JOAN FEYNMAN

Ever since her childhood, Joan (1927- 2020) was a curious and inquisitive girl. Nevertheless, her parents thought that women were not fit for science and dissuaded her from pursuing a career in research. Her brother, on the other hand, always supported and encouraged her curiosity about the world around her. This led Joan to obtain her degree in physics, and in 1958 she earned her Ph.D. For years, she worked hard to balance her life as a housekeeper and mother of three kids with her research career. In 1974, Feynman became **the first woman** elected to an office of the American Union of Geophysics. In 2000, she was awarded the **Exceptional Achievement Medal from NASA**. Then, in 2002, she was designated as one of the **elite senior scientists** of the prestigious Jet Propulsion Laboratory.

" I can be a mother part-time, or crazy full-time"

The Astronomer that Illuminated the Auroras

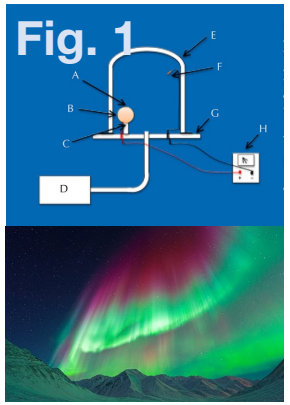
Using data collected by a NASA aircraft known as Explorer 33, Joan Feynman discovered that the Earth's magnetosphere has a long, broad tail on the side opposite the Sun. She further demonstrated that the appearance of the Northern Lights is due to the interaction between the magnetosphere of the Earth and the solar wind's magnetic field. Later, she proved that solar mass ejections happen in groups, which allowed engineers to calculate the way in which the energetic particles affect spacecraft over the course of their lifetimes and design safer satellites. Joan also studied the influence of the sun on abnormal winter weather patterns, in particular the impact of transient solar events and variations in the solar cycle.

Experiment: Simulate the Aurora Borealis

(With adult supervision) The majority of necessary components are available in high school science labs.

What you need

1. A magnetized sphere to represent the Earth, the Sun, or another star (Fig. 1B). The sphere itself doesn't need to be a magnet – it is enough for it to just conduct electricity and hollow, such that a magnet can be placed inside.
2. A compass to measure the magnetic field orientation
3. Another electrode (a simple cable or another magnetized sphere; Fig. 1F)
4. A vacuum plate with various electrical connections (Fig. 1G)
5. A vacuum hood (Fig. 1E)
6. A vacuum pump (Fig. 1D)
7. A high voltage power supply (Fig. 1H)



Procedure

1. To begin, magnetize the sphere (unless you're using a magnetic sphere). To do this, glue a magnet to the inside of the sphere and check the magnet's orientation.
2. Cut a tube that will serve as the base of the sphere and place it on the vacuum plate. Then, place the sphere on the tube with the north pole of the magnet facing up. Wire the connections from the vacuum plate to the power supply.
3. Connect another wire to the positive terminal of the vacuum plate and use adhesive tape to hold the wire to the magnetized sphere.
4. Connect the last cable to the negative terminal of the vacuum plate, and again use adhesive tape to attach the cable to the inside of the vacuum hood such that the end of the wire hangs close to the top of the hood on the opposite side of the sphere (see Fig. 1)
5. Connect the power supply and the vacuum pump. When the pressure is low enough (after about 5 – 15 minutes) the aurora will appear. To see the aurora better, darken the room!

More information

How Joan Feynman demystified Auroras

APSNews: Joan Feynman The Key To Science What are the Northern Lights?

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