Prof. Dr. Paul M. Kintner, Jr
SCHOOL OF ELECTRIC AND COMPUTER ENGINEERING,
CORNELL UNIVERSITY, ITHACA, NY, USA.

Paul Kintner has been a professor of Electrical and Computer Engineering at Cornell University since 1991. He received his Ph.D. in physics from the University of Minnesota in 1974, then was a postdoctoral research associate at the University of Iowa in Prof. Van Allen's group from 1974-1976. He came to Cornell University in 1976 as a research associate and was promoted to assistant professor in 1981 and associate professor in 1985. He was associate director from1997-2001. As of September 1, 2010, he is a Jefferson Fellow with the U.S. Department of State.

Prof. Kintner's scientific interests include the Geospace environment and the development of instrumentation for both in situ sensing on rockets and satellites and ground-based remote sensing. During the past 10 years, he has initiated a program to develop Global Positioning System receivers for scientific applications, including ground-based GPS receivers to monitor ionospheric scintillations and ionospheric drifts and space flight GPS receivers for time synchronization and precision positioning on multiple payload sounding rockets. He has been the principal investigator for eight sounding rockets, three of which were launched from Norway, and a co-investigator or contributor to 30 more space flight experiments. He is the author or co-author of more than 180 scientific publications on space physics and space weather.

Dr. Kintner was chair of the NASA Living With a Star/Geospace Mission Definition Team from 2001-2002. He is a fellow of the American Physical Society, a member of the American Geophysical Union, a senior member of the Institute of Electrical and Electronic Engineers, a senior member of the American Institute of Aeronautics and Astronautics, and a member of the Institute of Navigation. Dr. Kintner developed and teaches courses such as "GPS: Theory and Design" and "Advanced GPS Receiver Design", resulting in several teaching awards. Recently, he served on the National Research Council Committee on the Societal and Economic Impacts of Severe Space Weather Events, leading to this presentation.

Organizing committee:

Professor Alv Egeland, Department of Physics, University of Oslo
Professor Jan A. Holtet, Department of Physics, University of Oslo
Professor Reidun Sirevåg, Secretary General, the Norwegian Academy of Science and Letters
Rune Ingels, Vice President, Yara International ASA
Bo Andersen, Director General, Norwegian Space Centre

The Birkeland Lecture is open for everybody. There is no registration. Free admission.

For more information about the Birkeland Lecture 2009:

