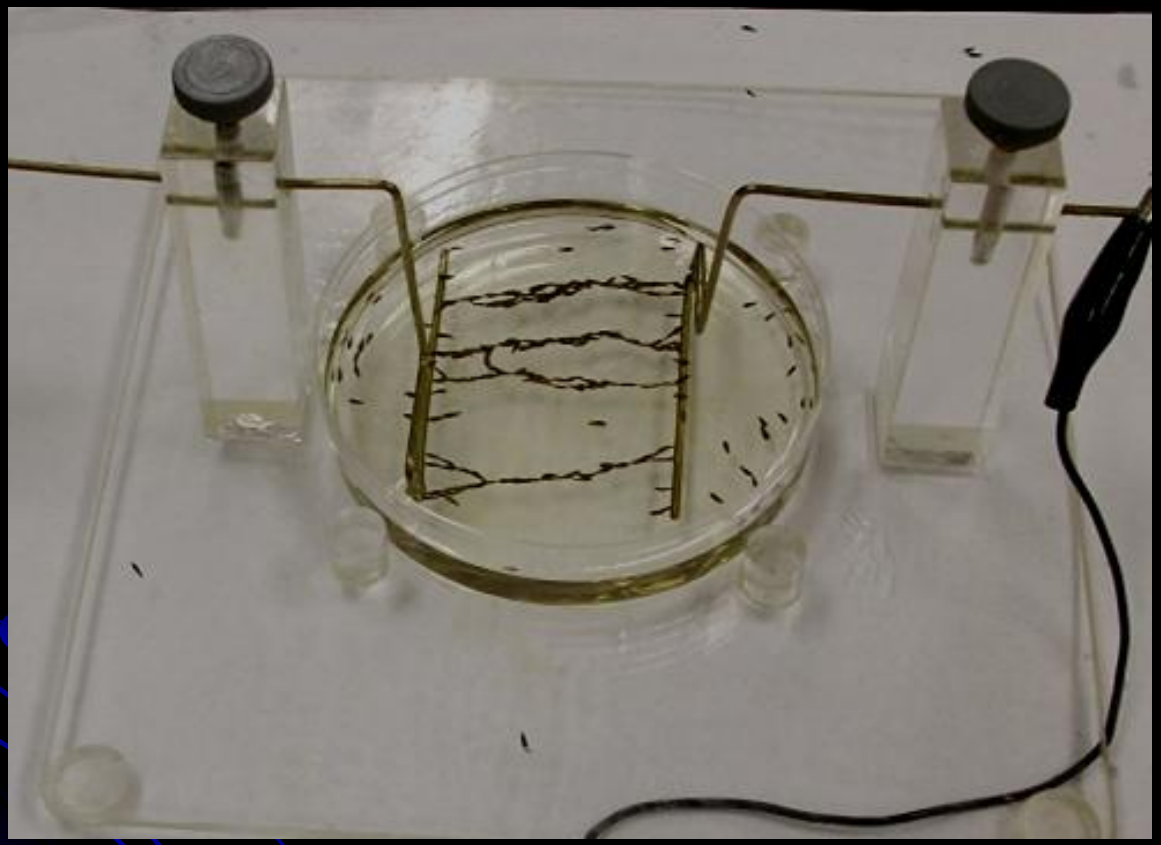
Experimental Set up – Camera View



Examples: Capacitor: Field off

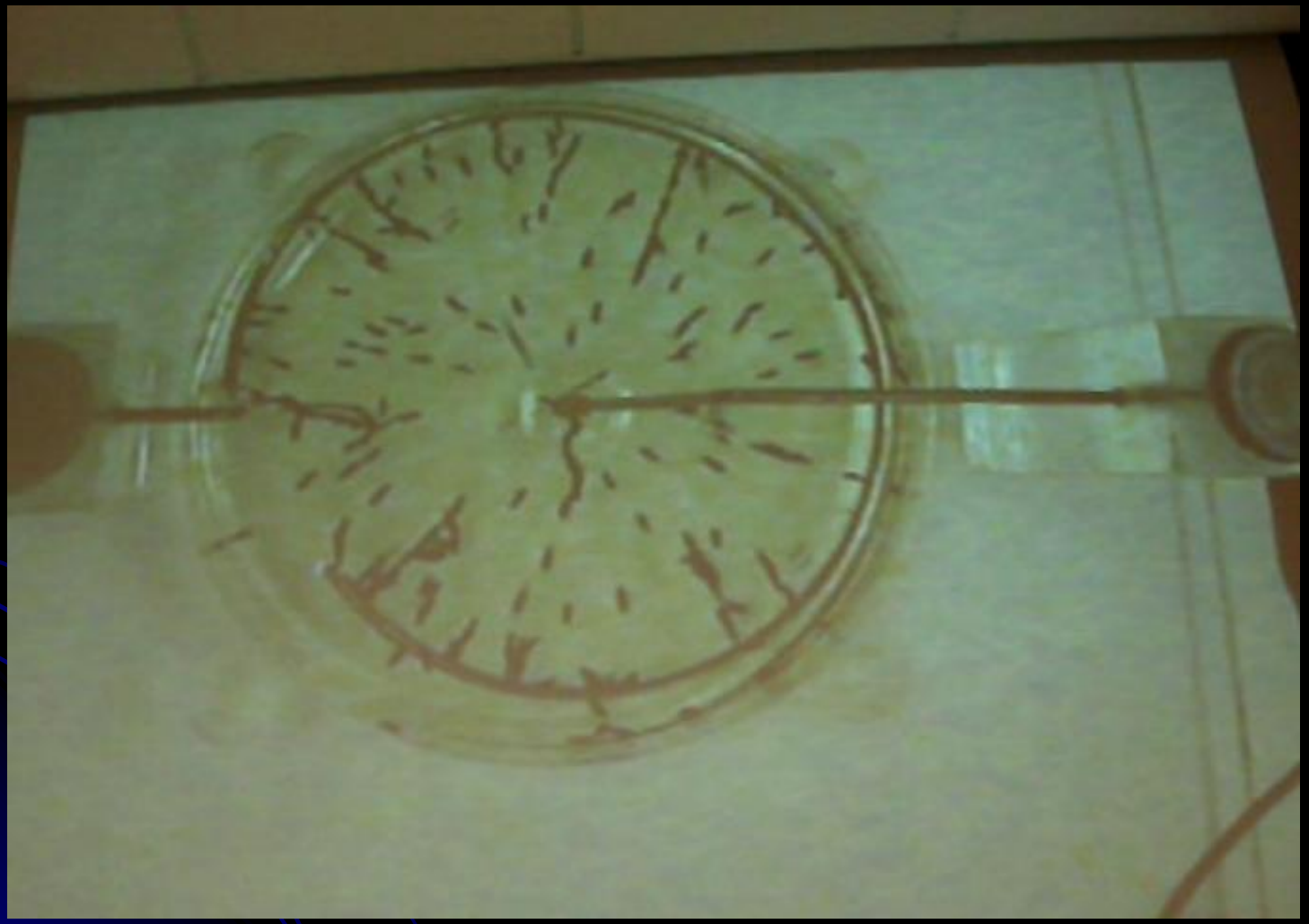


