

# CURRICULUM VITAE

Annika Lang geb. Niehage

## PERSONAL DETAILS

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Personal page: <http://www.math.chalmers.se/~langa/>

Current position: Professor of Mathematics

Affiliation: Department of Mathematical Sciences, Chalmers University of Technology & University of Gothenburg

Profiles: [Google scholar](#), [AMS](#), [ORCID](#), [Research Gate](#), [arXiv](#)

## EDUCATION & DEGREES

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09/2016	Docent at Chalmers University of Technology, Gothenburg, Sweden
01/2005 – 12/2007	PhD (Dr. rer. nat.) at Universität Mannheim, Germany, under supervision of Jürgen Potthoff and Christoph Schnörr, title: <i>“Simulation of Stochastic Partial Differential Equations and Stochastic Active Contours”</i>
11/25/2004	Diploma in Mathematics, diploma thesis under supervision of Raymond Laflamme (IQC), Martin Rötteler (IQC), Wolfgang K. Seiler (Universität Mannheim), title: <i>“Quantum Goppa Codes over Hyperelliptic Curves”</i>
09/2003 – 08/2004	Exchange student at the University of Waterloo, Canada, member of the Institute for Quantum Computing (IQC) with exchange of the department and scholarship “Landesstipendium Baden-Württemberg”
10/2002	Intermediate diploma (“Vordiplom”) in Mathematics and Computer Science
10/2000 – 11/2004	Studies of Mathematics and Computer Science at Universität Mannheim, Germany
1993 – 2000	“Abitur” at high school “Albert-Einstein-Gymnasium”, Hameln, Germany

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08/1997 – 07/1999	Prestudies “Studienvorbereitende Ausbildung (SVA)” in music and aural theory
1997 – 1998	“Jungstudentin” at conservatory “Hochschule für Musik”, Detmold, Germany for trumpet under supervision of Max Sommerhalder

## WORKING EXPERIENCE & INTERNSHIPS

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07/2020 –	Professor at Chalmers University of Technology, Gothenburg, Sweden
08/2019 – 08/2023	Head of unit consisting of PhD students, postdocs, and guest teachers within the Division of <i>Applied Mathematics and Statistics</i> , Department of Mathematical Sciences, Chalmers & University of Gothenburg
10/2016 – 06/2020	Associate professor (“Docent”), Chalmers University of Technology, Gothenburg, Sweden
10/2013 – 09/2016	Associate professor (“Universitetslektor”) for mathematical statistics, Chalmers University of Technology, Gothenburg, Sweden including parental leave 08/2014 – 08/2015
01/2011 – 09/2013	Instructor (“Dozentin”) and Postdoc in the ERC project <i>Sparse Tensor Approximations of High Dimensional and Stochastic Partial Differential Equations</i> with Christoph Schwab at the Seminar for Applied Mathematics, ETH Zürich, Switzerland
09/2006 – 12/2010	Scientific assistant (“Wissenschaftliche Angestellte”) with Jürgen Potthoff at “Lehrstuhl für Mathematik V”, Universität Mannheim, Germany including parental leave 06 – 12/2010
06/2005 – 08/2006	Research assistant at “Lehrstuhl für Mathematik V”, Universität Mannheim, Germany
2001 – 2005	Teaching assistant (“Tutor”) at Universität Mannheim, Germany
2001 – 2003	Internship at etcom datentechnik, Hameln, Germany (Software development) (15 weeks)

## SCHOLARSHIPS & AWARDS

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01/2006 – 01/2008	e-fellows scholar
01/2005 – 08/2006	PhD scholarship “Landesgraduierstipendium”
09/2003 – 08/2004	Scholarship “Landesstipendium Baden-Württemberg” for the exchange stay at the University of Waterloo, Canada
1989 – 1997	Participant at “Jugend Musiziert” in the categories trumpet solo, quartet, and trio, best result: 1. price at “Landeswettbewerb” (second of three rounds) in the category trumpet solo

#### VISITING SCIENTIST (minimum 4 weeks)

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06 – 07/2008	Pao-Liu Chow, Wayne State University, Detroit, USA
09/2003 – 08/2004	University of Waterloo, Institute for Quantum Computing, Canada

#### GRANT EXPERIENCE

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09/2023–08/2028	Consolidator Grant from the <b>European Research Council</b> (ERC CoG) <i>Time-evolving Stochastic Manifolds</i> , EUR 1,997,651
01/2021–12/2024	Project Grant from the <b>Swedish Research Council</b> <i>Efficient Approximation Methods for Random Fields on Manifolds</i> , SEK 3,400,000
2020 – 2022	<b>Area of Advance Transport/CHAIR</b> , Postdoc position <i>Stochastic Traffic Networks (STONE)</i> , with Balázs Kulcsár and Pinar Boyraz Baykas, SEK 2,400,000
2019 – 2024	<b>WASP</b> “Mathematics of AI”, PhD student project <i>Deepest Learning Using Stochastic Partial Differential Equations</i> within the WASP graduate school “Mathematics of AI”, ca. SEK 4,000,000 (estimated), terminated 2020 due to the student resigning from the contract
2018	<b>SveFUM</b> stipendium for travel to NUMDIFF-15, Halle, Germany, SEK 8,000
2017 – 2020	<b>STINT</b> Joint China–Sweden Mobility programme, together with David Cohen, Mihály Kovács, Stig Larsson, SEK 600,000
2017	Funding for research stay of Andrea Barth (Universität Stuttgart) in Gothenburg by <b>Stiftelsen G S Magnusons fond</b> , SEK 15,000

