

Exploring the Differences between Electricity and Magnetism

Go to the Physics Exploration Center. Enter through the resource room in 311/312 Thaw Hall.

This exploration involves understanding the difference between electricity and magnetism. Go to the set up which involves metal cages, PVC rod, fur cloth, bar magnets etc.

(a) Rub both the smaller and larger PVC rods with fur. Put the smaller PVC rod (that you just "charged") on the pivot stand so that it is free to rotate. Bring the larger "charged" PVC rod close to it. What do you see?

(b) Predict what would happen if you enclosed the smaller "charged" PVC rod in the metal cage provided and brought the larger "charged" PVC rod close to the cage on the outside. Explain. Now do the experiment. Do you see any deflection in the smaller PVC rod inside the cage? What important phenomena does it illustrate?

(c) Now take a light long magnet with pointed ends and put it on the pivot stand so that it can freely rotate. Then, slowly bring from the side one end of any bar magnet close to the magnet on the pivot. Repeat this experiment by bringing the other end of the bar magnet close to the magnet on the pivot. What do you see?

(d) Predict what would happen if you enclosed the magnet on the pivot in the metal cage provided and brought the bar magnet close to the cage on the outside. Explain. Now do the experiment. Do you see any deflection in the magnet on the pivot inside the base? What does your observation illustrate?

(e) If you bring a charged PVC rod close to an uncharged aluminum piece on a pivot, what would you expect to observe. Do the experiment: Make sure the aluminum piece on the pivot is uncharged by touching it with your hand. Then, bring the charged PVC rod close to it (from the side). Do you observe what you expected? Explain.

(f) If you bring a pole (north or south) of a magnet close to an uncharged aluminum piece on a pivot (this aluminum piece is part of the pivot stand), what would you expect to observe. Explain your reasoning. Do the experiment: Make sure the aluminum piece on the pivot is uncharged by touching it with your hand. Then, bring the magnet pole close to it (from the side). Do you observe what you expected?

(g) In part (a) of the exploration, you brought a charged PVC rod close to another charged PVC rod (with same charge) on a pivot and observed that there was force between them. If instead, you brought a pole of a magnet close to a charged PVC rod on a pivot what would you expect? Do the experiment and explain your observation. Don't forget to bring each pole of the magnet close to the charged PVC rod on the pivot to infer if your observations are related to magnetic force or electrical force. If the force is electric in nature, draw a diagram.