Electric Charge and Electric Force

Jean Brainard, Ph.D.
A lightning bolt is like the spark that gives you a shock when you touch a metal doorknob. Of course, the lightning bolt is on a much larger scale. But both the lightning bolt and spark are a sudden transfer of electric charge.

**Introducing Electric Charge**

Electric charge is a physical property of particles or objects that causes them to attract or repel each other without touching. All electric charge is based on the protons and electrons in atoms. A proton has a positive electric charge, and an electron has a negative electric charge. In the Figure 1.1, you can see that positively charged protons (+) are located in the nucleus of the atom, while negatively charged electrons (−) move around the nucleus.

**Electric Force**

When it comes to electric charges, opposites attract, so positive and negative particles attract each other. You can see this in the Figure 1.2. This attraction explains why negative electrons keep moving around the positive nucleus of the atom. Like charges, on the other hand, repel each other, so two positive or two negative charges push apart. This is also shown in the diagram. The attraction or repulsion between charged particles is called electric force. The strength of electric force depends on the amount of electric charge on the particles and the distance between them. Larger charges or shorter distances result in greater force.
Q: How do positive protons stay close together inside the nucleus of the atom if like charges repel each other?
A: Other, stronger forces in the nucleus hold the protons together.

Summary

- Electric charge is a physical property of particles or objects that causes them to attract or repel each other without touching.
- Particles that have opposite charges attract each other. Particles that have like charges repel each other. The force of attraction or repulsion is called electric force.
Review

1. What is electric charge?
2. Make a simple table summarizing electric forces between charged particles.

References

1. Christopher Auyeung. Location of charges in an atom . CC BY-NC 3.0
2. Zachary Wilson. Like charges repel each other . CC BY-NC 3.0