2016	Funding for research stay of Raphael Kruse (TU Berlin) in Gothenburg by <b>GoCAS</b> , together with Stig Larsson, SEK 15,000
09/2016	Funding for organization of NASPDE 2016 workshop in Gothenburg by the <b>Swedish Research Council</b> , SEK 70,000
09/2016	Funding for organization of NASPDE 2016 workshop in Gothenburg by <b>GoCAS</b> , together with Stig Larsson, SEK 110,000
01/2015–12/2018	Project Young Research Grant from the <b>Swedish Research Council</b> <i>Approximation and simulation of Lévy-driven SPDE</i> , SEK 3,200,000
10/2013 – 2017	Research financed by Knuth & Alice Wallenberg project <i>Stochastics for big data and big systems – bridging local and global</i> , head of the project Holger Rootzén
01/2011 – 09/2013	Research financed by ERC project <i>Sparse Tensor Approximations of High Dimensional and Stochastic Partial Differential Equations</i> , head of the project Christoph Schwab
07/2009	Travel and accommodation grant of Fakultät für Mathematik und Informatik, <b>Universität Mannheim</b> , for SPA 2009, Berlin
09/2005	Travel grant of Fakultät für Mathematik und Informatik, <b>Universität Mannheim</b> , for AGCT 10, Luminy
09/2005	Accommodation grant of <b>Centre International de Rencontres Mathématiques</b> for AGCT 10, Luminy
01/2006 – 01/2008	e-fellows scholar
01/2005 – 08/2006	<b>PhD scholarship</b> “Landesgraduiertenstipendium”

#### WORKSHOP & CONFERENCE ORGANIZATION

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06/2023	Scientific and local organizing committee for Nordstat 2023, Gothenburg, Sweden
09/2022	Scientific committee for the DMV Jahrestagung, Berlin, Germany
09/2022	Workshop <i>Theory and Computational Methods for SPDEs</i> with David Cohen, Marta Sanz-Solé, and Samy Tindel, BIRS Oaxaca (CMO)
07/2019	Minisymposium <i>Numerical methods for stochastic (partial) differential equations</i> with David Cohen and Gilles Vilmart, SciCADE 2019, Innsbruck, Austria

- 05/2019 Workshop *Numerical Methods for SPDE: 20 successful years and future challenges* with Andrea Barth, David Cohen, Raphael Kruse, Institut Mittag-Leffler
- 06/2018 International conference *SPA 2018*, part of the organizing committee, head was Sergey Zuev, Chalmers University of Technology & University of Gothenburg, Gothenburg
- 06/2017 Special Session *SPDEs: From Theory to Simulation* with David Cohen and Lluís Quer-Sardanyons, Meeting of the Catalan, Spanish and Swedish Math. Societies, Umeå
- 02/2017 Mini-Workshop *Stochastic Differential Equations: Regularity and Numerical Analysis in Finite and Infinite Dimensions* with Martin Hutzenthaler, Lukasz Szpruch, and Larisa Yaroslavtseva, Mathematisches Forschungsinstitut Oberwolfach
- 09/2016 Workshop *NASPDE 2016* with Stig Larsson, Chalmers University of Technology & University of Gothenburg, Gothenburg
- 06/2015 Workshop *Advances in Numerical Methods for SPDEs* with David Cohen and Stig Larsson, Institut Mittag-Leffler

PUBLICATIONS

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see also <http://www.math.chalmers.se/~langa/>

## PEER-REVIEWED RESEARCH ARTICLES

- [1] Annika Niehage. Nonbinary quantum Goppa codes exceeding the quantum Gilbert–Varshamov bound. *Quantum Information Processing*, 6(3):143–158, 2007, MADOC, Mannheimer Manuskript 279, May 2006.
- [2] Annika Lang. Mean square convergence of a semidiscrete scheme for SPDEs of Zakai type driven by square integrable martingales. *Procedia Computer Science*, 1(1):1609–1617, 2010.
- [3] Annika Lang, Pao-Liu Chow, and Jürgen Potthoff. Almost sure convergence of a semidiscrete Milstein scheme for SPDEs of Zakai type. *Stochastics*, 82(3):315–326, June 2010.
- [4] Annika Lang. A Lax equivalence theorem for stochastic differential equations. *J. Comput. Appl. Math.*, 234(12):3387–3396, October 2010.
- [5] Annika Lang and Jürgen Potthoff. Fast simulation of Gaussian random fields. *Monte Carlo Meth. Appl.*, 17(3):195–214, September 2011.
- [6] Annika Lang. Almost sure convergence of a Galerkin approximation for SPDEs of Zakai type driven by square integrable martingales. *J. Comput. Appl. Math.*, 236(7):1724–1732, January 2012.
- [7] Andrea Barth and Annika Lang. Simulation of stochastic partial differential equations using Finite Element methods. *Stochastics*, 84(2-3):217–231, April 2012.
- [8] Annika Lang, Pao-Liu Chow, and Jürgen Potthoff. Erratum: Almost sure convergence of a semidiscrete Milstein scheme for SPDEs of Zakai type. *Stochastics*, 84(4):561, August 2012.
- [9] Tanja Teuber and Annika Lang. A new similarity measure for nonlocal filtering in the presence of multiplicative noise. *Comp. Stat. Dat. Ana.*, 56(12):3821–3842, December 2012.
- [10] Andrea Barth and Annika Lang. Milstein approximation for advection-diffusion equations driven by multiplicative noncontinuous martingale noises. *Appl. Math. Opt.*, 66(3):387–413, December 2012.
- [11] Andrea Barth and Annika Lang. Multilevel Monte Carlo method with applications to stochastic partial differential equations. *Int. J. Comput. Math.*, 89(18):2479–2498, December 2012.
- [12] Andrea Barth, Annika Lang, and Christoph Schwab. Multilevel Monte Carlo method for parabolic stochastic partial differential equations. *BIT Num. Math.*, 53(1):3–27, March 2013.
- [13] Annika Lang and Jürgen Potthoff. Erratum: Fast simulation of Gaussian random fields. *Monte Carlo Meth. Appl.*, 19(1):73–75, March 2013 .

