Birkeland had an idea. He knew that Earth was a giant magnet. Like all magnets, Earth has a north magnetic pole and a south magnetic pole. Birkeland led an expedition to Norway to measure Earth’s magnetic field.

He found that near the North Pole, the magnetic field lines don’t run along the Earth’s surface, the way they do near the equator. Instead, the field lines go almost straight up and down. What could that mean?

Think of the Earth as a magnet. Near the middle of the magnet (where the Earth’s equator would be) the lines of force run right alongside the magnet. But near the North and South Poles, the lines run almost straight into the ends of the magnet.

Colors in the Night Sky: The Aurora

BY STEPHEN WHITT

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COLORS IN THE NIGHT SKY: THE AURORA

Before the charged particles can get to the ground, though, they smash into air molecules. The collisions make the molecules glow with beautiful, bright colors – green, pink, and red. This is the aurora, light created by tiny particles from the Sun smashing into the Earth’s atmosphere at the end of a four-day journey through space. That’s quite a trip!

Imagine you are on the Sun. The Sun’s temperature is much too hot for anything alive. But you aren’t alive. You are a tiny particle so small that you can’t be seen in even the most powerful microscope.

What happens when you reach Earth?

To find out, let’s leave the solar wind for a moment and travel back in time, to meet a scientist and explorer named Kristian Birkeland.

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Have you ever rubbed your feet across the carpet and then touched something made of metal? If you have, you’ve felt a shock! You build up an electric charge when you rub your feet on the carpet. The charge moves from your finger to the metal when you touch it. This movement is what causes the shock.

The particles from the Sun also carry an electric charge. But how does this charge create the aurora?

Imagine you are on the Sun. The Sun’s temperature is much too hot for anything alive. But you aren’t alive. You are a tiny particle so small that you can’t be seen in even the most powerful microscope.

Kristian Birkeland. Photo courtesy of Wikimedia Commons.
The northern lights (or the southern lights, if you're from the Southern Hemisphere) are eerie, multicolored streaks and shapes that appear in the night sky, as if from nowhere. To find out where they come from, we’ll have to take a little trip. Are you ready?

Kristian Birkeland now knew more about the Earth’s magnetic field. But he still didn’t know what caused the aurora. How were the two things related?

To understand how these things are related, you need to know a little about electricity.

Kristian Birkeland wanted to understand the aurora (another name for the northern and southern lights). The mysterious light was often seen near the North and South Poles. It wasn’t usually seen closer to the equator. People described the light as a “fire in the sky.” But what could it be?
Electricity and magnets affect each other. Watch a compass during a thunderstorm. You’ll see the magnet inside the compass (what we call the needle) move every time lightning flashes across the sky.

Heat causes the solar wind. The Sun is so hot that particles fly off its surface, a little like steam rising from a hot bowl of soup.

Imagine you’re a part of this solar wind. You’re flying away from the Sun faster than the fastest spaceship. Directly ahead of you is Earth, a pretty blue-white ball. You’re moving fast, but Earth is still far away. It takes you a little over four days to make the trip to Earth.