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UNIVERSITETET I OSLO

DET NORSKE VIDENSKAPS-AKADEMI

Norsk Romsenter
NORWEGIAN SPACE CENTRE

YARA

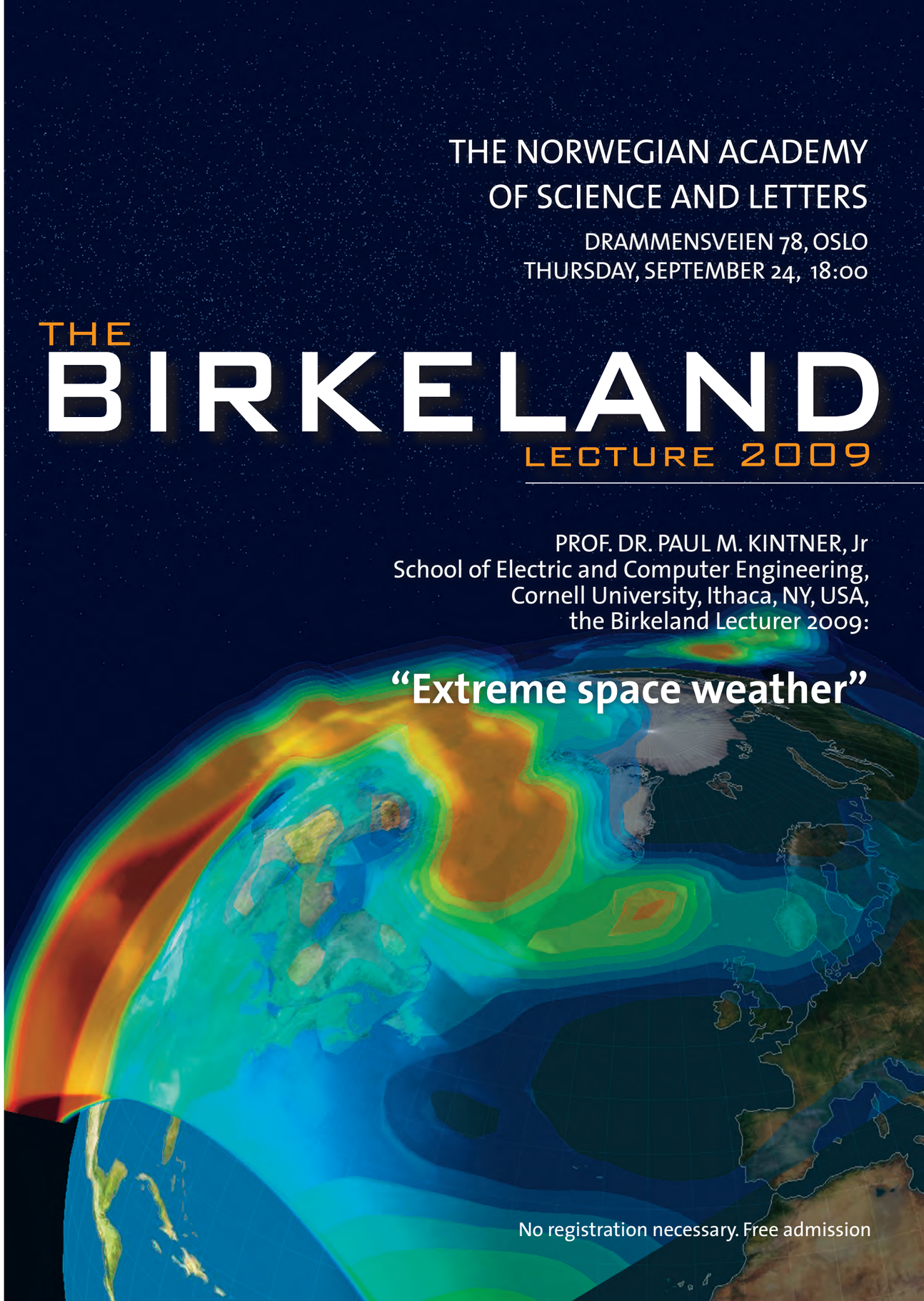
THE NORWEGIAN ACADEMY OF SCIENCE AND LETTERS

DRAMMENSVEIEN 78, OSLO
THURSDAY, SEPTEMBER 24, 18:00

THE BIRKELAND LECTURE 2009

PROF. DR. PAUL M. KINTNER, Jr
School of Electric and Computer Engineering,
Cornell University, Ithaca, NY, USA,
the Birkeland Lecturer 2009:

"Extreme space weather"



No registration necessary. Free admission

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

The Birkeland Lecture 1987-2008

The University of Oslo has since 1987 arranged a "Birkeland Lecture" in cooperation with the Norwegian Academy of Science and Letters, the Norwegian company Norsk Hydro (from 2004 YARA ASA) and the Norwegian Space Centre (from 2005). Except for the year 2003, when the lecture was presented in Tokyo, the lectures have been given in Norway, most of them at the Academy's premises in Oslo. Some years seminars have been arranged in connection with the lectures, e.g. in 1993 when the lecture was a part of a "Joint Japanese – Norwegian Workshop on Arctic Research", in 1995 when the lecture was a part of a seminar on Norwegian environmental research, and in 2001 when the lecture was given in connection with a workshop on Norwegian space research, with emphasis on the Cluster satellite programme. This cooperation between the University of Oslo, the Academy, Norsk Hydro/YARA and the Norwegian Space Centre is above all an endeavor to honor the great Norwegian scientist and entrepreneur Kristian Birkeland. However, it has also given the University the opportunity to invite to Oslo many outstanding scientists within the field of geophysical and space research, areas which were central in Kristian Birkeland's own research.