- [14] Andrea Barth and Annika Lang.  $L^p$  and almost sure convergence of a Milstein scheme for stochastic partial differential equations. *Stochastic Processes Appl.*, 123(5):1563–1587, May 2013.
- [15] Annika Lang, Stig Larsson, and Christoph Schwab. Covariance structure of parabolic stochastic partial differential equations. *Stoch. PDE: Anal. Comp.*, 1(2):351–364, June 2013.
- [16] Roman Andreev and Annika Lang. Kolmogorov–Chentsov theorem and differentiability of random fields on manifolds. *Potential Anal.*, 41(3):761–769, October 2014.
- [17] Annika Lang and Christoph Schwab. Isotropic Gaussian random fields on the sphere: Regularity, fast simulation and stochastic partial differential equations. *Ann. Appl. Probab.*, 25(6):3047–3094, December 2015.
- [18] Annika Lang, Jürgen Potthoff, Martin Schlather, and Dimitri Schwab. Continuity of random fields on Riemannian manifolds. *Comm. Stoch. Anal.*, 10(2):185–193, June 2016.
- [19] Kristin Kirchner, Annika Lang, and Stig Larsson. Covariance structure of parabolic stochastic partial differential equations with multiplicative Lévy noise. *J. Diff. Equations*, 262(12):5896–5927, June 2017.
- [20] Annika Lang, Andreas Petersson, Andreas Thalhammer. Mean-square stability analysis of approximations of stochastic differential equations in infinite dimensions. *BIT Num. Math.*, 57(4):963–990, December 2017.
- [21] Annika Lang and Andreas Petersson. Monte Carlo vs. multilevel Monte Carlo in weak error simulations of SPDE approximations. *Math. Comp. in Simulation*, 143:99–113, January 2018.
- [22] Lukas Herrmann, Annika Lang, and Christoph Schwab. Numerical analysis of log-normal diffusions on the sphere. *Stoch. PDE: Anal. Comp.*, 6(1):1–44, March 2018.
- [23] Peter E. Creasey and Annika Lang. Fast generation of isotropic Gaussian random fields on the sphere. *Monte Carlo Meth. Appl.*, 24(1):1–11, March 2018.
- [24] Chuchu Chen, David Cohen, Raffaele D’Ambrosio, Annika Lang. Drift-preserving numerical integrators for stochastic Hamiltonian systems. *Adv. Comput. Math.*, 46(2):27, April 2020.
- [25] Galatia Cleanthous, Athanasios Georgiadis, Annika Lang, and Emilio Porcu. Regularity, continuity and approximation of isotropic Gaussian random fields on compact two-point homogeneous spaces. *Stochastic Processes Appl.*, 130(8):4873–4891, August 2020.
- [26] Mihály Kovács, Annika Lang, Andreas Petersson. Weak convergence of fully discrete finite element approximations of semilinear hyperbolic SPDE with additive noise. *ESAIM:M2AN*, 54(6):2199–2227, November-December 2020.
- [27] Mike Pereira, Pinar Boyraz Baykas, Balázs Kulcsár, Annika Lang. Parameter and density estimation from real-world traffic data: A kinetic compartmental approach. *Transp. R. B.*, 155:210–239, January 2022.

- [28] Erik Jansson, Mihály Kovács, and Annika Lang. Surface finite element approximation of spherical Whittle–Matérn Gaussian random fields. *SIAM J. on Sci. Comput.*, 44:A825–A842, 2022.
- [29] Mike Pereira, Annika Lang, and Balázs Kulcsár. Short-term traffic prediction using physics-aware neural networks. *Transp. R. C*, 142:103772, September 2022.
- [30] David Cohen and Annika Lang. Numerical approximation and simulation of the stochastic wave equation on the sphere. *Calcolo*, 59(3):32, September 2022.
- [31] Mihály Kovács, Annika Lang, and Andreas Petersson. Hilbert–Schmidt regularity of symmetric integral operators on bounded domains with applications to SPDE approximations. *Stochastic Analysis and Applications*, 41:564–590, April 2023.
- [32] Mihály Kovács, Annika Lang, and Andreas Petersson. Approximation of SPDE covariance operators by finite elements: A semigroup approach. *IMA J. Num. Anal.*, 43:1324–1357, December 2023.
- [33] Annika Lang and Mike Pereira. Galerkin–Chebyshev approximation of Gaussian random fields on compact Riemannian manifolds. *BIT Num. Math.*, 63:51, December 2023.