Examples: Capacitor: Field on

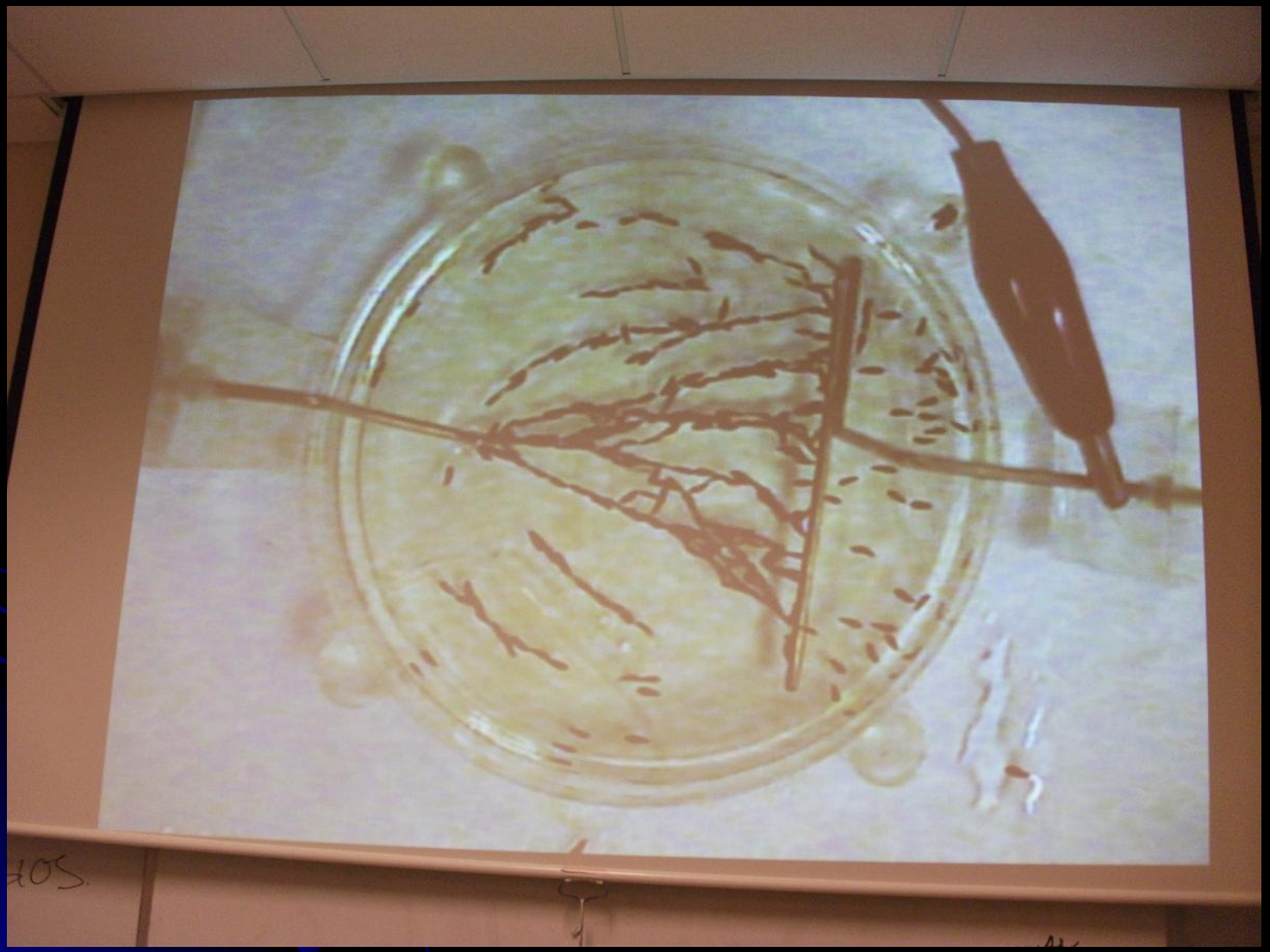


VIDEO: http://youtu.be/q3Gb3RsRmfw