1987: Hannes Alfven , Kungliga Tekniska Høgskolan , Stockholm, Sverige, and University of California, San Diego, USA::
"The Auroral Research in Scandinavia"
(University of Oslo, 03. 09 1987)

1988: Alex J. Dessler , Rice University, Housten, USA:
"I have it" - Birkeland´s quest for research founding"
(University of Oslo, 16. 09 1988)

1989: T.A. Potemra, The John Hopkins University, Laurel, USA:
"Satelite measurements of Birkeland currents"
and
Naoshi Fukushima, Tokyo University, Japan:
"Birkeland´s work with the geomagnetic disturbances in relation to modern research"
(The Norwegian Science Museum, Oslo, 24.10 1989)

1990: James van Allen , University of Iowa, USA:
"On the future of space science and applications"
(The Norwegian Academy of Science and Letters, Oslo, 10.10 1990)

1991: Syun-Ichi Akasofu , Geophysical Institute, Fairbanks, Alaska:
"Helio-magnetism"
(University of Oslo, 24.10 1991)

1992: W. Ian Axford , Max-Planck Institut, Lindauer, Tyskland:
"The origin of cosmic rays"
(University of Oslo, 24.09 1992)

1993: Takasi Oguti, Solar-Terrestrial Environment Laboratory, Tokyo, Japan:
"Sun-earth energy transfer"
(Tokyo University, Japan, 07.10 1993)

1994: Stanley W.H. Cowley, Imperial College, UK:
"The Solar wind – Magnetosphere-Ionosphere connection"
(The Norwegian Academy of Science and Letters, Oslo, 22.09 1994)

1995: Anthony L. Peratt, Los Alamos National Laboratory, USA:
"The legacy of Birkeland´s plasma torch"
(University College, Notodden, Norway, 21.09 1995)

1996: Gerard Haerendel, Max Planck Institute, Garching, Tyskland:
"Physics along auroral magnetic field lines"
(University of Oslo, Norway, 19. 09 1996)

1998: No lecture, but a ***"Birkeland event"*** at Tokyo University 30. 09 with presentation of a Birkeland bust to Tokyo University, and a mini-seminar at the Norwegian Embassy.

2001: David Southwood, Imperial College, London / Director of Research ESA, Paris:
"Kristian Birkeland, Science Forever, Lessons for Today"
(The Norwegian Academy of Science and Letters, 20.09 2001)

2002: Alain F. Roux, Centre dÈtude des Env. Terrestres et Planetaires, CETP, Paris:
"Role of Kristian Birkeland curents in the dynamics of the geomagnetic tail"
(The Norwegian Academy of Science and Letters, Oslo, 19.09 2002)

2003: Lev M Zelenyi, Space Research Institute, IKI, Moscow, Russia:
"Space Weather"
(The Norwegian Academy of Science and Letters, Oslo, 19.09 2003)

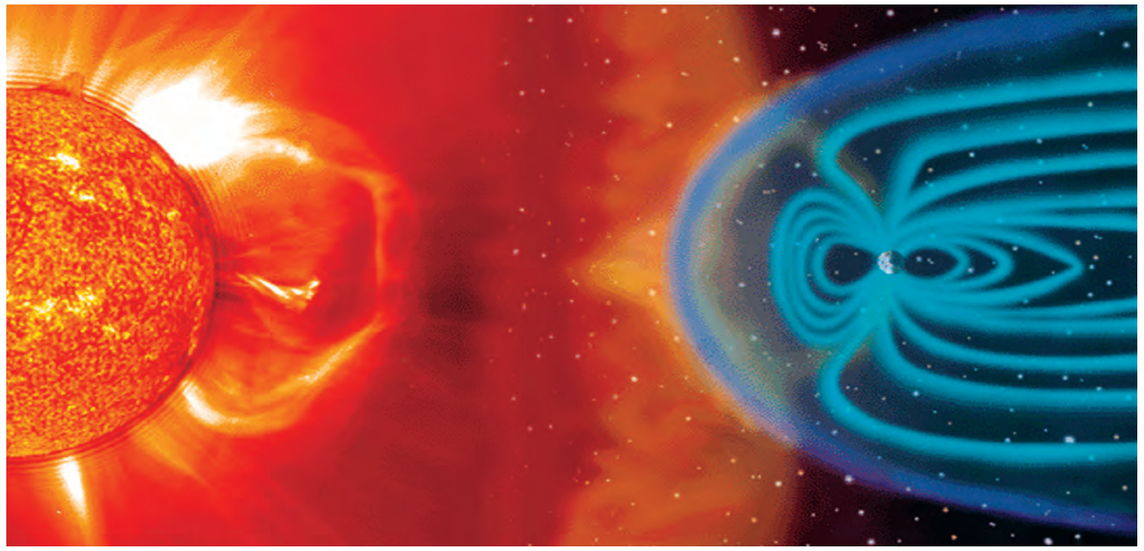
2004: Catherine G. Coleman, NASA, Houston, USA:
"Our Earth seen from Space"
(University of Oslo, 23.09 2004)