#### BOOK CHAPTERS / REFEREED PROCEEDINGS

- [1] Tanja Teuber and Annika Lang. Nonlocal filters for removing multiplicative noise. In Alfred Bruckstein, Bart ter Haar Romeny, Alexander Bronstein, and Michael Bronstein, editors, *Scale Space and Variational Methods in Computer Vision*, Springer Berlin / Heidelberg, 2012, LNCS 6667, pp. 50–61.
- [2] Annika Lang. Isotropic Gaussian random fields on the sphere. In Albert Cohen, Wolfgang Dahmen, Ronald A. DeVore, and Angela Kunoth, editors, *Multiscale and High-Dimensional Problems, 39/2013*, volume 10 of *Oberwolfach Reports*, pages 2216–2219. European Mathematical Society, 2013.
- [3] Annika Lang. Stochastic partial differential equations. In Katsushi Ikeuchi, editor, *Computer Vision: A Reference Guide*, pp. 770–775, Springer, 2014.
- [4] Annika Lang. A Note on the Importance of Weak Convergence Rates for SPDE Approximations in Multilevel Monte Carlo Schemes. In Ronald Cools and Dirk Nuyens, editors, *Monte Carlo and Quasi-Monte Carlo Methods, MCQMC, Leuven, Belgium, April 2014*, pp. 489–505, Springer, 2016.
- [5] Annika Lang. Mean-square stability analysis of SPDE approximations. In Lukasz Szpruch, Martin Hutzenthaler, Annika Lang and Larisa Yaroslavtseva, editors, *Stochastic Differential Equations: Regularity and Numerical Analysis in Finite and Infinite Dimensions, 9/2017*, volume 14 of *Oberwolfach Reports*, pages 476–479. European Mathematical Society, 2017.
- [6] Annika Lang. Drift-preserving numerical integrators for stochastic Hamiltonian systems. In Oliver Ernst, Fabio Nobile, Claudia Schillings and Tim Sullivan, editors, *Uncertainty Quantification, 12/2019*, volume 16 of *Oberwolfach Reports*, pages 713–714. European Mathematical Society, 2019.



- [7] Annika Lang. Random fields: How does regularity influence the resulting structures?. In Björn Engquist and Daniel Peterseim, editors, *Computational Multiscale Methods, 35/2019*, volume 16 of *Oberwolfach Reports*, pages 2129–2132.. European Mathematical Society, 2019.
- [8] Annika Lang. Stochastic partial differential equations. In Katsushi Ikeuchi, editor, *Computer Vision: A Reference Guide*, 2nd edition, Springer, 2021.
- [9] Annika Lang. Connecting random fields on manifolds and stochastic partial differential equations in simulations. In Stig Larsson, Ricardo H. Nochetto, Stefan A. Sauter, Christian Wieners, editors, *Space-Time Methods for Time-Dependent Partial Differential Equations*, volume 19 of *Oberwolfach Reports*, pages. 346–349. European Mathematical Society, 2022.

#### POPULAR SCIENCE

- [1] Erik Jansson, Annika Lang, Mike Pereira. *Sampling of random fields on manifolds*, ECMI blog, May 2021.
- [2] Annika Lang and Ioanna Motschan-Armen. *Generation of random surfaces by stochastic partial differential equations*, ECMI blog, September 2023.

#### THESES

- [1] Annika Niehage. Quantum Goppa Codes over Hyperelliptic Curves. Diploma thesis, arXiv:0501074 [quant-ph], 2005.
- [2] Annika Lang. *Simulation of Stochastic Partial Differential Equations and Stochastic Active Contours*. PhD thesis, Universität Mannheim, 2007.

#### PREPRINTS

- [1] Adam Andersson, Annika Lang, Andreas Petersson, and Leander Schroer. Finite element approximation of Lyapunov equations for the computation of quadratic functionals of SPDEs. arXiv:1910.05261, October 2019.

#### LECTURE NOTES

- [1] Andrea Barth, Annika Lang, and Christoph Schwab. *Numerical Analysis of Stochastic Ordinary Differential Equations*. 2011.
- [2] Annika Lang and Jürgen Potthoff. *Stochastic Simulation - An Introduction With Scilab*. 2012.
- [3] Andrea Barth, Claude J. Gittelsohn, Annika Lang, and Christoph Schwab. *Introduction to Numerical Analysis of Stochastic Partial Differential Equations*. 2012.
- [4] Annika Lang and Andreas Petersson. *Financial Time Series*. 2015–17.
- [5] Annika Lang. *Statistical Inference Principles*. 2018.

