What causes the Northern Lights?

KS2 KS3 Ages 7-14 ⏰ 3 min read

The Northern Lights — *Aurora Borealis* — are caused by charged particles from the Sun colliding with gases in Earth's upper atmosphere. The result is one of nature's greatest light shows.

The Sun's constant storm

The Sun is constantly throwing out a stream of charged particles — electrons and protons — in every direction. This is called the **solar wind**. It reaches Earth continuously, and during solar flares or coronal mass ejections, the flow intensifies dramatically.

Earth's magnetic shield

Earth has a magnetic field — generated by the movement of liquid iron in its outer core — that surrounds the planet like an invisible bubble (called the magnetosphere). It deflects most of the solar wind around Earth, protecting us from radiation that would otherwise strip away our atmosphere over millions of years, as happened to Mars.

But at the North and South Poles, the magnetic field lines converge and dip down into the planet. This creates a funnel where charged particles can spiral down into the atmosphere along the field lines.

It's like a force field with two small gaps at the top and bottom. Most incoming particles bounce off the shield. But the ones that find the gap at the pole spiral down the funnel of magnetic field lines like water down a plughole — and when they arrive in the atmosphere, they crash into gas molecules and make them glow.

Why different colours?

Different gases at different altitudes produce different colours when excited. Oxygen at around 100km up produces the most common green. Oxygen at higher altitudes (above 200km) produces rare red. Nitrogen produces blue and purple. The mix of altitudes and gases creates the shifting, layered curtains of colour.

Why can you only see them near the poles?

Because that's where the magnetic field funnels the particles in. Normally you need to be above about 55° latitude — Iceland, northern Norway, Scotland on a good night. But during severe solar storms, when particle flows are intense enough to overwhelm the outer magnetosphere, the aurora can be seen much further south — even southern England, France, and occasionally further.