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Degrees

- MS (mechanical engineering) 1993, University of Houston
- MS (engineering physics) 1993, Uppsala University
- PhD (numerical analysis) 1997, Uppsala University
- Docent (space physics) 2004, Umeå University

Experience

- University of Houston, Dept. of Mechanical Engineering.
Research assistant for NASA Lyndon B. Johnson Space Center 1991–93
- Uppsala University, Dept. of Scientific Computing.
PhD student, 1993–97
Teaching in C++-programming 1993–97; in parallel computing 1994–96;
in optimization 1996–97.
- Umeå University, Dept. of Space Physics.
Lektor in Mathematics, 1998–2000
Teaching in calculus and in C-programming 1998–00
- Swedish Institute of Space Physics, Kiruna.
Post Doc, 2001
- NASA’s Goddard Space Flight Center, Greenbelt, Maryland, USA.
National Research Council (NRC) Associate, 2005
- Swedish Institute of Space Physics, Kiruna.
Scientist, 2002–
Deputy Head of the Solar System Physics and Space Technology program.
Operations Manager for the ASPERA-3 experiment, 2002–
PI for ASPERA-3 on Mars Express, 2014–
Representative for the High Performance Computer Center North (HPC2N)

Awards and Grants

- SIAM Student Paper Prize, 1997.
- Bjurzon’s Prize, 1998. Awarded yearly for the best PhD thesis at the Faculty of Science and Technology, Uppsala University.
- Funding from The ESF Standing Committee for Physical and Engineering Sciences (PESC) for arranging the workshop *Modeling of the Mercury Environment: Where are we before BepiColombo?*, in Kiruna, 2004.
- Funding from The Swedish National Space Board (SNSB) for *Modeling the interaction between the solar wind and solar system objects*, 2010–2014.
- The Strömer Ferner award, The Royal Swedish Academy of Sciences, 2011.
- Funding from The Swedish Research Council (VR) for *The Solar Wind Interaction with Mars*, 2012–2014.
- Funding from The European Space Agency (ESA) for *Dusty plasma environments: Near-surface characterisation and modelling*, 2012–2013.
- Funding from The European Space Agency (ESA) for *Production and archiving of solar wind moments from Mars and Venus Express observations*, 2015–2024.

- Funding from The Swedish National Space Agency (SNSA) for *Mars Express/ASPERA-3*, 2015–2026.
- Funding from The Swedish National Space Agency (SNSA) for *Atmospheric escape to space at Mars*, 2020–2024.

Referee Assignments

Geophysical Research Letters, Journal of Geophysical Research, A&A, ApJ, ApJL, MNRAS, PSJ, Journal of Computational Physics, Oxford University Press, AGU Books, SIAM Journal on Scientific Computing, Parallel Computing, Icarus, Planetary and Space Science, Annales Geophysicae, Frontiers in Astronomy and Space Sciences, Earth and Space Science, Advances in Space Research, IEEE Transactions on Magnetism, Computer Physics Communications, Numerical Methods for Partial Differential Equations.

National Science Foundation (NSF) reviewer 2008–2021.

Member of ESA Review Panel for Physical Sciences (AO-2009), 2009.

European Science Foundation (ESF) reviewer 2006–2012, 2016–2025.

Member of SNSB reference group for Horizon 2020, 2014–

NASA Solar System Workings panel, External Reviewer 2025.

NASA Research Opportunities in Space and Earth Sciences (ROSES) reviewer 2010–2013, 2021.

NASA PDS reviewer 2014–2015.

UK Research and Innovation (UKRI), STFC reviewer 2023.

Austrian Science Fund (FWF) reviewer 2024.

EU Horizon 2020 Expert evaluator for the EU Research Infrastructures Work Programme, 2014.

EU Horizon Europe Individual evaluator for EIC Pathfinder Open, 2025.

Member of the Swedish National Allocations Committee (SNAC), 2006–2009.

SNAC reviewer 2009–2020.

Member of the evaluation panel for E-Science, The Council for Research Infrastructures, Swedish Research Council, 2011–2017. Chairman 2012 and 2015.

University of California promotion evaluations, 2017–2023.

Svenska rymdforskarens samarbetsgrupp (SRS) board member in the field of the solar system, 2019–

Member of the Expert Working Group on Astrophysics, ESA Directorate of Human and Robotic Exploration, 2020–2021.

Refereed Publications

- *Constrained Motion Problems With Applications*. Master's thesis, University of Houston, 1993.
- Constrained motion problems with applications by nonlinear programming methods, R. Glowinski and M. Holmström. *Surveys on Mathematics for Industry*, 5:75–108. Springer-Verlag, 1995.
- Parallelizing the fast wavelet transform, Mats Holmström. *Parallel Computing*, 11(21):1837–1848. Elsevier, 1995.
- *Wavelet Based Methods for Time Dependent PDEs*. Doctoral thesis, Uppsala University, 1997.
- Adaptive wavelet methods for hyperbolic PDEs, M. Holmström and Johan Waldén. *Journal of Scientific Computing*, 1(13):19–49. Plenum, 1998.
- Solving hyperbolic PDEs using interpolating wavelets, Mats Holmström, *SIAM Journal on Scientific Computing*, 2(21):405–420, 1999.
- Extraction of a deterministic component from ROSAT X-ray data using a wavelet transform and the principal component analysis, L. Liszka and M. Holmström. *Astronomy & Astrophysics Supplement Series*, 140:125–134, 1999.

- Solving hyperbolic PDEs using conservative subdivision schemes, *Proceedings of the 3rd European Conference: Numerical Mathematics and Advanced Applications*, 542–547. World Scientific, 2000.
- X-ray imaging of the solar wind—Mars interaction, M. Holmström, S. Barabash and E. Kallio, *Geophysical Research Letters*, 7(28):1287–1290, 2001.
- Energetic neutral atoms at Mars: I. Imaging of solar wind protons, M. Holmström, S. Barabash and E. Kallio, *Journal of Geophysical Research-Space Physics*, Vol. 107, No. 10, 2002.
- Energetic neutral atoms at Mars IV: Imaging of planetary oxygen, S. Barabash, M. Holmström, A. Lukyanov and E. Kallio, *Journal of Geophysical Research-Space Physics*, Vol. 107, No. 10, 2002.
- The D-CIXS X-ray mapping spectrometer on SMART-1, M. Grande et al., *Planetary and Space Science*, 51, 427-433, 2003.
- Scientific rationale for the D-CIXS X-ray spectrometer on board ESA’s SMART-1 mission to the Moon, S.K. Dunkin et al., *Planetary and Space Science*, 51, 427-433, 2003.
- X rays from solar wind charge exchange at Mars: A comparison of simulations and observations, H. Gunell, M. Holmström, E. Kallio, P. Janhunen, K. Dennerl, *Geophysical Research Letters*, vol. 31, L22801, 2004. doi:10.1029/2004GL020953
- The solar wind interaction with Venus and Mars: Energetic neutral atom and X-ray imaging, Mats Holmström and Esa Kallio, *Advances in Space Research*, 33(2):187-193, 2004.
- Energetic Neutral Atom imaging at Mercury, A. Lukyanov, S. Barabash, and M. Holmström. *Advances in Space Research*, 33(11):1888-1896, 2004.
- Fast Visualization of Volume Emissions using Conservative Subdivision, Mats Holmström, *Mathematics and Computers in Simulation*, 6(64):631-642, 2004.
- Charge-exchange processes at Mars: ENAs and X-rays, E. Kallio and M. Holmström, in *Mars’ Magnetism, and Its Interaction with the Solar Wind*, Winterhalter et al., Space Sciences Series of ISSI, Springer, 2004.
- Solar Wind-Induced Atmospheric Erosion at Mars: First Results from ASPERA-3 on Mars Express, R. Lundin, S. Barabash, H. Andersson, M. Holmström et al., *Science*, 305, 1933-1936, 2004.
- Planetary ENA Imaging: Venus and a comparison with Mars, H. Gunell, M. Holmström, H. K. Biernat, and N. V. Erkaev, *Planetary and Space Science*, 53, 433–441, 2005. doi:10.1016/j.pss.2004.07.021
- Simulations of X-rays from Solar Wind Charge Exchange at Mars: Parameter dependence, H. Gunell, M. Holmström, E. Kallio, P. Janhunen, K. Dennerl, *Advances in Space Research*, 36(11):2057-2065, 2005. doi:10.1016/j.asr.2005.06.007
- Low Energy Neutral Atom Imaging on the Moon with the SARA Instrument aboard Chandrayaan-1 Mission, Anil Bhardwaj, Stas Barabash, Yoshifumi Futaana, Yoichi Kazama, Kazushi Asamura, David McCann, R. Sridharan, Mats Holmstrom, Peter Wurz, and Rickard Lundin. *Journal of Earth System Science*, v. 114, n. 6, 2005, 749–760, Indian Academy of Sciences.
- Aspects of solar wind interaction with Venus, H.K. Biernat, N.V. Erkaev, I.L. Arshukova, C.J. Farrugia, H. Lammer, T. Penz, U.V. Amerstorfer, D.F. Vogl, T. Zhang, K. Schwingenschuh, R. Nakamura, W. Baumjohann, H. Gunell, M. Holmström, E. Kallio, S. Orsini, A. Milillo, K. Gether, and M. Leitner, in *Solar-Planetary Relations*, H.K. Biernat, H. Lammer, D.F. Vogl, and S. Mühlbachler Eds., Research Signpost, 153–208, 2005.