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 REVIEWS
 

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*Reviewer* of theses, grant proposals, and for more than 30 international journals including:

Advances in Computational Mathematics, Annals of Operations Research, Annals of Applied Probability, Annals of Probability, Applied Mathematics and Computation, Applied Mathematics and Optimization, BIT Numerical Mathematics, Computational Methods in Applied Mathematics, Computers & Mathematics with Applications, Electronic Communications in Probability, Electronic Journal of Probability, Electronic Journal of Qualitative Theory of Differential Equations, Electronic Journal of Statistics, FILOMAT, IEEE — Transactions on Signal Processing, IMA Journal of Numerical Analysis, International Journal of Computer Mathematics, Journal of Applied Statistics, Journal of Complexity, Journal of Computational and Applied Mathematics, Journal of Difference Equations and Applications, Journal of Mathematical Analysis and Applications, Journal of Theoretical Probability, Mathematical Geosciences, Mathematical Modelling and Numerical Analysis, Mathematical Reviews, Mathematics and Computers in Simulation, Mathematics of Computation, Numerische Mathematik, Proceedings of the Royal Society A, SIAM Journal on Control and Optimization, SIAM Journal on Financial Mathematics, SIAM Journal on Mathematical Analysis, SIAM Journal on Numerical Analysis, SIAM/ASA Journal on Uncertainty Quantification, SIAM Journal on Scientific Computing, SMAI Journal of Computational Mathematics, Statistics and Computing, Statistics & Probability Letters, Stochastic Analysis and Applications, Stochastic Partial Differential Equations: Analysis and Computations, Stochastic Processes and their Applications, Stochastics: An International Journal of Probability and Stochastic Processes, Stochastics and Dynamics

*Associate editor* IMA Journal of Numerical Analysis (2019–), Journal of Stochastic Analysis and Applications (2020–)

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 TALKS & POSTERS
 

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- 09/2023      *Evolving surfaces driven by stochastic PDEs*, mini-symposium talk at MS09, AIP 2023, Göttingen
- 09/2023      *Surface finite element approximation of Gaussian random fields on Riemannian manifolds*, mini-symposium talk at MS04, AIP 2023, Göttingen
- 08/2023      *Simulation of random fields on Riemannian manifolds*, CS60, ETH Zürich
- 06/2023      *The stochastic wave equation on the sphere: properties and simulation*, NORDSTAT2023, Gothenburg
- 05/2023      *Simulation of random fields on Riemannian manifolds*, Berlin Probability Colloquium, Berlin
- 05/2023      *Short-term traffic prediction: physics-aware neural networks*, plenary talk, Structured Learning CHAIR Theme Kickoff!, Gothenburg
- 02/2023      *Simulation of random fields on Riemannian manifolds*, LiU Seminar Series in Statistics and Mathematical Statistics, Linköping

- 11/2022 *Simulation of random fields on Riemannian manifolds*, DNA Seminar, NTNU, Trondheim
- 11/2022 *Simulation of random fields on Riemannian manifolds*, Statistics Seminar, University of Cambridge
- 09/2022 *Stochastic partial differential equations and random fields on Riemannian manifolds*, plenary talk, Numerical analysis and applications of SDEs, Banach Centre, Bedlewo
- 09/2022 *Simulation of random fields on Riemannian manifolds*, invited section talk, DMV Annual Meeting, Berlin
- 09/2022 *Short-term traffic prediction using physics-aware neural networks*, Statistics for Stochastic Processes: SDEs, SPDEs and concentration of measure, Luxembourg
- 07/2022 *The stochastic wave equation on the sphere: properties and simulation*, invited talk, SciCADE 2021, Reykjavík
- 07/2022 *Introduction to stochastic partial differential equations and their approximation*, mini-course at Summer School on Computational Mathematics, Gdańsk
- 06/2022 *Simulation of random fields on Riemannian manifolds*, invited talk, 30th Birthday of Acta Numerica, Banach Centre, Bedlewo
- 06/2022 *Short-term traffic prediction using physics-aware neural networks*, invited talk, Thematic Program Computational Uncertainty Quantification: Mathematical Foundations, Methodology & Data, ESI Wien
- 04/2022 *Connecting random fields on manifolds and stochastic partial differential equations in simulations*, KTH Seminar on Numerical Analysis, Stockholm
- 02/2022 *Connecting random fields on manifolds and stochastic partial differential equations in simulations*, invited talk, Workshop on Space-Time Methods for Time-Dependent Partial Differential Equations, MF Oberwolfach
- 02/2022 *Connecting random fields on manifolds and stochastic partial differential equations in simulations*, Mathematics & Statistics Colloquium, Maynooth University, Ireland
- 12/2021 *STOchastic traffic NETworks*, AI research sample, Chalmers AI Research Center – Zooming out!, Göteborg
- 09/2021 *Connecting random fields on manifolds and stochastic partial differential equations in simulations*, invited talk, Workshop "Junior Female Researchers in Probability", Berlin
- 09/2021 *Connecting random fields on manifolds and stochastic partial differential equations in simulations*, invited talk, XI Forum of PDEs, Banach Center in Bedlewo