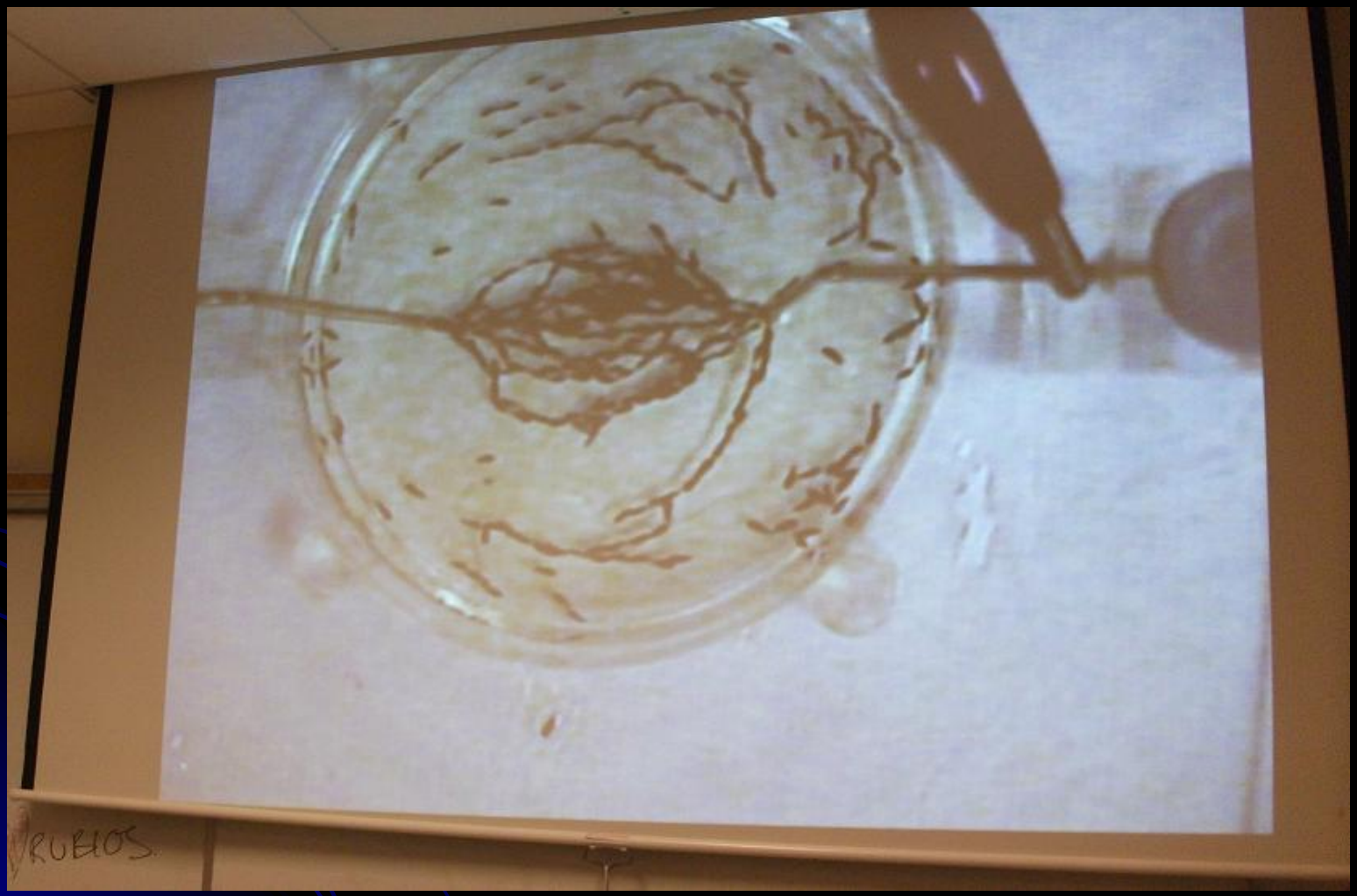
Examples: Monopole



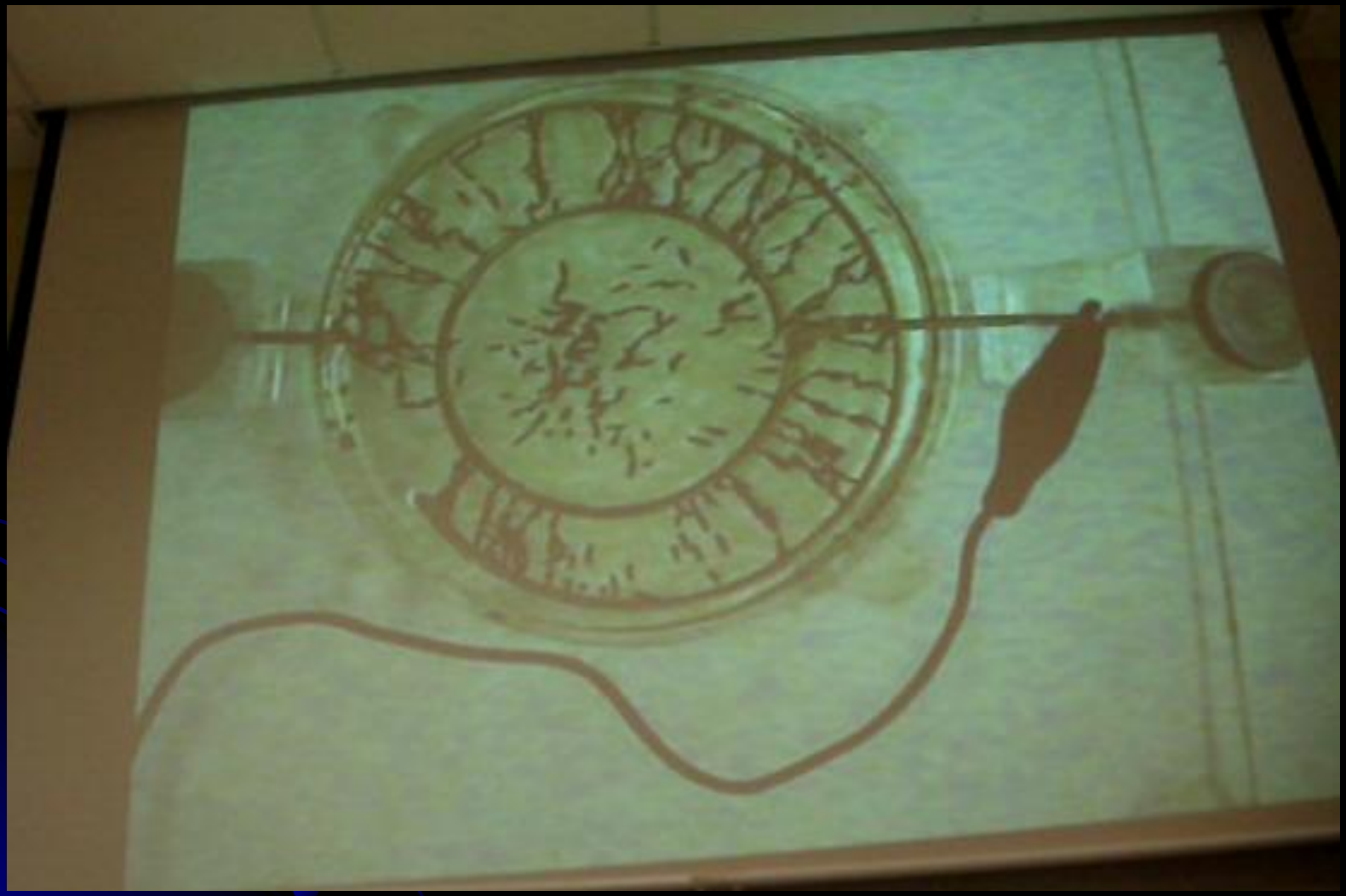
Examples: Pole & Capacitor Plate