- MHD modeling of the interaction between the solar wind and solar system objects, Andreas Ekenbäck and Mats Holmström, in *PARA 2004*, J. Dongarra, K. Madsen, and J. Waśniewski, Eds., Lecture Notes in Computer Science 3732, 554-562, Springer-Verlag, 2006. doi:10.1007/11558958_66
- Planetary ENA imaging: Effects of different interaction models for Mars, H. Gunell, M. Holmström, S. Barabash, E. Kallio, P. Janhunen, A.F. Nagy, and Y. Ma, *Planetary and Space Science*, 54(2):117-131, 2006.
- Energetic Neutral Atom Imaging Mass Spectroscopy of the Moon and Mercury Environments, Y. Kazama, S. Barabash, A. Bhardwaj, K. Asamura, Y. Futaana, M. Holmström, R. Lundin, R. Sridharan, and P. Wurz, *Advances in Space Research*, 37(1):38-44, 2006. doi:10.1016/j.asr.2005.05.047
- Observations in the Shadow of Mars by the Neutral Particle Imager, M. Holmström, K. Brinkfeldt, S. Barabash, and R. Lundin, in *Advances in Geosciences. Volume 3: Planetary Science (PS)*, W.H. Ip, and A. Bhardwaj Eds., 119-134, World Scientific Publication Company, 2006. ISBN 981-256-983-8.
- Low Energy Neutral Atoms Imaging of the Moon, Yoshifumi Futaana, Stas Barabash, Mats Holmström, and Anil Bhardwaj, *Planetary and Space Science*, 54(2):132-143, 2006.
- Plasma Acceleration above Martian Magnetic Anomalies, R. Lundin, D. Winningham, S. Barabash, R. Frahm, M. Holmström, et al., *Science*, 311, 980-983, 2006.
- First observation of Mars with XMM-Newton - High resolution X-ray spectroscopy with RGS, K. Dennerl, C.M. Lisse, A. Bhardwaj, V. Burwitz, J. Englhauser, H. Gunell, M. Holmström, F. Jansen, V. Kharchenko and P.M. Rodriguez-Pascual, *Astronomy & Astrophysics*, 451, 709-722, 2006.
- First ENA observations at Mars: Subsolar ENA jet, Y. Futaana, S. Barabash, A. Grigoriev, M. Holmström, et al., *Icarus*, 182(2):413-423, 2006.
- Mass composition of the escaping plasma at Mars, E. Carlsson, A. Fedorov, S. Barabash, E. Budnik, A. Grigoriev, H. Gunell, H. Nilsson, J.-A. Sauvaud, R. Lundin, Y. Futaana, M. Holmström, et al., *Icarus*, 182(2):320-328, 2006.
- First ENA observations at Mars: ENA emissions from the Martian upper atmosphere, Y. Futaana, S. Barabash, A. Grigoriev, M. Holmström, et al., *Icarus*, 182(2):424-430, 2006.
- Plasma Intrusion above Mars Crustal Fields—Mars Express ASPERA-3 Observations, Markus Fränz, J. D. Winningham, E. Dubinin, E. Roussos, J. Woch, S. Barabash, R. Lundin, M. Holmström, et al., *Icarus*, 182(2):406-412, 2006.
- Observations of magnetic anomaly signatures in Mars Express ASPERA-3 ELS data, Y. Soobiah, A. J. Coates, D. R. Linder, D. O. Kataria, J. D. Winningham, R. A. Frahm, J. R. Sharber, J. Scherrer, S. Barabash, R. Lundin, M. Holmström, et al., *Icarus*, 182(2):396-405, 2006.
- Erratum to *Observations of magnetic anomaly signatures in Mars Express ASPERA-3 ELS data*, Y. Soobiah, A. J. Coates, D. R. Linder, D. O. Kataria, J. D. Winningham, R. A. Frahm, J. R. Sharber, J. Scherrer, S. Barabash, R. Lundin, M. Holmström, et al., *Icarus*, 187(2):623-625, 2007.
- Carbon dioxide photoelectron energy peaks at Mars, R. A. Frahm, J. D. Winningham, J. R. Sharber, J. R. Scherrer, S. J. Jeffers, A. J. Coates, D. R. Linder, D. O. Kataria, R. Lundin, S. Barabash, M. Holmström, et al., *Icarus*, 182(2):371-382, 2006.
- First ENA observations at Mars: Solar-wind ENAs on the nightside, K. Brinkfeldt, H. Gunell, P. C:son Brandt, S. Barabash, R.A. Frahm, J.D. Winningham, E. Kallio, M. Holmström, et al., *Icarus*, 182(2):439-447, 2006.

