



## The Birkeland Lecture

The Nobel Laureate Hannes Alfvén gave the first Birkeland Lecture in Oslo in 1987. The lecture was a joint venture by the University of Oslo, the Norwegian Academy of Science and Letters and the Norwegian company Norsk Hydro. In 2004 Yara ASA took the place of Norsk Hydro and since 2005 the Norwegian Space Centre has been a partner in this cooperation. The Birkeland Lecture is above all an endeavor to honor the great Norwegian scientist and entrepreneur *Kristian Birkeland*. However, it has also given the organizers an opportunity to invite to Oslo many outstanding scientists within the field of geophysical and space research, areas that were central in Kristian Birkeland's own research.

Except for the year 1993, when the lecture was presented in Tokyo, and in 1998, when a mini-seminar was organized at the Norwegian Embassy in Tokyo, the lectures have been given in Norway, most of them at the Academy's premises in Oslo. In 1993 the lecture was given in a "Joint Japanese – Norwegian Workshop on Arctic Research". In 1995 the lecture was a part of a seminar on Norwegian environmental research, and in 2001 the lecture was given in connection with a workshop on Norwegian space research, with emphasis on the Cluster satellite program.

In 2017 the Birkeland Lecture was included in the program for the celebration of Kristian Birkeland's 150 years anniversary, a three-day event with lectures and seminars. In 2020 the lecture was cancelled due to the Corona pandemic.

## Yara's Birkeland Prize in Physics and Chemistry

In 1905, Kristian Birkeland's research formed a basis for the foundation of the world's first company to manufacture fertilizer on an industrial scale, Norsk Hydro.

Birkeland was a visionary scientist with the ability and commitment to carry out large scale projects in the laboratory and the field, to follow up with theoretical studies, and to see the application of his results. Today Yara carries this heritage forward and takes great pride in being part of the effort to improve food security. A company's continued success depends upon its ability to innovate. To honor the innovative spirit of its cofounder, Yara established the

Birkeland Prize in Physics and Chemistry in 2009.

Yara's Birkeland Prize will be awarded to a Ph. D. candidate from a Norwegian university who has carried out a scientific study that is in accordance with the innovative mind of Kristian Birkeland.

The prize has an emphasis on the environment and technology, and encourage research across traditional borders. The prize will alternate between physics and chemistry, with chemistry in even-numbered years and physics in odd-numbered years. The award ceremony will take place in connection with the Birkeland lecture

This portrait of Professor Kristian Birkeland was painted by Asta Nørregaard in 1906.

## Organizing committee:

Professor *Jann A. Holtet*, Department of Physics, University of Oslo  
Professor *Susanne Viefers*, Department of Physics, University of Oslo  
Professor *Per Barth Lilje*, Institute of Theoretical Astrophysics, University of Oslo  
*Øyvind Sørensen*, Chief Executive, the Norwegian Academy of Science and Letters  
*Camilla Nyhus Christensen*, Strategic Corporate Sponsorship and Event Manager Corporate Communication, Yara  
*Pål Brekke*, Lead Space Science, Norwegian Space Agency

A list of former Birkeland lecturers is found on <https://www.dnva.no>



DET NORSKE VIDENSKAPS-AKADEMI  
THE NORWEGIAN ACADEMY OF SCIENCE AND LETTERS



Knowledge grows

THE NORWEGIAN ACADEMY OF SCIENCE AND LETTERS

DRAMMENSVEIEN 78, OSLO  
TUESDAY 17 SEPTEMBER, 17:30

# The Birkeland Lecture 2024

ILLUSTRATION: SOHO (ESA AND NASA) AND BAS (BRITISH ANTARCTIC SURVEY)



Professor **Richard B. Horne FRS**  
British Antarctic Survey  
Cambridge, UK

## Space Weather and the Polar Regions

PHOTO: BAS



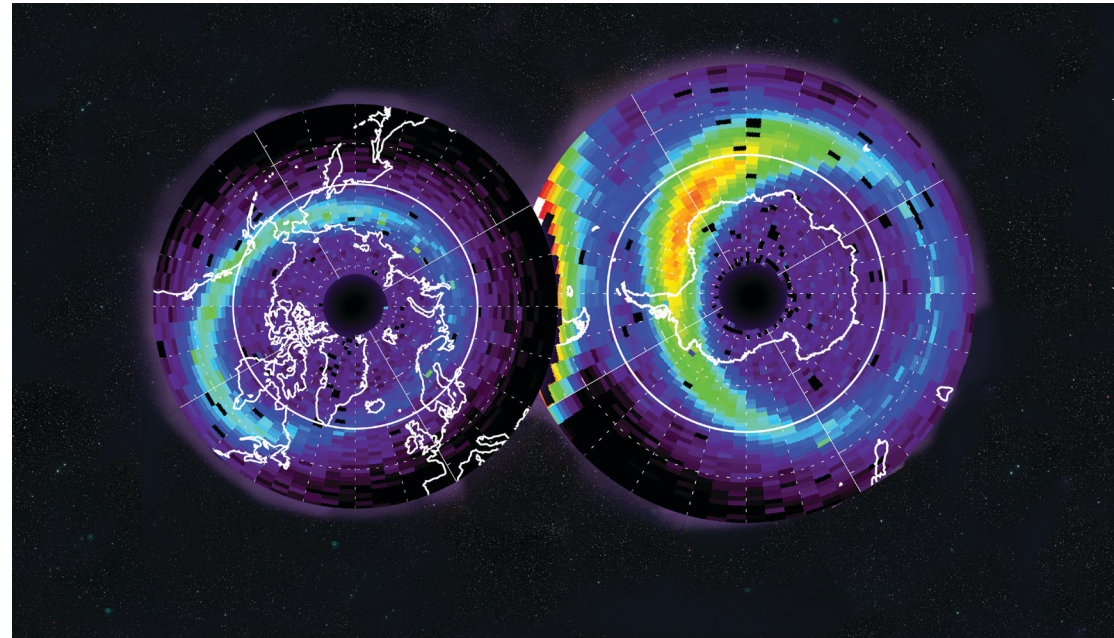
**PROFESSOR RICHARD HORNE FRS**  
British Antarctic Survey  
Cambridge UK