- 09/2021 *Connecting random fields on manifolds and stochastic partial differential equations in simulations*, invited talk, NUMDIFF-16, Martin Luther University Halle-Wittenberg
- 08/2021 *Connecting random fields on manifolds and stochastic partial differential equations in simulations*, invited talk, MCM 2021, online/Universität Mannheim
- 06/2021 *Connecting random fields on manifolds and stochastic partial differential equations in simulations*, one world seminar talk, One world SNIP seminar, ICMS
- 06/2021 *Connecting random fields on manifolds and stochastic partial differential equations in simulations*, summer school invited talk, Young Researchers between Geometry and Stochastic Analysis 2021, online/Kristiansand
- 06/2021 *The stochastic wave equation on the sphere: properties and simulation*, seminar talk, stochastic analysis seminar, UNICAMP, Brazil
- 05/2021 *The stochastic heat and wave equation on the sphere*, seminar talk, matstat seminar, Stockholms universitet
- 03/2021 *The stochastic wave equation on the sphere: properties and simulation*, seminar talk, STAR seminar, University of Oslo
- 03/2021 *A finite element approximation of Gaussian random fields on the sphere*, invited talk, CRC1114 Conference 2021, Berlin
- 02/2020 *Finite element approximation of Lyapunov equations for the computation of quadratic functionals of SPDEs*, invited talk, Young researchers between geometry and stochastic analysis, University of Bergen
- 01/2020 *Finite element approximation of Lyapunov equations for the computation of quadratic functionals of SPDEs*, invited talk, Workshop on multiscale methods for deterministic and stochastic dynamics, Université de Genève
- 11/2019 *Random fields: Regularity and simulation*, Ecole des Mines, Fontainebleau
- 09/2019 *Quadratic functionals of SPDE solutions: Efficient computation via Lyapunov equations*, invited talk, Statistical Inference for Stochastic PDEs, HU Berlin
- 07/2019 *Random fields: How does regularity influence the resulting structures?*, invited talk, Workshop on Computational Multiscale Methods, MF Oberwolfach
- 06/2019 *Deep learning and stochastic partial differential equations: a possible connection*, invited talk, Workshop on Mathematics for Complex Data, KTH Stockholm

- 03/2019 *Drift-preserving numerical integrators for stochastic Hamiltonian systems*, invited talk, Workshop on Uncertainty Quantification, MF Oberwolfach
- 12/2018 *SPDE simulation on spheres*, invited talk, Nonlinear Stochastic Evolution Equations: Analysis, Numerics and Applications, TU Berlin
- 10/2018 *SPDE simulation on spheres*, invited talk, Forum on Numerical Methods for SPDEs, Chinese Academy of Sciences, Beijing, China
- 09/2018 *SPDE simulation on spheres*, invited talk, NUMDIFF-15, Martin Luther Universität Halle-Wittenberg
- 09/2018 *Simulation of random models: where stochastic analysis meets high performance computing*, MV colloquium, Chalmers & GU
- 06/2018 *The stochastic heat equation: A short review on 15 years of simulation*, invited talk, Universität Mannheim
- 11/2017 *Random field simulation: bridging stochastic processes and their applications*, invited seminar talk, KTH Stockholm
- 11/2017 *Random field simulation: bridging stochastic processes and their applications*, invited talk, FINEWSTOCH Networkshop II, University of Oslo
- 06/2017 *Simulating weak convergence rates for SPDE approximations*, invited talk, Meeting of the Catalan, Spanish and Swedish Math. Societies, Umeå Universitet
- 06/2017 *Simulating weak convergence rates for SPDE approximations*, invited talk, Recent Developments in Numerical Methods with Applications in Statistics and Finance, Universität Mannheim
- 02/2017 *Mean-square stability analysis of SPDE approximations*, invited talk, Mini-Workshop on Stochastic Differential Equations: Regularity and Numerical Analysis in Finite and Infinite Dimensions, Oberwolfach
- 02/2017 *Mean-square stability analysis of SPDE approximations*, invited talk, Multiscale Methods for Stochastic Dynamics, Geneva
- 11/2016 *Simulating weak convergence rates for SPDE approximations*, invited talk, Nonlinear Stochastic Evolution Equations: Analysis and Numerics, TU Berlin
- 10/2016 *Weak error simulation for stochastic partial differential equations*, talk, Scientific Computing in Sweden, Uppsala Universitet
- 09/2016 *Stochastic simulation: How do we generate pictures and what do they show?*, docentföreläsning, Chalmers
- 05/2016 *(Multilevel) Monte Carlo in error computation*, invited talk, Workshop on Uncertainty Quantification, Institut Mittag-Leffler
- 12/2015 *The multilevel Monte Carlo methods with applications to stochastic partial differential equations*, talk, Uppsala Universitet