- Electric fields within the martian magnetosphere and ion extraction: ASPERA-3 observations, E. Dubinin, R. Lundin, M. Fränz, J. Woch, S. Barabash, A. Fedorov, D. Winningham, N. Krupp, J.-A. Sauvaud, M. Holmström, et al., *Icarus*, 182(2):337-342, 2006.
- Solar wind plasma protrusion into the martian magnetosphere: ASPERA-3 observations, E. Dubinin, D. Winningham, M. Fränz, J. Woch, R. Lundin, S. Barabash, A. Fedorov, R. Frahm, J. Sharber, A. Coates, N. Krupp, J.-A. Sauvaud, M. Holmström, et al., *Icarus*, 182(2):343-349, 2006.
- Structure of the martian wake, A. Fedorov, E. Budnik, J.-A. Sauvaud, C. Mazelle, S. Barabash, R. Lundin, M. Acuña, M. Holström, et al. *Icarus*, 182(2):329-336, 2006.
- First ENA observations at Mars: Charge exchange ENAs produced in the magnetosheath, H. Gunell, K. Brinkfeldt, M. Holmström, et al., *Icarus*, 182(2):431-438, 2006.
- Ion escape at Mars: Comparison of a 3-D hybrid simulation with Mars Express IMA/ASPERA-3 measurements, E. Kallio, A. Fedorov, E. Budnik, T. Säles, P. Janhunen, W. Schmidt, H. Koskinen, P. Riihelä, S. Barabash, R. Lundin, M. Holmström, et al., *Icarus*, 182(2):350-359, 2006.
- Numerical interpretation of high-altitude photoelectron observations, Michael W. Liemohn, R. Frahm, J. D. Winningham, Y. Ma, S. Barabash, R. Lundin, J. U. Kozyra, A. F. Nagy, S. M. Bougher, J. Bell, D. Brain, D. Mitchell, J. Luhmann, M. Holmström, et al., *Icarus*, 182(2):383-395, 2006.
- Electron oscillations in the induced martian magnetosphere, J. D. Winningham, R. A. Frahm, J. R. Sharber, A. J. Coates, D. R. Linder, Y. Soobiah, E. Kallio, J. R. Espley, R. Lundin, S. Barabash, M. Holmström, et al., *Icarus*, 182(2):360-370, 2006.
- Energetic Neutral Atoms (ENA) at Mars: Properties of the hydrogen atoms produced upstream of the Martian bow shock and implications for ENA sounding technique around non-magnetized planets, E. Kallio, S. Barabash, K. Brinkfeldt, H. Gunell, M. Holmström, et al., *Icarus*, 182(2):448-463, 2006.
- Ionospheric Plasma Acceleration at Mars: ASPERA-3 results, R. Lundin, D. Winningham, S. Barabash, R. Frahm, H. Andersson, M. Holmström, et al., *Icarus*, 182(2):308-319, 2006.
- Direct Measurements of Energetic Neutral Hydrogen in the Interplanetary Medium, A. Galli, P. Wurz, S. Barabash, A. Grigoriev, R. Lundin, Y. Futaana, H. Gunell, M. Holmström, et al. *The Astrophysical Journal*, 644:1317-1325, 2006.
- Loss of hydrogen and oxygen from the upper atmosphere of Venus, H. Lammer, H. I. M. Lichtenegger, H. K. Biernat, N. V. Erkaev, I. L. Arshukova, C. Kolb, H. Gunell, A. Lukyanov, M. Holmstrom, S. Barabash, T. L. Zhang, and W. Baumjohann, *Planetary and Space Science*, 54(13-14):1445-1456, 2006. doi:10.1016/j.pss.2006.04.022
- Asymmetries in Mars' Exosphere: Implications for X-ray and ENA Imaging, M. Holmström, *Space Science Reviews*, 126(1-4):435-445, 2006.
- The Hydrogen Exospheric Density Profile Measured with ASPERA-3/NPD, A. Galli, P. Wurz, H. Lammer, H.I.M. Lichtenegger, R. Lundin, S. Barabash, A. Grigoriev, M. Holmström, H. Gunell, *Space Science Reviews*, 126(1-4):447-467, 2006.
- Energetic Hydrogen and Oxygen Atoms Observed on the Nightside of Mars, A. Galli, P. Wurz, S. Barabash, A. Grigoriev, H. Gunell, R. Lundin, M. Holmström, and A. Fedorov, *Space Science Reviews*, 126(1-4):267-297, 2006.

- Locations of Atmospheric Photoelectron Energy Peaks within the Mars Environment, R.A. Frahm, J.R. Sharber, J.D. Winningham, P. Wurz, M.W. Liemohn, E. Kallio, M. Yamauchi, R. Lundin, S. Barabash, A.J. Coates, D.R. Linder, J.U. Kozyra, M. Holmström, S.J. Jeffers, H. Andersson, S. McKenna-Lawler, *Space Science Reviews*, 126(1–4):389–402, 2006.
- Simulations of Solar Wind Charge Exchange X-ray emissions at Venus, H. Gunell, E. Kallio, R. Jarvinen, P. Janhunen, M. Holmström, K. Dennerl, *Geophysical Research Letters*, 34, L03107, 2007. doi:10.1029/2006GL028602.
- First observation of energetic neutral atoms in the Venus environment, A. Galli, P. Wurz, P. Bochsler, S. Barabash, A. Grigoriev, Y. Futaana, M. Holmström, et al., *Planetary and Space Science*, 56(6):807–811, 2008.
- Ionospheric Photoelectrons at Venus: Initial Observations by ASPERA-4 ELS, A. J. Coates, R. A. Frahm, D. R. Linder, D. O. Kataria, Y. Soobiah, G. Collinson, J. R. Sharber, J. D. Winningham, S. J. Jeffers, S. Barabash, J.A. Sauvaud, R. Lundin, M. Holmström, et al., *Planetary and Space Science*, 56(6):802–806, 2008.
- The Venusian induced magnetosphere: A case study of plasma and magnetic field measurements on the Venus Express mission, Kallio, E., T.L. Zhang, S. Barabash, R. Jarvinen, I. Sillanpää, P. Janhunen, A. Fedorov, J.A. Sauvaud, C. Mazelle, J.J. Thocaven H. Gunell, H. Andersson, A. Grigoriev, K. Brinkfeldt, Y. Futaana, M. Holmström, R. Lundin, M. Yamauchi, et al., *Planetary and Space Science*, 56(6):796–801, 2008.
- Mars Express/ASPERA-3/NPI and IMAGE/LENA observations of energetic neutral atoms in Earth and Mars orbit, M. Holmström, M.R. Collier, S. Barabash, K. Brinkfeldt, T.E. Moore, and D. Simpson, *Advances in Space Research*, 41(2):343–350, 2007. doi: 10.1016/j.asr.2007.09.011
- Auroral Plasma Acceleration above Martian Magnetic Anomalies, R. Lundin, D. Winningham, S. Barabash, R. Frahm, D. Brain, H. Nilsson, M. Holmström, et al., *Space Science Reviews*, 126(1–4):333–354, 2006.
- The Analyzer of Space Plasmas and Energetic Atoms (ASPERA-3) for the Mars Express Mission, S. Barabash, R. Lundin, H. Andersson, K. Brinkfeldt, A. Grigoriev, H. Gunell, M. Holmström, et al., *Space Science Reviews*, 126(1–4):113–164, 2006.
- Energisation of O⁺ and O²⁺ ions at Mars: An analysis of a 3-D quasi-neutral hybrid model simulation, E. Kallio, A. Fedorov, S. Barabash, P. Janhunen, H. Koskinen, W. Schmidt, R. Lundin, H. Gunell, M. Holmström, Y. Futaana, M. Yamauchi, A. Grigoriev, J. D. Winningham, R. Frahm, J. R. Sharber. *Space Science Reviews*, 126(1–4):39–62, 2006.
- IMF direction derived from cycloid-like ion distribution observed by Mars Express, M. Yamauchi, Y. Futaana, A. Fedorov, E. Dubinin, R. Lundin, J.-A. Sauvaud, D. Winningham, R. Frahm, S. Barabash, M. Holmstrom, et al., *Space Science Reviews*, 126(1–4):239–266, 2006.
- The Analyzer of Space Plasmas and Energetic Atoms (ASPERA-4) for the Venus Express Mission, S. Barabash, J.-A. Sauvaud, H. Gunell, H. Andersson, A. Grigoriev, K. Brinkfeldt, M. Holmström, et al., *Planetary and Space Science*, 55(12):1772–1792, 2007.
- The loss of ions from Venus through the plasma wake, S. Barabash, A. Fedorov, J.J. Sauvaud, R. Lundin, C.T. Russell, Y. Futaana, T.L. Zhang, H. Andersson, K. Brinkfeldt, A. Grigoriev, M. Holmström, M. Yamauchi, et al., *Nature*, 450, 650–653, 2007.
- Energetic neutral atoms as the explanation for the high velocity hydrogen around HD 209458b, M. Holmström, A. Ekenbäck, F. Selsis, T. Penz, H. Lammer, and P. Wurz, *Nature*, 451, 970–972, 2008.