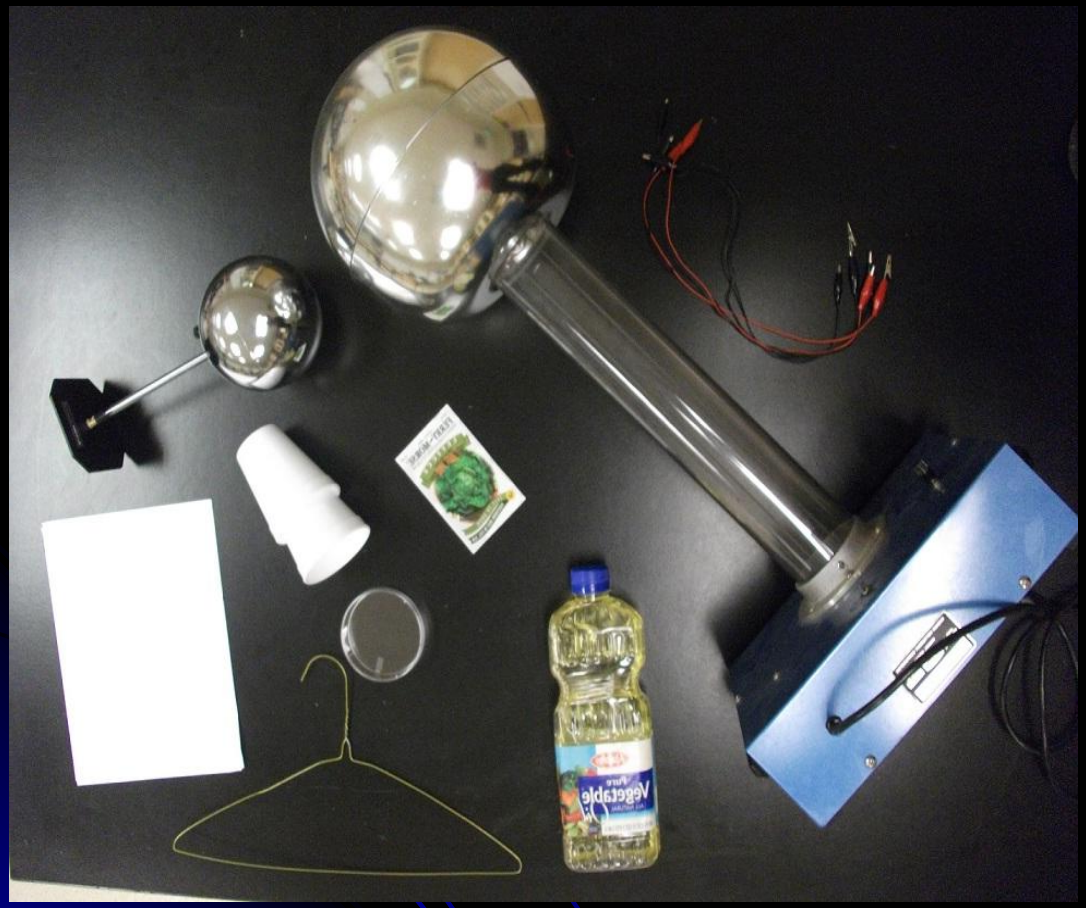
Examples: Dipole



Examples: No E-Field in a Conductor



Making the Home Made Version

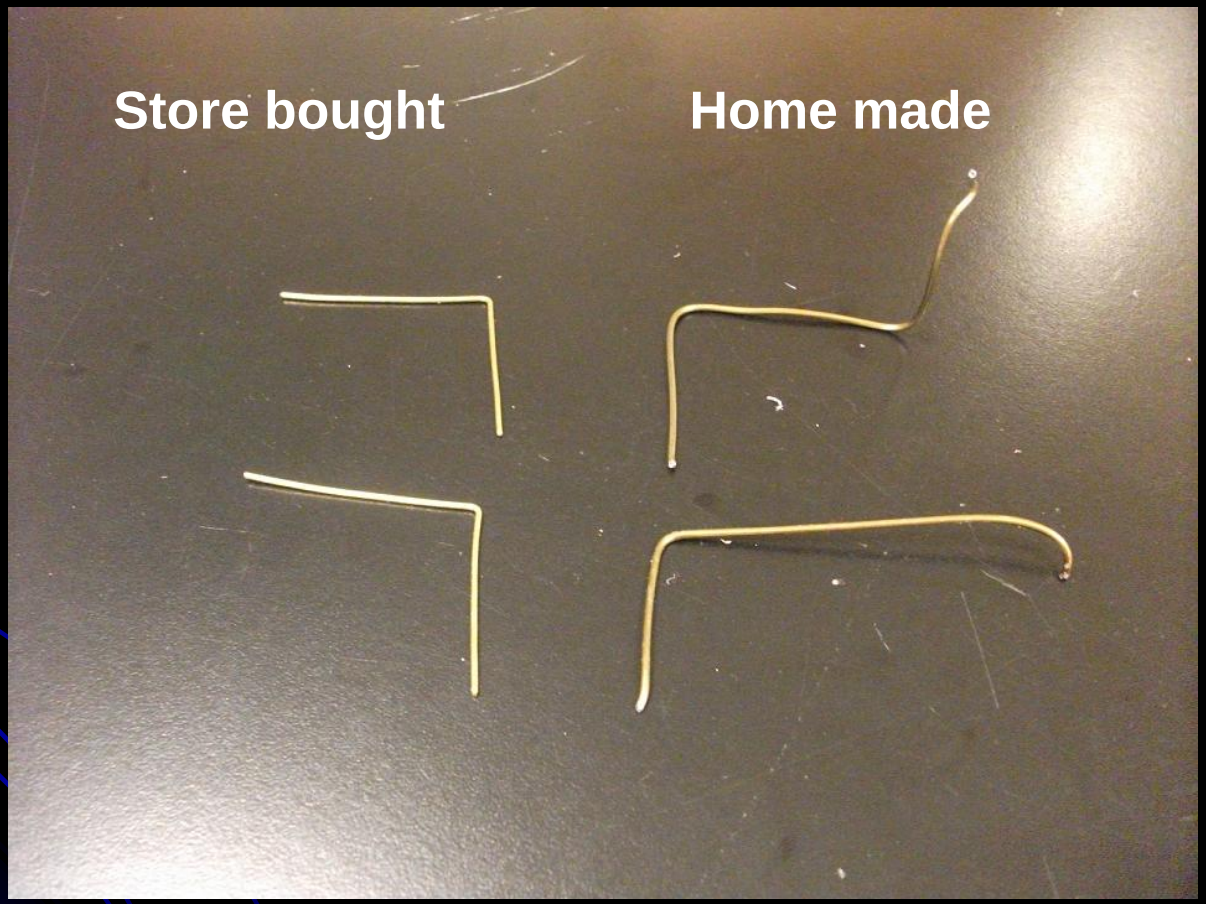