- 09/2015 *Stochastic and random partial differential equations: a shared simulation problem*, invited talk, NASPDE 2015, INRIA Sophia Antipolis
- 09/2015 *How can SPDE simulations become more efficient?*, invited talk, SciCADE 2015, Potsdam
- 09/2015 *What is the importance of strong vs. weak error analysis when computing stochastic partial differential equations?*, invited talk, SciCADE 2015, Potsdam
- 07/2015 *SPDE simulation: How does “P” increase the complexity?*, invited talk, MCM 2015, Linz
- 07/2015 *Computing stochastic partial differential equations: a variety of challenges*, talk, plenary speaker, MCM 2015, Linz
- 10/2014 *Gaussian random fields in the plane and on spheres: regularity and approximation*, talk, Big New Researchers Get-Together, Göteborg
- 06/2014 *How can solutions of SPDEs be simulated on a computer?*, talk, RDSN14, Mannheim
- 05/2014 *Gaussian random fields on the sphere: one class of random fields on manifolds*, invited talk, Spatial Statistics and UQ, Bath
- 04/2014 *Multilevel Monte Carlo method with applications to stochastic partial differential equations*, talk, MCQMC 2014, Leuven
- 01/2014 *Hilbertraumwertige Zufallsvariablen: Was ist das und welche Methoden nutzen bei der Charakterisierung? (Hilbert-space-valued random variables: What is it and which methods help to characterize them?)*, talk, Universität Köln
- 01/2014 *Simulation von Zufallsfeldern & stochastischen partiellen Differentialgleichungen: Was verbindet sie? (Simulation of random fields & stochastic partial differential equations: What links them?)*, talk, Goethe-Universität Frankfurt
- 12/2013 *Zufallsfelder: Approximation, Regularität und Anwendungen (Random fields: approximation, regularity, and applications)*, talk, Universität Mannheim
- 11/2013 *How does one computationally solve a stochastic partial differential equation?*, talk, Chalmers University of Technology, Göteborg
- 10/2013 *Isotropic Gaussian random fields on the sphere*, invited talk, Sixth Workshop on Random Dynamical Systems, Universität Bielefeld
- 09/2013 *Covariance structure of parabolic stochastic partial differential equations*, invited talk, Dirichlet Forms and Applications: German-Japanese Open Meeting on Stochastic Analysis, Universität Leipzig
- 09/2013 *Simulating the driving noise of a stochastic partial differential equation*, invited talk, Summer school on Numerical Methods for Stochastic Differential Equations, TU Wien

- 07/2013 *Isotropic Gaussian random fields on the sphere*, invited talk, Workshop on Multiscale and High-Dimensional Problems, MF Oberwolfach
- 07/2013 *Wie löst man eine stochastische partielle Differentialgleichung mit dem Computer? (How does one solve a stochastic partial differential equation with the computer?)*, talk, Goethe-Universität Frankfurt
- 05/2013 *Zufallsfelder zwischen Approximation, Regularität und Anwendungen (Random fields between approximation, regularity, and applications)*, talk, WWU Münster
- 05/2013 *Satz von Picard-Lindelöf (Theorem of Picard–Lindelöf)*, lecture, WWU Münster
- 04/2013 *Model versus reality in my research*, talk, Chalmers University of Technology, Göteborg
- 03/2013 *Was ist die vom Computer simulierte Lösung einer stochastischen partiellen Differentialgleichung? (What is the by a computer simulated solution of a stochastic partial differential equation?)*, talk, Universität Paderborn
- 03/2013 *Das schwache Gesetz der großen Zahlen (The weak law of large numbers)*, lecture, Universität Paderborn
- 11/2012 *Von stochastischen Prozessen zu Zufallszahlen*, talk, Universität Stuttgart
- 11/2012 *Von stochastischen Prozessen zu Zufallszahlen (From stochastic processes to random numbers)*, talk, TU Darmstadt
- 11/2012 *Zentraler Grenzwertsatz (Central limit theorem)*, lecture, TU Darmstadt
- 01/2012 *Simulation of stochastic processes*, talk, Universität Bielefeld
- 12/2011 *Multilevel Monte Carlo Methode für stochastische partielle Differentialgleichungen (Multilevel Monte Carlo method for stochastic partial differential equations)*, talk, TU Darmstadt
- 12/2011 *Zufallszahlen und Monte-Carlo-Methoden (Random numbers and Monte Carlo methods)*, lecture, TU Darmstadt
- 10/2011 *Multi-level Monte Carlo Finite Element method for parabolic SPDEs*, seminar talk, Chalmers University of Technology, Göteborg
- 10/2011 *Multi-level Monte Carlo Finite Element method for parabolic SPDEs*, invited seminar talk, Universität Basel
- 08/2011 *Multi-level Monte Carlo Finite Element method for parabolic SPDEs*, invited talk, High-Dimensional Aspects of Stochastic PDEs, HIM, Bonn
- 06/2011 *Lax's Equivalence Theorem for Stochastic Differential Equations*, invited talk, 24th Biennial Conference on Numerical Analysis, Glasgow
- 06/2010 *Stochastische partielle Differentialgleichungen — Numerik und Simulation*, talk, TU Kaiserslautern