Supplementary information at www.nature.com

- Location of the bow shock and ion composition boundaries at Venus — initial determinations from Venus express ASPERA-4, C. Martinecz, M. Fränz, J. Woch, N. Krupp, E. Roussos, E. Dubinin, U. Motschmann, S. Barabash, R. Lundin, M. Holmström, et al., *Planetary and Space Science*, 56(6):780–784, 2008.
- Mars Express and Venus Express multi-point observations of geoeffective solar flare events in December 2006, Y. Futaana, S. Barabash, M. Yamauchi, S. McKenna-Lawlor, J.G. Luhmann, D. Brain, E. Carlsson, J.-A. Sauvaud, J.D. Winningham, R.A. Frahm, P. Wurz, M. Holmström, et al., *Planetary and Space Science*, 56(6):873–880, 2008.
- Comparative analysis of Venus and Mars magnetotails, A. Fedorov, C. Ferrier, J.A. Sauvaud, S. Barabash, T.L. Zhang, C. Mazelle, R. Lundin, H. Gunell, H. Andersson, K. Brinkfeldt, Y. Futaana, A. Grigoriev, M. Holmström, et al., *Planetary and Space Science*, 56(6):812–817, 2008.
- Energetic neutral atom imaging of comets, A. Ekenbäck, M. Holmström, S. Barabash, H. Gunell, *Geophysical Research Letters*, 35, L05103, 2008.
- Shear driven waves in the induced magnetosphere of Mars, H. Gunell, U.V. Amerstorfer, H. Nilsson, C. Grima, M. Koepke, M. Fränz, J.D. Winningham, R.A. Frahm, J.-A. Sauvaud, A. Fedorov, N.V. Erkaev, H.K. Biernat, M. Holmström, R. Lundin, and S. Barabash, *Plasma Physics and Controlled Fusion*, 50, 074018, 2008.
- Advanced method to derive the IMF direction near Mars from cycloidal proton distributions, M. Yamauchi, Y. Futaana, A. Fedorov, E. Kallio, R.A. Frahm, R. Lundin, J.-A. Sauvaud, D.J. Winningham, S. Barabash, and M. Holmström, *Planetary and Space Science*, 56(8):1145–1154, 2008.
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- A Comet-like Escape of Ionospheric Plasma from Mars, R. Lundin, S. Barabash, M. Holmström, H. Nilsson, M. Yamauchi, M. Fraenz, and E.M. Dubinin. *Geophysical Research Letters*, 35, L18203, 2008.
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- Statistical analysis of the observations of the MEX/ASPERA-3 NPI in the shadow, A. Milillo, A. Mura, S. Orsini, S. Massetti, P. Cson Brandt, T. Sotirelis, R. D’Amicis, S. Barabash, R.A. Frahm, E. Kallio, A. Galli, P. Wurz, M. Holmstrom, E.C. Roelof, J.D. Winningham, P. Cerulli-Irelli, S. Livi, R. Lundin, M. Maggi, and A. Morbidini. *Planetary and Space Science*, 57(8-9):1000–1007, 2009.

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- Exoplanet Upper Atmosphere Environment Characterization, Helmut Lammer, Kristina G. Kislyakova, Petra Odert, Martin Leitzinger, Maxim L. Khodachenko, Mats Holmström and Arnold Hanslmeier, *From Interacting Binaries to Exoplanets: Essential Modeling Tools*, IAU Symposium S282, 525–532, Mercedes T. Richards & Ivan Hubeny, eds., 2012.

- Modeling the Lunar plasma wake, M. Holmström, B. Eliasson, O5.409, 39th EPS Conference on Plasma Physics and 16th International Congress on Plasma Physics, S. Ratynskaya, L. Blomberg, A. Fasoli, eds., Europhysics Conference Abstracts, Vol. 36F, ISBN 2-914771-79-7, European Physical Society, 2012.
- The Hot and Energetic Universe: Solar system and exoplanets, G. Branduardi-Raymont, S. Sciortino, K. Dennerl, M. Güdel, M. Holmstrom, D. Koutroumpa, A. Maggio, G. Micela, I. Pillitteri, J. Sanz-Forcada, A. Read, A. Bhardwaj, Y. Ezoe, and R. Gladstone, arXiv, 1306.2332, 2013.
- Stability of Earth-like N₂ atmospheres: Implications for habitability, H. Lammer, K.G. Kislyakova, M. Güdel, M. Holmström, N.V. Erkaev, P. Odert, and M.L. Khodachenko, *The early evolution of the atmospheres of terrestrial planets*, Astrophysics and Space Science Proceedings, Vol. 35, Springer, 33–52, J.M. Trigo-Rodríguez, F. Raulin, C. Müller & C. Nixon, eds., 2013.
- Handling vacuum regions in a hybrid plasma solver, *Numerical modeling of space plasma flows (ASTRONUM-2012)*, ASP Conference Series, vol. 474, 202–207, 2013.
- Stellar Driven Evolution of Hydrogen-Dominated Atmospheres from Earth-like to Super-Earth-type Exoplanets, Kristina G. Kislyakova, Mats Holmström, Helmut Lammer, and Nikolai V. Erkaev, *Characterizing Stellar and Exoplanet Environments*, Helmut Lammer & Maxim L. Khodachenko, eds., Astrophysics and Space Science Library Volume 411, Springer, 137–151, 2015.
- Characterising exoplanets and their environment with UV transmission spectroscopy, L. Fossati et al., White paper submitted to STScI for Hubble’s 2020 vision, 2015. arXiv:1503.01278
- ESA SciSpacE white papers, Astrophysics, Space Plasma Physics, 2021.
- The Influence of Planetary and Stellar Characteristics on Atmospheric Escape and Habitability, Whitepaper #037 in the Decadal Survey for Solar and Space Physics (Heliophysics) 2024-2033, Dave Brain, Ofer Cohen, Kevin France, Yoshifumi Futaana, Alex Gloer, Parker Hinton, Mats Holmstrom, François Leblanc, Yingjuan Ma, William Peterson, Shotaro Sakai, Ennio Sanchez, Nee-sha Schnepf, and Robert Strangeway, Bulletin of the AAS, Vol. 55, Issue 3, 2023.
- Atmospheric Escape Influences Planetary Habitability, D. Brain et al., Community White Papers for NASA Decadal Astrobiology Research and Exploration Strategy (NASA-DARES 2025)

Popular Publications

- Parallelizing the Fast Wavelet Transform, *PDC Progress Report*, Paralleldatorcentrum, KTH, 76–78, 1993.
- Interpreting an ENA image, *Aspera Aspirations*, IRF, 1:5, 2001.
- Charge-Exchange Processes near Mars, *HPC2N Progress Report*, High Performance Computing Center North, Umeå University, 24–25, 2002.
- Where did the water on Mars go?, *Nordic Space Activities*, 1:8–9, 2003.
- ASPERA-3 on its way to Mars, *Nordic Space Activities*, 3:15–16, 2003.
- Ett Svenskt instrument vid Mars, *Aktuell Forskning & Utveckling*, 2, 2004.
- Written in the stars, *Public Service Review: European Science & Technology*, 10, 2011.
- Written in the stars, *Public Service Review: European Union*, 21, 2011.