2005: Wiliam J. Burke, Air Force Geophysics Laboratory, USA:
"Kristian Birkelands Message from the Sun – Its meaning then and now"
(University of Oslo, 22.09 2005)

2006: Margaret Kivelson, University of California, Los Angeles (UCLA), USA:
"A century after Birkeland: Auroras and related phenomena at moons and planets"
(The Norwegian Academy of Science and Letters, Oslo, 21.09 2006)

2007: Dr: Eigil Friis-Christensen, Danish National Space Center (DTU)
"Unrest on the Sun – storms on the Earth. The magnetic connection"
(The Norwegian Academy of Science and Letters, Oslo, 27.09 2007)

2008 Franz-Josef Lübken, Leibniz-Institut für Atmosphärenphysik, Kühlungsborn, Germany
"Dramatic climate changes in the upper atmosphere"
(The Norwegian Academy of Science and Letters, Oslo, 25.09 2008)



Prof. Dr. Paul M. Kintner, Jr, School of Electric and Computer Engineering, Cornell University, Ithaca, NY, USA

"Extreme space weather"

The sun has its own seasons, and the stormy season will be upon us soon. Every eleven years, the sun enters a period of increased activity called the solar maximum. The FUV (far ultraviolet) portion of the solar spectrum intensifies, making our ionosphere denser and thicker. Frequent solar flares eject up to 10 billion tons of plasma at speeds approaching 1500 kilometers per second, generating intense, broadband bursts of radio waves, magnetic storms at the earth, and stirring up the ionosphere in ways recently thought unimaginable. Called the sunspot cycle, this period of activity is the result of a solar dynamo in which electric currents and magnetic fields are built up in the outer layer of the sun and then destroyed in energetic outbursts. The next sunspot maximum is currently predicted to arrive in May 2013 and to be a relatively weak maximum in terms of sunspot count. One would hope that this is cause for relief, except that the most intense solar outbursts have occurred during below average solar cycles.

We have survived previous sunspot maxima with few ill effects; why should we not do so again? The answer is that our technological infrastructure is changing. Longer, higher voltage power grids are more vulnerable to magnetic fields produced by electric currents in space. GPS and other satellite-based services are vulnerable to having their signals interrupted or the satellites damaged. Furthermore, not only have ill effects with serious consequences happened during previous solar maxima, but we also have only a foggy understanding of the severity of space weather. Given a world that is more interconnected with technical systems that are more brittle and less forgiving of unexpected stress, we need to understand the extremes of space weather.

Yara's Birkeland Prize in Physics and Chemistry

Yara's Birkeland Prize in Physics and Chemistry 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 spirit of Kristian Birkeland. The prize will focus on the environment and technology, and encourage research across the traditional borders. The prize will alternate between physics and chemistry, with chemistry in years with odd numbers and physics in years with even numbers. The award ceremony will take place in connection with the Birkeland lecture. The price will be awarded for the first time in 2009.

FRONT PAGE: Reconstruction of the ionospheric storm over North America and polar regions on October 30, 2003, during a major solar outbursts. This storm produced the failure of augmented GPS aviation services over the continental United States, Canada and Alaska. (Figure courtesy of Dr. C. Mitchell.)