Materials

- *Van de Graaff and clips (or Fun Fly Stick)*
- *Small Grounding Sphere (optional)*
- *Brass (looking) Hanger*
- *Styrofoam cups*
- *Petri Dish*
- *White Paper*
- *Lettuce Seeds*

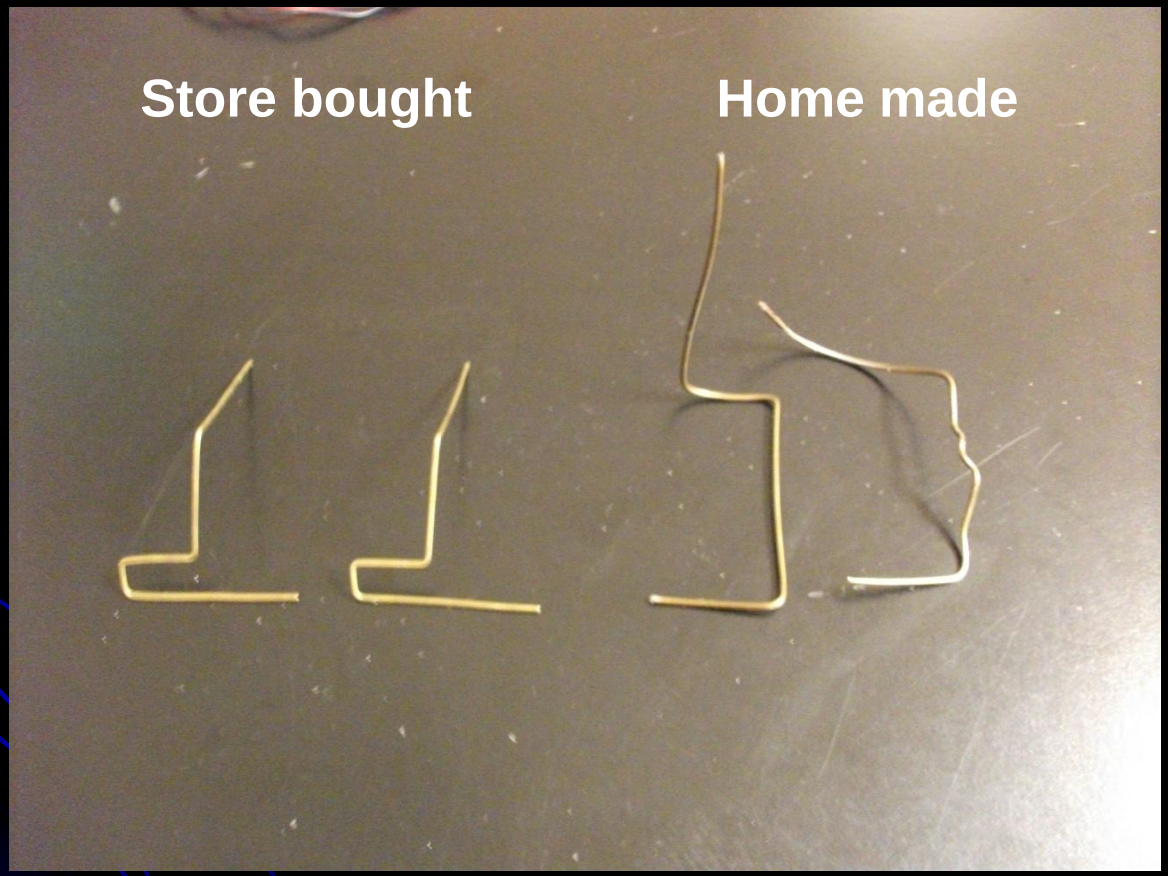
Constructing Simple Electrodes:

Point Charge



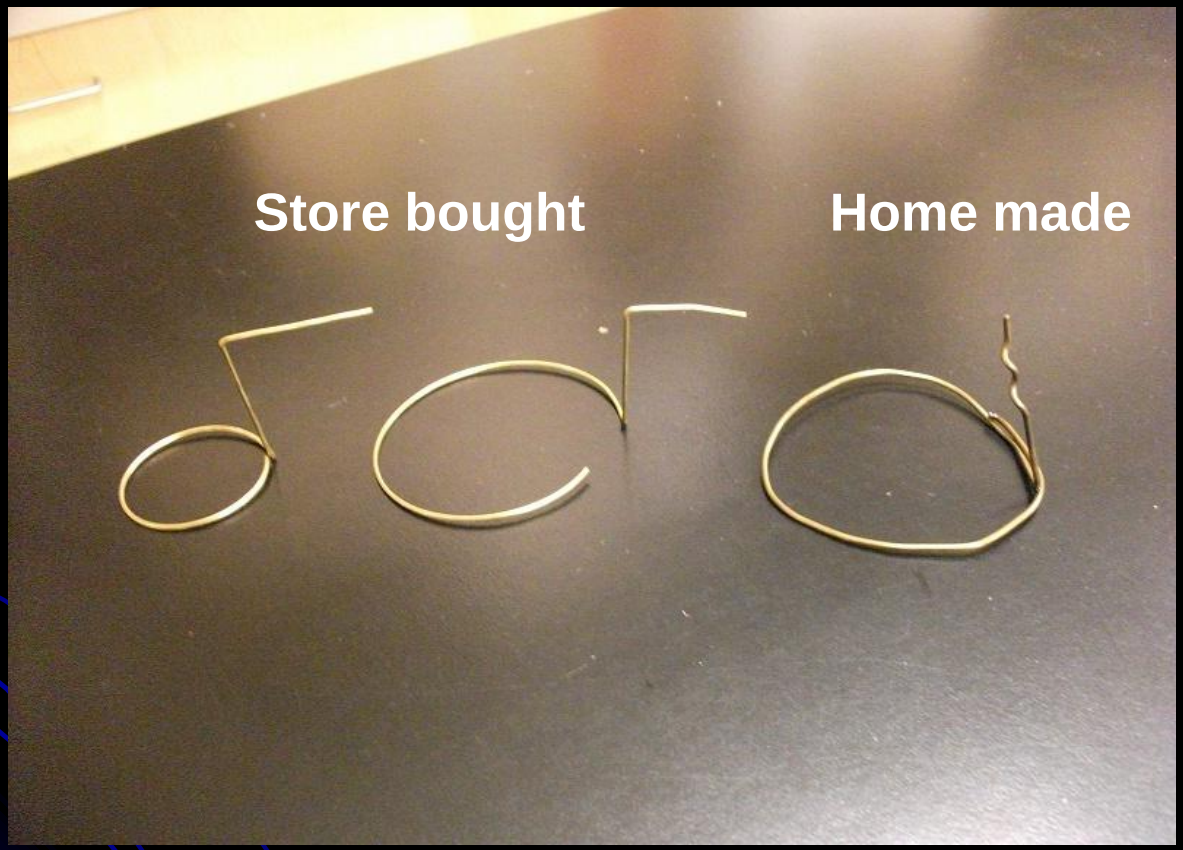
Constructing Simple Electrodes:

Capacitor

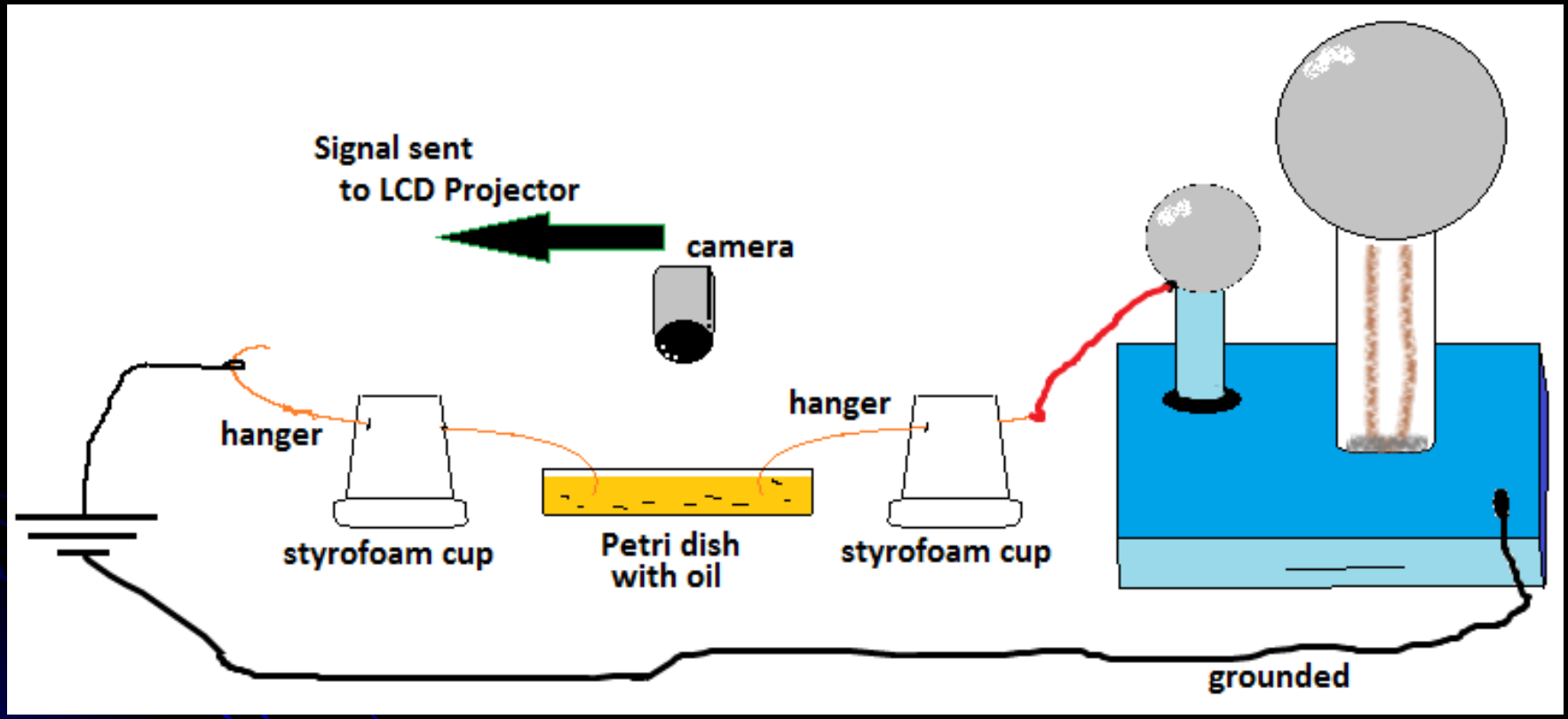


Constructing Simple Electrodes:

Round



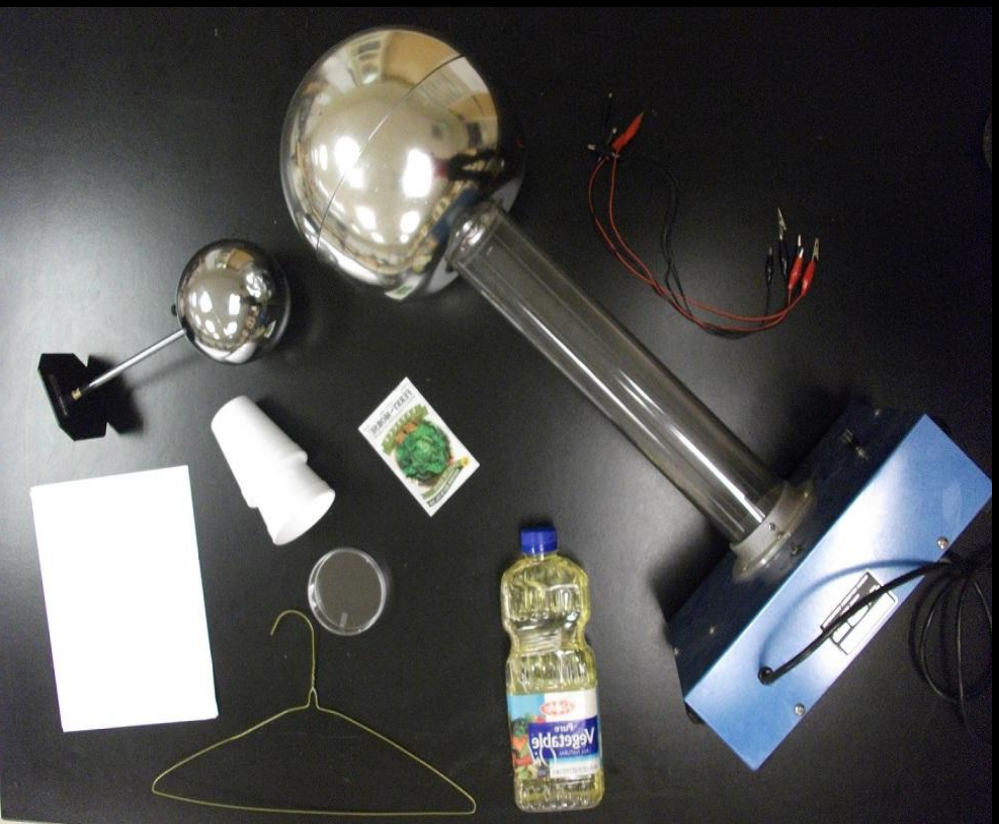
Experimental set up: Home-Made DIY



Tips for Successful Demonstrations

1. *How to bend & break a hanger – do it again & again
2. Place white paper underneath the dish – for camera
3. Hold a fluorescent light tube to drain off the charge
4. *An Arc should occur between the electrodes -not wires
5. Don’t put too many seeds, they clump & image poorly.
6. Bend the hanger with pliers, students are happy to help.

thank you



James Lincoln

James @ Physics Videos .net

VIDEO:
http://youtu.be/q3Gb3RsRmfw