(1) Spectroscope:
For this experiment, the students use a fragment of a DVD as a diffraction grating mounted in a spectroscope made using a paper template. Once made, the students can investigate the atomic makeup of the sun and try to identify what kind of lightbulbs they have in their houses/classroom using the spectroscope. If students are in the classroom this demo might be especially interesting because the fluorescent lightbulbs will have a discrete spectrum, providing them with a real-world example of the discreteness of atomic energy levels and how spectroscopy helps us to understand what other stars and planets are made of.

(2) Calculating the Speed of Light:
This experiment assumes that students have access to a microwave oven, if this is a reasonable assumption it's a fun (and tasty) experiment. A large flat-bottom dish is filled with an even layer of marshmallows and partially melted in the microwave oven (without the turntable). The standing wave of the microwave produces hotspots (identifiable where the marshmallows are the most melted), and the distance between these hotspots can tell you the wavelength of the standing wave. Then, using the frequency specification of the microwave oven, the students can calculate the speed of light!

(3) Cornstarch:
Participants will make and play with the oobleck, specifically, for example, by hitting it very fast with their hand and then immersing their hand in slowly, to investigate its strange properties which make it neither a regular liquid nor a regular solid. We'll connect this with the perhaps more familiar material response to changes in temperature (such as freezing or boiling water) to show how this activity relates to science that the participants may already know, and also how changing macroscopic properties of a system, like the pressure acting on it, can lead to exotic states of matter. Participants will gain understanding of how a system's behavior at the molecular level can affect its macroscopic properties and vice versa and how setting such properties to extreme values is an active area of current research. The science discussion can be tailored to a particular age range but the activity itself is suitable for any student.

(4) Electromagnet:
We are still workshopping this activity to make it as interesting as possible. A lot can be done with just a battery, some copper wire, and a magnet or two.

Using the few simple items listed to make an electromagnet and see how it works thus has two goals: to actively show participants the intimate relationship between electricity and magnetism by demonstrating how an electric current can give rise to a magnetic field, and vice-versa, and inferring from applying the electromagnet to some small objects like paper clips how electromagnets might be used in real life applications.