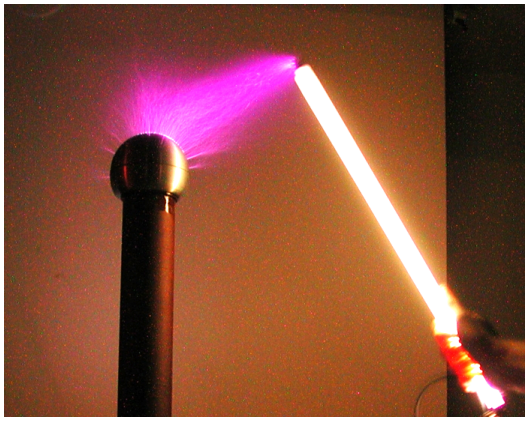
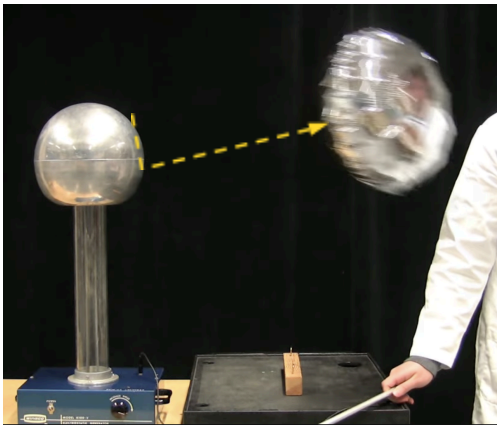
Electricity

All objects are made of particles so small microscopes can't see them, called atoms. Atoms are made of even smaller particles with **positive (protons) and negative (electrons) electric charges**. Usually each positive proton is paired with a negative electron, and there are equal amounts of electrons and protons. Sometimes there are too many of one kind of charge. Because the negative electrons are light-weight, they can wander around easily in search of partners for any lonely charges. **Movement of positive and negative charges makes up electricity**! Charges can move in two ways, called current electricity and static electricity [1].



A **Tesla coil** makes **current electricity: the unpaired charges are flowing freely, as long as there is a closed loop, or circuit**. One end of the Tesla coil is connected to the ground. Because the coil makes **very high voltages (lots of energy per tiny charged particle)**, the electricity can leave the Tesla coil and jump through the air to get back to the ground. If a fluorescent light bulb is held near the coil, the electricity will go through the light bulb to get to the ground, which makes it light up while held in the hand [2].

A **Van de Graaff generator** makes **lots of static electricity: the unpaired charges are mostly stuck in one place**. Normally, **charges of the same kind don't like to collect in one place**; they like to run away from particles with the same charge. **Van de Graaff generators store lots of the same kind of charge (electrons) in one place as static electricity** [3]. If a balloon with equal numbers of positive and negative charges touches the Van de Graaff generator, the balloon picks up extra negative electrons running from all the stored electrons. The now negatively charged balloon immediately leaps away from the very negatively charged generator [4]!



[1] Halliday and Resnik (2020). Electric Current. *Principles of Physics*
[2] The Wonders of Physics Traveling Outreach Program (2025). *The Tesla Coil.* Retrieved from https://wonders.physics.wisc.edu/tesla-coil/
[3] The Wonders of Physics Traveling Outreach Program (2025). *Our Van de Graaff Hall of Fame!.* Retrieved from https://wonders.physics.wisc.edu/van-de-graaff/
[4] MIT Tech TV. "MIT Physics Demo -- Inducing Dipoles with a van de Graaff Generator." YouTube, 12 June 2009, www.youtube.com/watch?v=1jP_D0S2CtY. Accessed 24 Oct. 2025.