

# THE BOOK OF THE NORTHERN LIGHTS — SWEDISH LAPLAND

## INTRODUCTION — When the Sky Breathes

There exist natural spectacles that surpass reason.

The northern lights are one of them.

They are not merely seen — they are *felt*. They take root in memory.

In the frozen silence of a Lapland night — when the thermometer drops below  $-30^{\circ}\text{C}$ , when snow creaks under your boots, and reindeer sleep among the birch trees — a light awakens.

A green breath. A red veil. A violet dance.

Then, we stop talking. Even the most talkative fall silent.

Because something greater is arriving.

The northern lights are a cosmic interaction:

- ➡ the Sun — source of all life
  - ➡ the Earth — protected by its magnetic shield
  - ➡ humankind — small, yet aware, watching the sky
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## 1 THE SUN: THE FIRST ACTOR

### 1.1 — A Heart of Fire

The Sun is a star — a sphere of plasma, 1.39 million km across, burning at 15 million degrees.

Every second, it converts 620 million tons of hydrogen into helium.

In this process, it releases:

- light
- heat
- electromagnetic radiation
- charged particles  $\Rightarrow$  the solar wind

### 1.2 — The Solar Wind

A stream of protons and electrons, blowing at an average:

- ➡ 400 km/s (normal)
- ➡ up to 2 000 km/s during coronal mass ejections (CME)

A CME can hurl billions of tons of plasma toward Earth.

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## 2 EARTH'S SHIELD: THE MAGNETOSPHERE

### 2.1 — Earth's Core

Earth's magnetic field is produced by the rotation of its liquid outer core (iron + nickel). It acts like a colossal magnet around the planet.

## 2.2 — Shape of the Magnetosphere

Imagine a stretched-out tear:

- sun-facing side → compressed to 60 000 km
- night-side → a magnetic tail stretching up to 1 000 000 km

Particles from the solar wind cling to magnetic field lines like beads on strings.

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## 3 THE AURORA: THE COLLISION THAT CREATES LIGHT

### 3.1 — The Mechanism

Solar particles enter through the poles → collide with atmospheric gases.

Electrons energize oxygen and nitrogen,  
then atoms release a photon as they return to their normal state.

➡ It is quantum mechanics — in live action.

### 3.2 — The Colors Explained

Color	Atom	Altitude	Explanation
Green	Oxygen	100–150 km	fast relaxation → most common
Red	Oxygen	200–300 km	low density → rare, slow light
Violet / Blue	Ionized nitrogen	< 120 km	heavy collisions, low-altitude auroras
White / Pink			
Mix		variable	strong solar storms

### 3.3 — Forms of Auroras

- Auroral arc — long horizontal ribbon
- Curtains — like moving drapery
- Rays — vertical light pillars
- Zenith crown — above your head, as if the sky is opening

### 3.4 — Measuring Intensity

Kp Index (0 to 9)

- Kp 0–2 → weak, often invisible
- Kp 3–4 → visible in Lapland
- Kp 5–6 → visible up to Scotland
- Kp 7–8 → visible in Germany, northern France, Poland
- Kp 9 → exceptional — sometimes visible in Spain

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## 4 AURORAS THROUGH HISTORY

## 4.1 — Since Antiquity

First known mentions: 2600 B.C., Chinese chronicles.

Ancient Greeks — Aristotle — describe “heavenly flames.”

## 4.2 — Medieval Era

Europe — sign of divine warning

Scandinavian chronicles — omen for kings

## 4.3 — Renaissance & Enlightenment

1621 — Pierre Gassendi writes the first scientific explanation

1716 — Edmond Halley links auroras with Earth’s magnetism

1902 — Kristian Birkeland builds “terrella,” miniature magnetic Earths

## 4.4 — Modern Era

1957 — start of space exploration

2000–2020 — NOAA, ESA, NASA satellites enable near-real-time forecasts

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# 5 THE NORTHERN LIGHTS AND NORTHERN CULTURES

## 5.1 — Sámi: Ancestral People of Lapland

For the Sámi, the aurora is not a spectacle:

➡ It is a living being — capable of hearing.

Traditional taboos:

- do not whistle
- do not run
- do not lift your arms to the sky
- do not laugh at it

Some elders say: “*It hears everything. It knows everything.*”

## 5.2 — Norse Myths

Icelandic sagas speak of a sky “on fire.”

For some Vikings, auroras were the reflection of Valkyries’ armor, messengers of Valhalla.


## 5.3 — Japan — A Modern Legend

It is still said today: conceiving a child beneath the auroras grants a happy life — some couples travel to Lapland just for this.

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## 6 TOURISM: SEEING AURORAS IN SWEDISH LAPLAND


### 6.1 — Where to Go

 Best precise locations:

- **Abisko** — view over Lake Torneträsk (telepherique plateau)
- **Kiruna** — Luossavaara hill, former ski jump
- **Jukkasjärvi** — frozen lake behind the IceHotel
- **E10 road toward Björkliden** — panoramic stops, no light pollution


### 6.2 — When?

 Season: **September 1 → March 31**

 Best hours: **21:00 – 02:30**

 Strongest statistically: **Equinoxes (Sept 20–25 / Mar 18–23)**

### 6.3 — Safety

 Possible temperatures: **–20 to –38 °C**

Real dangers:

- fingers freezing in under 10 min without gloves
- cars stuck in snow (bring shovel / flashlight)
- phone batteries draining in 5–15 min

### 6.4 — Expert Photography

- Lens: 14–24 mm wide-angle
- Aperture: f/1.4 — f/2.8
- ISO: 2000–4000
- Exposure: 0.3 – 8 sec
- Focus: manual — set at  $\infty$  in daylight and don't touch
- Tip: keep spare batteries warm in inner pockets
- Bonus: use a red headlamp — preserves night vision

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## 7 A SENSORY INTERPRETATION

Seeing the aurora is not only scientific.

It is physical — the cold burns the skin.

It is sonic — silence amplifies every breath.

It is emotional — it awakens something ancient, instinctive.

People often report sensations of:

- time slowing
- fragility
- connection to nature
- wanting to cry or laugh for no reason

No other natural experience combines so intensely:  
the cosmos + Earth + the intimate self

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## **8 FAQ**

Question	Answer
Can they be seen all year?	No — darkness is required. In summer, the sun barely sets (midnight sun).
Are they dangerous?	Not for humans. But a massive solar storm could destroy electrical grids (Carrington Event, 1859).
Do they make sound?	Some witnesses describe crackling — possible cause: electrical fields above snow.
Can they be predicted?	Yes: alerts 30 min to 3 h ahead. Impossible to predict to the minute.
Can you touch them?	No — they occur 100 km above ground.

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## **9 POETIC CONCLUSION**

There are nights when the Earth seems to breathe.  
When mountains fall silent.  
When you feel you are not alone — not merely human — but part of the cosmos.

A northern light is not a show:  
it is a meeting between light and cold,  
between Sun and Earth,  
between you — standing — and the infinite.

 **END**