Invited Presentations

- Stanford, July 1997, Solving hyperbolic PDEs using interpolating wavelets, SIAM Annual Meeting.
- Umeå, November 8, 2000, Simulations of Charge-Exchange Processes near Mars, The HPC2N Workshop on Computing in Science and Engineering.
- Nice, March 26, 2001, X-ray Imaging of the Solar Wind-Mars Interaction, EGS XXVI General Assembly.
- Bern, October 25, 2001. Simulations of charge-exchange processes near Mars, Mars' magnetism, and its interaction with the solar wind: A comparison of Mars Global Surveyor and Phobos mission data, Workshop, International Space Science Institute (ISSI).
- Houston, October 15, 2002. The Solar Wind Interaction with Venus and Mars: Energetic Neutral Atom and X-Ray Imaging, World Space Congress, COSPAR.
- Paris, July 20, 2004. The Latest Results on the Energetic Neutral Atoms and Plasma of Mars from the ASPERA Instrument of Mars Express, COSPAR.
- Paris, July 22, 2004. ENA Imaging on Moon, COSPAR.
- Umeå, October 12, 2004. A Journey to Mars, the moon, Venus and Mercury: Computer Simulations in Solar System Physics, SNIC/HPC2N-evaluation.
- Umeå, December 7, 2004. A Journey to Mars, the moon, Venus and Mercury: Computer Simulations in Solar System Physics, Inauguration of HPC2Ns cluster Sarek.
- San Francisco, December 17, 2004. Exploring the Moon and Mars solar wind interaction using energetic neutral atoms, AGU Fall Meeting.
- Singapore, June 20, 2005, ENA observations in the eclipse of Mars, AOGS 2nd Annual Meeting.
- Singapore, June 21, 2005, Energetic Neutral Atom Imaging of Mercury and the Moon. Science and Instrumentation AOGS 2nd Annual Meeting.
- Singapore, June 23, 2005, ENA Production at Mars, the Moon, and Mercury, AOGS 2nd Annual Meeting.
- Singapore, June 23, 2005, ENA emissions from Mars: simulations and observations on Mars Express, AOGS 2nd Annual Meeting.
- Singapore, June 23, 2005, Analyzer of Space Plasmas and Energetic Neutral Atoms (ASPERA-4) Onboard Venus Express, AOGS 2nd Annual Meeting.
- Lund, November 21, 2006, Solar Wind-Planet Interactions, SNIC Interaction.
- Bern, March 17, 2008, Characterisation of exoplanet atmospheres, magnetospheres and stellar winds from ENA observations, ISSI team meeting on "Characterisation and Evolution of Exoplanet Atmospheres"
- Bern, February 10, 2009, A modular hybrid code, ISSI team meeting on "Intercomparison of Global Models and Measurements of the Martian Plasma Environment"
- Bern, March 23, 2009, Energetic neutral atoms around HD 209458b: Estimations of magnetospheric properties, ISSI team meeting on "Characterisation and Evolution of Exoplanet Atmospheres"
- Uppsala, June 29–July 3, 2009, Hybrid modeling of plasmas, European Conference on Numerical Mathematics and Advanced Applications, ENUMATH 2009.

- Graz, Austria, November 30, 2009, Characterizing stellar winds via exoplanet-ENA-cloud observations, ESF strategic workshop: Observation, characterisation and evolution of habitable exoplanets and their host stars.
- San Diego, June 13–18, 2010, Hybrid modeling of space plasmas using the FLASH code, 5th International Conference on Numerical Modeling of Space Plasma Flows, ASTRONUM 2010.
- Bern, June 22, 2010, Observational constraints on the exospheres and stellar wind interactions of transiting exoplanets, ISSI team meeting on "Characterisation and Evolution of Exoplanet Atmospheres"
- Rome, September 21, 2010, Energetic Neutral Atoms in Planetary Systems, European Planetary Science Congress.
- ESAC, Madrid, September 30, 2010, Energetic Neutral Atom Observations in the Solar System and Beyond, Charge Exchange Madrid.
- Sapporo, Japan, October 8, 2010, Modeling the Interaction Between the Moon and the Solar Wind, 5th Alfvén Conference on Plasma Interaction with Non-magnetized Planets/Moons and its Influence on Planetary Evolution, Hokkaido University.
- Melbourne, Australia, July 6, 2011, The Interaction Between the Moon and the Solar Wind, IUGG.
- Ahmedabad, India, December 13, 2011, Modeling the moon-solar wind interaction, 7th Chandrayaan-1 Meeting, Physical Research Laboratory.
- Bern, March 20, 2012, ENA observations in the solar system and beyond, ISSI team meeting on "Characterizing stellar and exoplanetary environments via observations and advanced modelling techniques".
- Umeå, May 31, 2012. How Stellar Winds Interact with Planets, HPC2N Symposium — Inauguration of Abisko.
- Big Island, Hawaii, USA, June 26, 2012. Handling Vacuum Regions in a Hybrid Plasma Solver, ASTRONUM 2012.
- Beijing, China, August 27, 2012. Characterisation of exoplanet atmospheres, magnetospheres and stellar winds from energetic neutral atom observations, IAU XXVIII General Assembly.
- Bern, November 13, 2012, An Open Hybrid Plasma Solver: Capabilities for Airless Bodies, ISSI team meeting on "Kinetic plasma processes at airless bodies".
- Bern, January 14, 2013, Observations and modeling of soft X-rays from Venus and Mars, ISSI team meeting on "Soft X-ray Emissions".
- Stockholm, June 18, 2013. Characterisation of exoplanet atmospheres, magnetospheres and stellar winds from energetic neutral atom observations, Nordita Scientific program on Photo-Evaporation in Astrophysical Systems.
- Biarritz, France, July 2, 2013. Hybrid modeling of the interaction between the solar wind and planets, ASTRONUM 2013.
- Les Houches, France, October 24, 2013. Aeronomy, atmosphere-solar wind interaction, escape, Planet Mars IV workshop.
- Long Beach, USA, June 27, 2014. A Hybrid Model for the Interaction Between the Solar Wind and Planets Implemented in FLASH, ASTRONUM 2014.
- Bern, August 10, 2015, An Open Hybrid Plasma Solver: Recent activities, ISSI team meeting on "Kinetic plasma processes at airless bodies".
- Dubrovnik, Croatia, May 26, 2016, Current Systems at Moons, AGU Chapman Conference on Currents in Geospace and Beyond.

- Riga, Latvia, September 21, 2017. Interaction between Mars' induced magnetosphere and the comet Siding Spring, European Planetary Science Congress 2017.
- Umeå, November 30, 2017. How the Solar Wind interacts with the Moon, Mars, Comets, Ceres, Ganymede, Callisto and Exoplanets, HPC2N Open House with Kebnekaise Celebration.
- Nicosia, Cyprus, October 15, 2018. Highlights from ASPERA-3 during 10 years of MUAN, MUAN Jubilee Workshop, International Space Summit.
- KTH, October 12, 2020. Mars and Lunar exploration, ongoing activities at IRF, Space Rendezvous: Towards Moon and Mars.
- Boulder, USA, October 16, 2024. ASPERA-3 update, MAVEN Team Meeting.
- Umeå, October 16, 2025. Particle-in-cell simulations of the interactions between the solar wind and planets, Keynote talk, the Swedish eScience Academy.

