Dr. Michael Hesse

Space Plasma Physics Group
Department of Physics and Technology
University of Bergen
5007 Bergen
Norway

EDUCATION

Dr. rer. nat., Theoretical Physics. Thesis: "Untersuchungen zur magnetischen Rekonnexion in dreidimensionalen Systemen (Investigations of Magnetic Reconnection in Three-dimensional Systems)," Ruhr-Universität, Bochum, Germany (1988)
Diplom Physiker, Mathematics minor. Thesis: "Bifurkationstheoretische Behandlung von Stromschichten (Bifurcation-theoretical Treatment of Current Sheets)," Ruhr-Universität, Bochum, Germany (1985)

EXPERIENCE

University of Bergen, Norway (2017 - present)

Professor of Physics (1/2017 - present) Leader of the Space Plasma Physics Group. Researches basic space plasma phenomena by means of analytical theory, and fluid- and particle-based numerical models. Research foci are the dynamics of magnetospheric, as well as solar and astrophysical plasmas, both on macro- and micro-scales, as well as space weather processes. Studies the kinetic physics of magnetic reconnection by comparing both analytical and numerical model-based predictions to advanced spacecraft observations. Provides basic physics education as well as education and student involvement in the above research topics.

Coordinator, ESA Geomagnetic Expert Service Centre (8/2019 – present) Leads an international team of geomagnetic data providers to maintain and expand ESA's geomagnetic space weather service. Defines strategic priorities and implementation strategies in response to customer requirements, ESA priorities, and according to present and emerging capabilities. Negotiates and interfaces with ESA, customers, and other Experts Service Centres. Represents organization to ESA, customers, and the scientific community.

Southwest Research Institute, San Antonio, TX (2017 - present)

Senior Scientist (20% position) Leads the Theory and Modeling team for NASA's Magnetospheric Multiscale (MMS), which provides a key contribution to mission success. Participates in the MMS leadership team. Provides scientific advice regarding mission operations and research priorities. Leads scientific element of Senior Review proposals. Conducts theoretical and

simulation-based research related to the MMS mission. Supports and participates in flight mission proposals to NASA and elsewhere.

NASA Goddard Space Flight Center, Greenbelt, MD (1993 – 2016)

Director of the Heliophysics Science Division (1/2012-12/2016) As a member of the Senior Executive Service, provides strategic leadership for an organization composed of approximately 70 Civil Servants and 230 contractors, scientists, and research associates. Responsible for HSD scientific leadership, the management of organizational resources, management and development of budget and financial resources, and overall implementation of applicable occupational health and safety requirements. Represents the organization to senior leadership of government and nongovernmental organizations inside the U.S. and internationally. Directs and leads the Division in its responses to Announcements of Opportunity from NASA Headquarters and elsewhere. Is responsible for the conception, construction and delivery of flight hardware to sounding rocket and spacecraft projects, for the leadership of such projects, and for the analyses of the data from these experiments, the comparison of this data with computer simulations and theoretical models, and the publication of results in the scientific literature. Is also responsible for an extensive outreach effort, continuing education of visiting students, of postdoctoral fellows, and of scientific staff.

Chief, Space Weather Laboratory (2006-2011) Supervises a group of 17 Civil Servants and 43 contractors, scientists, and research associates. Provides guidance of day-to-day activities, supports the development of proposals, current, and new space flight, research, and space weather initiatives. Responsible for personnel planning including research directions and assignment of personnel to labor charge sources. Represents Laboratory in institutional and outside strategic planning activities. Supervises and educates multiple postdoctoral fellows, gives public lectures as well as targeted lectures to students, postdoctoral fellows, and scientific staff.

Lead Co-Investigator for Theory and Modeling, MMS /SMART mission (2004-present) Responsible for coordinating theory and modeling support for the science investigation. Conducts scientific research in conjunction with SMART science objectives. Works with SMART PI to develop mission science goals and objectives and for establishing instrument performance requirements. Participates in science team meetings, assists with mission design support, and, with his T&M team, represents the interests of the science team at technical interchange meetings.

Founding Director of the Community Coordinated Modeling Center (1999-2012). Responsible for leading a group of eleven scientific and engineering personnel. The CCMC is a US multi-agency activity, which employs research models for space weather purposes. Participating agencies are AF/XOW, AFOSR, AFRL, NASA, NSF, NOAA, and ONR. The CCMC provides to the research community access to space science models, and it transitions these models to operational agencies after suitable evaluation. The CCMC also conducts research into the development of higher fidelity science models, including those addressing multiscale coupling. Created the CCMC in the late

1990s and built it up to a world-leading activity of its present size. Created the Space Weather Research Center, a CCMC daughter, which provides space weather information to NASA's robotic mission throughout the solar system. Mentored undergraduate and graduate summer students, as well as postdoctoral fellows.

Project Scientist for Theory and Modeling for Living With a Star (1999-2005). Provides guidance related to theory and modeling and the National Space Weather Program to the Goddard Living With a Star team. Provides implementation scenarios to NASA Headquarters program management.

Project Scientist for Equator-S and Deputy Project Scientist for POLAR (1996-99). Responsible for setting and verifying scientific milestones. Directed and evaluated research activities of a large fraction of the US space science community and interacted closely with international space agencies and research institutions.