Professor Richard Horne FRS is a Distinguished Research Scientist at the British Antarctic Survey and a member of the Executive team. He is also visiting Professor at the University of Sheffield and Honorary Fellow of St Edmund's College Cambridge.

Richard is known for his research on wave-particle interactions and space weather. He showed that special types of radio waves accelerate charged particles to very high energies in space and play a major role in forming the radiation belts that surround the Earth and magnetised planets. Working with the space industry, Richard led EU and ESA projects to turn this basic research into a forecasting system that is now used by the European Space Agency, satellite operators and insurance underwriters to help protect satellites from radiation damage.

Richard is a recipient of the Kristian Birkeland Medal, the RAS Gold Medal, the URSI Appleton Prize, the NERC Economic Impact Award and the Lloyds Science of Risk prize. He is a Fellow of the Royal Society, American Geophysical Union, International Union of Radio Science, Royal Astronomical Society, and Academia Europaea.

Richard Chairs the Space Environment Impacts Expert Group that provides independent advice to the UK Government, and serves on other Government, Royal Society and UKRI committees.



Particle precipitation in the Polar Regions.



The Van Allen Probes

PHOTO: BAS (BRITISH ANTARCTIC SURVEY)

PHOTO: NASA, JOHNS HOPKINS APPLIED PHYSICS LABORATORY

# Space Weather and the Polar Regions

Professor **RICHARD B. HORNE FRS**

Space weather is driven by the Sun, but the effects are felt at the Earth. Space weather events give rise to beautiful auroral displays in both polar regions, but there are also more serious impacts. These include disruption to power supplies, aviation, satellites, communications, navigation, positioning and timing signals and much more.

Our modern society has become increasingly dependent on modern technology that has become more vulnerable to space weather in ways that are sometimes difficult to disentangle.

In the UK space weather is on the National Risk Register. The Government has published a policy for space weather which includes three

pillars; to enhance our understanding of severe events, increase resilience of essential infrastructure, and to be able to respond and recover from such events quickly. Part of the planning is to assess the impact of a reasonable worst case, which is usually taken as a 1 in 100-year event. Unfortunately, we have very little data to make these assessments which leads to large uncertainty.

In this lecture we will review what happened during the magnetic storm that took place in May 2024. This storm was only a 1 in 10-year event, comparable in size to the storm of 2003, but the way in which events unfolded was very different. There were only minor impacts on the

power grids, satellites, aircraft, communications, GNSS signals, orbiting space debris and low altitude satellites, but the storm tested our forecasting systems and provided valuable data.

We will discuss how the May 2024 storm can help us assess and prepare for what would happen in a 1 in 100-year event. We will discuss some of the lessons learned, why we need a new system of classifying magnetic storms and how new space missions can help improve our forecasting capability. We will also highlight some of the areas where we need more directed research and closer cooperation between science, forecasters and business.

## EIDEL: A Pioneer in Norwegian Space Technology

**TRULS ORDERLØKKEN ANDERSEN,**  
CEO, EIDEL AS

Truls has his background from the defense and defense industry and worked with business development and management. In recent years, he has led EIDEL to become an exciting player in the Norwegian space industry, which has also resulted in attention abroad.

In 2021, EIDEL was identified by the Aerospace and Defense Review as one of the top 10 European satellite technology companies.

Truls has his education from the Army Technical College and a BSC in economics and administration.

EIDEL is a leading designer and supplier of advanced electronics including hardware, software and instrumentation services. Our products ranges from specialized space grade instruments like sensors for space situational awareness and sounding rocket payload control systems to data acquisition, telemetry and quantum resistant encryption. For more than 50 years EIDEL has delivered products and services to a broad set of industries like defence, space, automotive, process industry, energy, marine and offshore engineering.

Eidsvoll Electronics was founded by Erik Olsson, a Swedish engineer, inventor and former employee at the Norwegian Defence Research Establishment – FFI. From a young age Erik was genuinely interested in electronics and solving problems with technology. As early as 1949 he bought his first transistor, a Raytheon CK722. From 1964 to 1965 he participated in development of a control system for the radio telescope at Råö rymdobservatorium, north of Gothenburg. In 1966 he set up his own laboratory in his garage at his home in Eidsvoll. There he started development of a satellite telemetry decoder which was delivered to Tromsø Telemetry Station following year, and Eidsvoll Electronics was born