Seminars

- Uppsala, April 1997, Solving hyperbolic PDEs using interpolating wavelets, TDB Seminar.
- Uppsala, May 1999, Solving hyperbolic PDEs using conservative subdivision, TDB Seminar.
- Kiruna, June 1999, Solving hyperbolic PDEs using conservative subdivision, IRF Seminar.
- Chicago, May 22, 2000, Energetic neutral atom images near Mars: On the parameterization of the Mars-Solar wind interaction models, University of Chicago, Dept. of Computer Science.
- Helsinki, August 30, 2000, ENA Simulations at IRF, 6th ASPERA-3 Meeting, Hotel Kiljavanranta.
- Uppsala, December 13, 2000, Simulations of charge-exchange processes near Mars and related inverse problems, Uppsala University, Dept. of Scientific Computing.
- Kiruna, February 13, 2001, Simulations of Charge-Exchange Processes near Mars, IRF Seminar.
- Kiruna, November 6, 2001, Fast neutral atom imaging: A journey to Mars, Mercury, and back, IRF Seminar.
- Kiruna, June 4, 2002, Fast Volume Rendering, IRF Seminar.
- Kiruna, September 5, 2002. Simulations of charge-exchange processes near Mars, IRF dagarna.
- Kiruna, October 30, 2002, Computing ion distributions near Mercury using the HPC2N Super Cluster, HPC2N Seminar.
- Kiruna, November 5, 2002, The Solar Wind Interaction with Venus and Mars: Energetic Neutral Atom and X-Ray Imaging, 8th ASPERA-3 Meeting, ASPERA-4 Kick-off Meeting, IRF.
- Stockholm, January 22, 2003, Computer Simulations of the Solar Wind Interaction with Solar System Objects: Applications for X-ray and ENA Imaging, KTH, Nada.
- Coventry, U.K., January 24, 2003, Computer Simulations of the Solar Wind Interaction with Solar System Objects: Applications for X-ray and ENA Imaging, University of Warwick, Space and Astrophysics Group.
- Kiruna, October 23, 2003, Monte Carlo simulations of planetary ions and neutrals at Mercury, IRF Seminar.

- Kiruna, October 14, 2004. Are Computer Simulations Science?, Docent Lecture.
- Greenbelt, Maryland, USA, August 29, 2005, ENA emissions from Mars: simulations and observations on Mars Express, LENA team telecon, NASA, GSFC.
- Kiruna, October 4, 2007, Energetic Neutral Atoms Around Extrasolar Planets, IRF Seminar.
- Bern, March 19, 2008, Energetic neutral atoms as the explanation for high-velocity hydrogen around an extrasolar planet, University of Bern.
- Uppsala, December 10, 2008, Characterisation of exoplanet atmospheres, magnetospheres and stellar winds from energetic neutral atom observations, Swedish Institute of Space Physics/Department of Astronomy and Space Physics, Uppsala University.
- Stockholm, March 25, 2010, The interaction of the solar wind with planets, SRS Meeting, Stockholm University.
- Kiruna, September 9, 2010, Modeling the Interaction Between the Moon and the Solar Wind, IRF Seminar.
- Sao Jose dos Campos, Brazil, November 24, 2010, Interactions between the solar wind and planets, Instituto Nacional de Pesquisas Espaciais (INPE; National Institute for Space Research).
- Stockholm, March 19, 2011, The Solar Wind Interaction with the Moon, the Alfvén Laboratory, Royal Institute of Technology (KTH), Stockholm.
- Stockholm, October 14, 2011, Characterisation of exoplanet atmospheres, magnetospheres and stellar winds from energetic neutral atom observations, The Department of Astronomy at Stockholm University, Stockholm.
- Kiruna, May 24, 2012, Modeling the Interaction Between the Moon and the Solar Wind. Part II, IRF Seminar.
- Kiruna, September 25, 2014, Planetary solar wind charge exchange X-ray emissions, IRF Seminar.
- Kiruna, October 17, 2014, Comet Siding Spring flyby of Mars, IRF Seminar.
- Kiruna, September 8, 2016, Colliding magnetospheres: Comet Siding Spring flyby of Mars, IRF Seminar.
- Uppsala, November 30, 2016, Hybrid modeling of the interaction between the solar wind and planets, Uppsala University, Dept. of Scientific Computing.
- Kiruna, May 24, 2018, Mars Express and ASPERA-3 celebrates 15 years at Mars, IRF Seminar.
- Kiruna, April 15, 2021, Estimating Ion Escape from Unmagnetized Planets, IRF Seminar.
- Kiruna, March 3, 2022, Did Mariner IV cross the bow wave of Mars?, IRF Seminar.
- Kiruna, September 21, 2023, Mars Express and ASPERA-3: Twenty years at Mars, IRF Seminar.
- Kiruna, October 2, 2025, Current systems at non-magnetized planets, IRF Seminar.

Contributed Presentations

- Oslo, January 1997, Solving hyperbolic PDEs using interpolating wavelets, Nordic computational differential equations circus.
- Atlanta, May 1999, Solving hyperbolic PDEs using conservative subdivision, SIAM Annual Meeting.
- Jyväskylä, July 1999, Solving hyperbolic PDEs using conservative subdivision, Enumath 99.
- Washington D. C., May 30, 2000, Energetic neutral atom images near Mars: On the parameterization of the Mars-Solar wind interaction models, AGU Spring Meeting.
- San Francisco, December 16, 2000, X-ray Imaging of the Solar Wind-Mars Interaction, AGU Fall Meeting.
- Chicago, October 4, 2001, Neutral Atom Imaging near Mercury, Workshop on Mercury: Space Environment, Surface, and Interior The Lunar and Planetary Institute.
- Yosemite National Park, February 8, 2002. Fast imaging of energetic neutral atoms near Mars, Magnetospheric Imaging Workshop.
- Nice, April 7, 2003, Monte Carlo simulations of global planetary ion distributions at Mercury poster presentation, EGS - AGU - EUG Joint Assembly.
- Lyngby, June 22, 2004. MHD modeling of the interaction between the solar wind and solar system objects, PARA'04.
- Vienna, April 29, 2005, ENA observations in the eclipse of Mars, EGU General Assembly.
- San Francisco, December 5, 2005. Mars Express/ASPERA-3/NPI and IMAGE/LENA Observations Downstream of the Heliospheric Neutral Atom Flow, M.R. Collier, M. Holmström, et al., AGU Fall Meeting.
- San Francisco, December 8, 2005. A Collisional Exospheric Model for Mars: Implications for X-ray and ENA Imaging, AGU Fall Meeting.
- Kiruna, Sweden, March 1, 2006, Asymmetries in Mars' Exosphere: Implications for X-ray and ENA Imaging, Kiruna Mars Workshop: Solar wind interaction and atmospheric evolution.
- Beijing, July 17–21, 2006. The effects of Mars' exosphere on ENA observations, COSPAR.
- Umeå, Sweden, June 18–21, 2006, A Modular Software for Particle Simulations in Space Physics, PARA 06.
- Berlin, September 18–22, 2006. The effects of Mars' exosphere on ENA observations, The Hydrogen Energetic Neutral Atom Environment of Hot Jupiters, A. Ekenbäck, M. Holmström, et al., The European Planetary Science Congress.
- San Francisco, December 11–15, 2006. Modeling Mars' Hydrogen Exosphere, AGU Fall Meeting.
- Potsdam, Germany, August 22, 2007. Energetic neutral atoms around the extrasolar planet HD 209458b, European Planetary Science Congress.
- San Francisco, December 10–14, 2007. Energetic Neutral Atoms Around the Extrasolar Planet HD 209458b, AGU Fall Meeting.
- San Diego, January 22–25, 2008. Why should we compare models?, Chapman Conference on the Solar Wind Interaction with Mars.