Senior research scientist in the Laboratory for Extraterrestrial Physics, in the Laboratory for Solar and Space Physics, and in the Heliophysics Science Division (1993-2016). Conducts research into fundamental physical processes in space plasmas, in support of NASA missions, and in pursuit of space weather-related objectives. Leads or participates in studies of magnetospheric, solar physical and astrophysical problems. Explained critical magnetospheric phenomena, such as the dipolarization, current disruption and diversion, and current wedge formation in the inner magnetosphere of the Earth, and its relation to mid-tail processes. Discovered the dissipative electron dynamics in collisionless magnetic reconnection. Developed particle-in-cell codes, hybrid codes, Hall-MHD, and MHD codes. Guest lecturer at the Niels Bohr Institute in Copenhagen, Denmark (taught introduction to magnetohydrodynamics). Co-Editor of monograph on magnetospheric current systems. Principal and Co-Investigator of multiple funded research grants from NASA and NSF. Co-Investigator on electric field instrument on POLAR.

Hughes System Corporation (STX), Lanham, MD (1991 - 1993)

Principal scientist. Theoretical research and numerical simulations of microphysical processes in space plasmas, such as current sheet formation and magnetic reconnection.

Los Alamos National Laboratory, Los Alamos, NM (1988 - 1991)

Director's Postdoctoral Fellow. Numerical simulations and theoretical research of macroscale dynamical processes in the Earth's magnetosphere and solar corona.

Ruhr-Universität, Bochum, Germany (1985 - 1988)

Research associate in the department for Theoretical Physics. Dissertation research: Investigations of magnetic reconnection in three-dimensional systems.

MANAGEMENT EDUCATION

Goddard Leadership Education Series (GLES) for supervisors (1995)
NASA Management Education program (MEP) (2003)
OPM Executive Development Seminar: Leading Change (2008)

PROFESSIONAL ACTIVITIES

NSF Geospace Environment Modeling program, steering committee (1993-1998)
NSF Geospace Environment Modeling program, NASA representative to the steering committee (1998-2003)
NSF Geospace Environment Modeling program, working group co-chair (1993-1997)
NSF Geospace Environment Modeling program, campaign co-coordinator (1996-1999)
NASA/Air Force Space Command/NRO partnership, modeling panel (1997)
Science Definition Team for Magnetospheric Multiscale Mission (1998-2000)
Science Definition Team for Magnetospheric Constellation Mission (1999-2003)
Community Coordinated Modeling Center, steering committee (1999-present)
National Security Space Architect space weather transition plan, advisor (1999-2000)
US Committee for Space Weather, alternate member (2000-2008)
Niels Bohr Institute of the University of Copenhagen, guest lecturer (2000)
Living With a Star NASA Goddard definition team (1999-2000)
Living With a Star Theory and Modeling pre-definition team, leader (2000)
Study Scientist, NASA LWS TR&T program (2002-2003)
Living With a Star, Project Scientist for Theory, Modeling, and Data Analysis (2003-2005)
National Academy of Science Decadal Study, panel member (2001-2002)
National Academy of Science Decadal Study, transition to operation working group (2001)
NASA Sun-Earth Connection Roadmap, member (2002-2003)
NASA Living With a Star Targeted Research and Technology steering committee (2004-2005), ex officio (2008-present)
NSF Geospace Environment Modeling program, GGCM steering committee member (2004-2009)
NSF National Astronomy and Ionosphere Center (Arecibo Observatory) Management Review, review team member (2007)
Office of the Federal Coordinator Joint Action Group on NPOESS Space Weather Assessment (2008)
University of Texas San Antonio, guest lecturer (2008, 2009)
Program Advisory Committee of the Center for Magnetic Self-Organization (NSF Frontier Center), member (2010-2014)
National Academy of Science Heliophysics Decadal Survey, Survey Committee member (2010-2012)

National Academy of Science Heliophysics Decadal Survey, Research-to-operations working group co-chair (2010-2011)
Chair, Review Panel, Danish National Space Institute, Danish Technical University (2011)
Member, ESF/ESSC Space Weather Assessment and Consolidation Working Group (2017-2019)
Member, Science Advisory Committee (SAC) of the Swedish National Space Agency (2018-)
Member, Advisory Committee of ESA's Space Safety program (2019-)

HONORS

Graduated "mit Auszeichnung," Ruhr-Universität, Bochum (1985)
Director's Postdoctoral Fellow, Los Alamos National Laboratory (1988-1990)
NASA Group Achievement Award, Polar Electric Fields (1998)
Space Science Achievement Award, first recipient, Goddard Space Flight Center (2002)
NASA Group Achievement Award, Community Coordinated Modeling Center (2004)
NASA Outstanding Leadership Medal (2007)
Elected Fellow of the American Geophysical Union (2010)
NASA Group Achievement Award, Magnetospheric Multiscale mission (2016)
NASA Distinguished Service Medal (2017)
Member, Academia Europaea (2019)
Space Weather and Nonlinear Waves and Processes prize of the American Geophysical Union (2019)

SCIENTIFIC PRODUCTIVITY

Over 290 publications in the scientific literature
H-Index: 61 (Google Scholar)
https://scholar.google.com/citations?user=3TbH4qUAAAAJ&hl=en
https://www.uib.no/en/persons/Michael.Hesse#uib-tabs-publications