- San Diego, January 22–25, 2008. A self-consistent Mars-Solar wind interaction model, poster presentation, Chapman Conference on the Solar Wind Interaction with Mars.
- Boston, May 19–23, 2008. Energetic neutral atoms as the explanation for the high velocity hydrogen around HD 209458b, Transiting Planets, IAU Symposium No. 253.
- Saint Petersburg, May 26–30, 2008. Energetic neutral atoms as the explanation for the high velocity hydrogen around HD 209458b (presented by T. Penz), Problems of Geocosmos.
- Vienna, April 23, 2009, Modeling the solar wind interaction with the Moon, EGU General Assembly.
- Potsdam, Germany, September 13-18, 2009. ENAs around HD 209458b: Estimations of magnetospheric properties, European Planetary Science Congress.
- Macau, October 21–24, 2009. Global hybrid simulation of the solar wind-Moon interaction, Lunar Plasma Environment Science Workshop.
- San Francisco, December 14–18, 2009. Dynamics of solar wind protons reflected by the Moon, AGU Fall Meeting.
- San Francisco, December 8, 2011. The Dynamic Lunar Wake, AGU Fall Meeting.
- Stockholm, July 6, 2012. Modeling the Lunar plasma wake, 39th European Physical Society Conference on Plasma Physics, 16th International Congress on Plasma Physics.
- Madrid, Spain, 23–28 September, 2012. An Open Hybrid Plasma Solver, European Planetary Science Congress.
- San Francisco, December 6, 2012. The Interaction Between the Moon and the Solar Wind, AGU Fall Meeting.
- San Francisco, December 10, 2013. Callisto Plasma Interactions, AGU Fall Meeting.
- London, July 10, 2014. Mars as a comet, 6th Alfven Conference.
- San Francisco, December 17, 2014. Modeling the plasma interactions of Phobos, AGU Fall Meeting.
- Lund, May 8, 2015. Characterising exoplanet atmospheres, magnetospheres and stellar winds from energetic neutral atom observations, Exoplanets in Lund 2015.
- Singapore, August 7, 2015. Mars solar wind interaction, AOGS 12th Annual Meeting.
- Lancaster, September 22, 2015. Siding Spring: Ion observations and hybrid modelling, MUAN meeting.
- San Francisco, December 16, 2015. The Interaction Between the Magnetosphere of Mars and that of Comet Siding Spring, AGU Fall Meeting.
- Los Angeles, 19 October, 2016. Ceres interaction with the solar wind, DPS48/EPSC11.
- San Francisco, December 12, 2016. Colliding magnetospheres: Comet Siding Spring flyby of Mars, AGU Fall Meeting.
- Boulder, Colorado, USA, May 17, 2017. The Mars Express/ASPERA-3 and Venus Express/ASPERA-4 solar wind databases, International Conference on Mars Aeronomy.
- Kiruna, Sweden, September 15, 2017. Characterizing exoplanet atmospheres, magnetospheres and stellar winds from energetic neutral atom observations, Astronomdagarna 2017.

- Madrid, Spain, February 27, 2018. The Mars Express/ASPERA-3 and Venus Express/ASPERA-4 solar wind databases, Mars Science Workshop "From Mars Express to ExoMars".
- ESTEC, May 14, 2018. The Mars Express/ASPERA-3 and Venus Express/ASPERA-4 solar wind databases, 52nd ESLAB Symposium: Comparative Aeronomy and Plasma Environment of Terrestrial Planets.
- Hawaii, USA, June 4, 2018. The Solar Wind Interaction with Mercury, AOGS.
- Pasadena, USA, July 18, 2018. The Solar Wind Interaction with Mercury, COSPAR.
- San Francisco, December 11, 2019. Stellar Wind Energy Influx to Intrinsic Magnetospheres, AGU Fall Meeting.
- Virtual, 15–17 June, 2021. Estimating Ion Escape from Unmagnetized Planets, Workshop on the Influence of a Global Magnetic Field on Ion and Atmospheric Loss and Planetary Habitability.
- New Orleans, 13 December, 2021, Estimating Ion Escape from Unmagnetized Planets, AGU Fall Meeting.
- Uppsala, 2 May, 2022. Estimations of Ion Escape from Mars, Mars Upper Atmosphere Network (MUAN) Meeting.
- Athens, Greece, July 22, 2022. Estimations of Ion Escape from Mars, 44th COSPAR Scientific Assembly.
- Granada, Spain, 22 September, 2022. Estimations of Ion Escape from Mars, Europlanet Science Congress.
- New York, 12 September, 2023. The influence of solar wind conditions on ion escape at Mars, MUAN and MAVEN meeting.
- San Antonio, 3 October, 2023. The Influence of Solar Irradiation and Solar Wind Conditions on Heavy Ion Escape From Mars, DPS 55 joint with EPSC 2023..
- San Francisco, 14 December, 2023. The Influence of Solar Irradiation and Solar Wind Conditions on Heavy Ion Escape From Mars, AGU Fall Meeting.
- Busan, Korea, 15 July, 2024. Ion Escape and Current Systems at Mars, 45th COSPAR Scientific Assembly.
- Pasadena, USA, 23 July, 2024. Ion Escape and Current Systems at Mars, Tenth International Conference on Mars.
- Beijing, China, 27 August, 2024. Mars Express related science and archiving, ISSI-BJ Team Meeting.
- London, UK, 20 May, 2025. Modeling Mars' plasma system global dynamics, 2025 M-MATISSE Community Workshop.
- Madison, USA, 17 July, 2025. Stellar wind interactions with resistive obstacles, ASTRONUM 2025.
- Lisbon, Portugal, 1 September, 2025. Current systems at non-magnetized planets, IAGA/IASPEI Joint Scientific Meeting 2025.
- Helsinki, Finland, 8 September, 2025. Current systems at non-magnetized planets, EPSC-DPS Joint Meeting 2025.
- New Orleans, USA, 15-19 December, 2025. The dynamics of ion escape from non-magnetized planets, AGU25.

Popular

- Uppsala University, October, 1997, Wavelet Based Methods for Time Dependent PDEs, Doctoral thesis, Uppsala University.
- Kiruna, February 1999, Vetenskapliga beräkningar och virtuella satelliter, IRF Seminar.
- Kiruna, March 26, 2002, and April 14, 2003, Interaction processes between the solar wind and planets: Current and future satellite experiments, presentation for Austrian physics teachers.
- Kiruna, October 24, 2002. X-ray emissions from comets and planets, presentation for NV1, Hjalmar Lundbohmsskolan.
- Kiruna, September 27-28, 2003. ASPERA-3 Status and IRFs Part in SMART-1, presentation at SMART-1 launch event.
- Kiruna, November 27, 2003. Mars Express: Kiruna på väg till Mars, presentation at Ferrum for Dataföreningen.
- Kiruna, January 29, 2004. Aktuella rymdprojekt vid IRF, presentation at KRM for University of Lund, "Rymdens fysik".
- Kiruna, March 30, 2004. Kommunikation i rymden, SUNET TREFpunkt vårmöte.
- Kiruna, May 6, 2004. Mars Exploration, presentation for students from Donnergymnasiet.
- Kiruna, October 22, 2004. Kiruna goes to the moon – Science with SARA. Moon event, IRF.
- Kiruna, January 28, 2007. Svenska instrument vid Mars och Venus. Presentation in the City Hall during the annual Snow Festival.
- Kiruna, April 24, 2007. Swedish Instruments at Mars and Venus. Presentation for students from Rymdgymnasiet 2 and Belgium.
- Kiruna, August 29, 2007. Svenska instrument vid Mars och Venus, presentation for NV 1-3, Hjalmar Lundbohmsskolan.
- Kiruna, February 18, 2008. IRF Instruments at Mars and Venus. Presentation for Space Master students, LTU.
- Kiruna, May 28, 2008. Svenska instrument vid Mars och Venus. Presentation for Technical Visits' guides.
- Kiruna, May 30, 2008. Datormodeller för Mars. Presentation for students at Rymdgymnasiet.
- Kiruna, January 19, 2009. Exoplaneter. Presentation for students at Rymdgymnasiet 3.
- Kiruna, June 16, 2009. Svenska instrument vid Mars och Venus, presentation for high school students from Skövde.
- Kiruna, June 7, 2010. Solsystemets Fysik. Presentation for students at Rymdgymnasiet.
- Kiruna, November 30, 2011. Hur solvinden påverkar planeter. Presentation for Rymdgymnasiet.
- Kiruna, February 17, 2015. Hur solvinden påverkar planeter. Presentation for Rymdgymnasiet.
- Kiruna, November 9, 2016. Answering space questions on Skype, Kästa school, Huddinge.

- Luleå, October 16, 2017. Institutet för rymdfysik (IRF): Sveriges främsta rymdforskningsinstitut, Möte med Region Norrbotten.
- Kiruna, January 4, 2018. Overview of planetary projects at IRF in Kiruna, Astronomisk Ungdom.
- Kiruna, February 14, 2018. Presentation of the Swedish Institute of Space Physics, IRF and their research, SpaceMaster students.
- Kiruna, 29 november, 2018. Exoplaneter, Presentation vid Rymdgymnasiets temadag om exoplaneter.
- Kiruna, 25 september, 2020. Mars, månen och Jupiter, Presentation för Rymdgymnasiet vid Astronomins Dag och Natt.
- Kiruna, May 7, 2021. Vart tog vattnet vägen på Mars? Norra Tjust Rotaryklubb.
- Kiruna, August 19, 2021. Jupiter, Månen och Mars (Vart tog vattnet vägen på Mars?). Rymdgymnasiet.
- Kiruna, November 3, 2021. Jupiter, Månen och Mars (Vart tog vattnet vägen på Mars?). Scouter.
- Kiruna, March 10, 2022. Jupiter, Månen och Mars (Vart tog vattnet vägen på Mars?). Gymnasieelever
- Kiruna, June 29, 2022. Mars Express and ASPERA-3: 18 years at Mars. Wigner Space Group Visit.
- Kiruna, May 23, 2024. Jupiter, Månen och Mars (Vart tog vattnet vägen på Mars?). Students at Vargen.
- Beijing, China, 26 August, 2024. Mars and Mars Express. ISSI-BJ Team Meeting, Lecture to Chinese students.
- Kiruna, 20 december, 2024. Swedish Institute of Space Physics: Jupiter, the Moon, Mars and Venus. Students from Uleåborg.
- Kiruna, 7 january, 2025. Swedish Institute of Space Physics: Jupiter, the Moon, Mars and Venus. Spanish physics students.
- online, 5 february, 2025. Particle-in-cell simulations of the interactions between the solar wind and planets. HPC2N Fika.

Teaching

After 2000. LTU, MSc program in Space Engineering, Luleå tekniska universitet, Institutionen i Kiruna, Civilingenjörsprogrammet i rymdteknik. Lectures:

- Kiruna, February 20, 2002. Image compression, i kursen Bildbehandling och fjärranalys (Image Analysis and Remote Sensing).
- Kiruna, May 26-27, 4x45 min, 2003. Wavelets, i kursen Numeriska metoder (Numerical Methods).

A PhD level course, *Introduction to computer modeling of space plasmas*, Kiruna, 2011 and 2021.

Advising

- Per-Olov Eriksson, 2000, MSc student, Umeå University.
- Anna Jonsson och Henrik Olsson, 2002, BSc students, Umeå University.
- Rickard Hansen, 2003, MSc student, Umeå University.
Recieved the Bengt Hultqvist price for his thesis.

- Csilla Szasz, PhD student, 2003-2008, assistant advisor, Graduate School of Space Technology, Luleå University of Technology.
- Andreas Ekenbäck, PhD student, 2003-2008, main advisor, Graduate School of Space Technology, Umeå University.
- Shahab Fatemi, 2009-2014, PhD student, main advisor, Graduate School of Space Technology, Luleå University of Technology.
- Vincent Hue, 2011, MSc student, University of Bordeaux, France.
- Jesper Lindkvist, 2011-2016, PhD student, main advisor, Umeå University.
- Viktor Lidström, 2017, MSc student, Luleå University of Technology.
- Nicolas Poirier, 2017, MSc student, ISAE ENSMA, France.
- Angele Pontoni, PhD student, 2017–2022, assistant advisor, Umeå University.
- Daniel Kastinen, PhD student, 2017–2022, assistant advisor, Umeå University.
- Qi Zhang, PhD student, 2020–2025, main advisor, Umeå University.
- Romain Canu-Blot, PhD student, 2022–, assistant advisor, Umeå University.
- Parvin Howaida, PhD student, 2024–, assistant advisor, Umeå University.
- Rafael Rodriguez Velasco, PhD student, 2025–, assistant advisor, Uppsala University.

Committees

- Kiruna, 9 April 1999, Solveig Kjus, *Lower Hybrid Wave Cavities: A Statistical Study*, Lic. degree, Umeå University.
- Kiruna, 18 June 2002, Mikael Hedin, *Advanced applications of the EISCAT incoherent scatter radar for multi-beam and electron line studies*, Lic. degree, Umeå University.
- Uppsala, 7 October 2006, Henrik Löf, *Iterative and Adaptive PDE Solvers for Shared Memory Architectures*, Ph.D. degree, Uppsala University.
- Luleå, 20 September 2007, Lars-Göran Westerberg, *Solar Wind Interaction with the Terrestrial Magnetopause*, Ph.D. degree, Luleå University of Technology.
- Bern, August 2009, Dominic Abplanalp, *Development of a sensitive TOF-Mass Spectrometer for Space Research*, Ph.D. degree, Physikalisches Institut, Universität Bern. External referee.
- Kiruna, 13 May 2011, Jonas Ekeberg, *Solitary Waves and Enhanced Incoherent Scatter Ion Lines*, Ph.D. degree, Umeå University.
- Bern, July 2013, Audrey Vorburger, *Investigation of the Solar Wind Interaction with the Lunar Surface*, Ph.D. degree, Physikalisches Institut, Universität Bern. External referee.
- Uppsala (online), 15 January 2021, Fredrik Johansson, *Rosetta Observations of Plasma and Dust at Comet 67P*, Ph.D. degree, Uppsala University.
- Gothenburg, 12 April 2023, Emil Fransson, *Turbulent transport in tokamak plasmas: linear-, quasi- and non-linear simulations*, Ph.D. degree, Chalmers.

Editor, Member and Organizer

- Umeå, Sweden, June 18–21, 2006. Organizer and Guest Editor of the mini symposia *Simulations in Geophysics and Space Physics*, PARA'06.
- Guest editor of *Advances in Space Research* (ASR) for session C3.2, "Planetary Upper Atmospheres, Ionospheres and Magnetospheres", at COSPAR 2006 in Beijing, July 17–21, 2006.
- Berlin, September 18–22, 2006. Co-convener of the session *Interaction of the Solar Wind with Surfaces and with Atmospheres*, The European Planetary Science Congress.
- San Francisco, December 10–14, 2007. Convener of the session *ENAs from Solar Wind Interaction with the Atmospheres, Exospheres, and Regoliths of Earth, Mars, Venus, the Moon and Other Solar System Bodies*, AGU Fall Meeting.
- Bern, 2009. Co-Leader of an ISSI International Team on the "Intercomparison of Global Models and Measurements of the Martian Plasma Environment"
- ESA appointed member of a MEX-MAVEN Working Group, 2013-
- Boulder, Colorado, USA, May 15–19, 2017. Member of the Science Organizing Committee for the *International Conference on Mars Aeronomy*.
- ESA/ESTEC, Noordwijk, The Netherlands, May 14–18, 2018. Member of the Science Organizing Committee for the ESLAB-52 Symposium *Comparative aeronomy and plasma environment of terrestrial planets*.
- Selfoss, Iceland, 11–15 February, 2019 Organizer and member of the Science Organizing Committee for Europlanet workshop *Outer planet moon-magnetosphere interactions*.
- Virtual, 15–17 June, 2021. Member of the Science Organizing Committee for a Workshop on the Influence of a Global Magnetic Field on Ion and Atmospheric Loss and Planetary Habitability.