- 06/2010 *Mean Square Convergence of a Semidiscrete Scheme for SPDEs of Zakai Type Driven by Square Integrable Martingales*, talk, ICCS, Amsterdam
- 05/2010 *Stochastische partielle Differentialgleichungen — Numerik und Simulation*, talk, WWU Münster
- 01/2010 *Lax's Equivalence Theorem for Stochastic Differential Equations*, talk, SAM, ETH Zürich
- 12/2009 *Lax's Equivalence Theorem for Stochastic Differential Equations*, seminar talk, CMA, Oslo
- 08/2009 *Stochastische partielle Differentialgleichungen — Numerik und Simulation (Stochastic Partial Differential Equations — Numerics and Simulation)*, talk, Universität Leipzig
- 07/2009 *A Milstein Scheme for Zakai's Equation*, talk, SPA 2009, Berlin
- 05/2009 *Almost Sure Convergence of Discrete-Time Solutions to Some Stochastic PDEs*, seminar talk, Wayne State University, Detroit
- 02/2009 *Simulation of Stochastic Partial Differential Equations*, invited seminar talk, TU Darmstadt
- 07/2008 *Simulation of Stochastic PDEs and Segmentation Problems*, seminar talk, Wayne State University, Detroit
- 07/2008 *Gaussian Random Fields*, seminar talk, Wayne State University, Detroit
- 06/2008 *Simulation of Stochastic Partial Differential Equations and Stochastic Active Contours*, invited talk, Rhein-Main Workshop "Mathematics of Computation", Mannheim
- 01/2007 *Gaussian Random Fields*, seminar talk, CMA, Oslo
- 05/2006 *Gaussian Random Fields and Segmentation*, talk, Summer school on Stochastic Differential Equations, Copenhagen
- 09/2005 *Nonbinary Quantum Goppa Codes Exceeding the Quantum Gilbert–Varshamov Bound*, invited talk, AGCT 10, CIRM Luminy
- 06/2004 *Quantum AG Codes over Non-Binary Fields*, Poster, Summer school on Quantum Information, Waterloo



LIST OF COURSES TAUGHT

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Spring 2024	Lecturer in <i>Computational Methods for Stochastic Differential Equations</i>
Fall 2023	Lecturer in <i>Stochastic Data Processing and Simulation</i>
Fall 2022	Lecturer in <i>Stochastic Data Processing and Simulation</i>
Spring 2022	Lecturer in <i>Financial Time Series</i>
Spring 2022	Lecturer in <i>Computational Methods for Stochastic Differential Equations</i>
Fall 2021	PhD course in <i>Stochastic Partial Differential Equations</i>
Fall 2021	PhD course in <i>Classical Papers in Numerical Analysis</i> , co-organizer
Fall 2021	Lecturer in <i>Stochastic Data Processing and Simulation</i>
Spring 2021	Lecturer in <i>Financial Time Series</i> (digital teaching)
Fall 2020	Lecturer in <i>Stochastic Data Processing and Simulation</i> (digital teaching)
Spring 2020	Lecturer in <i>Computational Methods for Stochastic Differential Equations</i>
Fall 2019	Lecturer in <i>Stochastic data processing and simulation</i>
Spring 2019	Lecturer in <i>Stochastic Data Processing and Simulation</i>
Spring 2018	Lecturer in <i>Financial Time Series</i>
Spring 2018	Lecturer and exercise classes in <i>Statistical Interference Principles</i>
Fall 2017	PhD course in <i>Stochastic Partial Differential Equations</i>
Fall 2017	PhD course in <i>Random Partial Differential Equations</i>
Spring 2017	Lecturer in <i>Financial Time Series</i>
Spring 2016	Lecturer in <i>Financial Time Series</i>
Spring 2016	Lecturer and exercise classes in <i>Statistical Interference Principles</i>
Fall 2015	PhD course in <i>Simulation of Random Fields</i>
Spring 2015	Lecturer and exercise classes in <i>Financial Time Series</i>
Spring 2014	Lecturer and exercise classes in <i>Statistical Interference Principles</i>
Spring 2013	Lecturer in <i>Numerical Analysis of Stochastic PDEs</i>
Fall 2012	Seminar in <i>Numerical Analysis of Stochastic PDEs</i>

Spring 2012	Lecturer and exercise classes in <i>Numerical Analysis of Stochastic PDEs</i>
Fall 2011	Lecturer and exercise classes in <i>Numerical Analysis of Stochastic ODEs (Comp. Methods in Quant. Finance I: Monte Carlo Methods)</i>
Spring 2010	Seminar <i>Stochastics</i>
Fall 2009/10	Seminar <i>Stochastic Integration and stochastic differential equations</i> , joint with J. Potthoff
Fall 2009/10	Lecturer and exercise classes in <i>Stochastic Simulation</i>
Spring 2009	Seminar <i>Markov chains</i> , joint with J. Potthoff
Spring 2009	Exercise classes in <i>Probability II</i>
Fall 2008/09	Lecturer and exercise classes in <i>Stochastic Simulation</i>
Spring 2008	Proseminar <i>Elementary Probability Theory</i>
Spring 2008	Exercise classes in <i>Probability I</i>
Fall 2007/08	Exercise classes in <i>Stochastic Simulation</i>
Fall 2007/08	Exercise classes in <i>Introduction to Probability Theory</i>
Spring 2007	Exercise classes and tutorials in <i>Real Analysis II</i>
Fall 2006/07	Exercise classes and tutorials in <i>Real Analysis I</i>
Summer 2006	Tutorials in <i>Introduction to Probability Theory</i>
Winter 2004/05	Exercise classes in <i>Algebra</i>
Winter 2004/05	Tutorials in <i>Algorithms &amp; data structures</i>
Summer 2003	Tutorials in <i>Linear Algebra II</i>
Winter 2002/03	Tutorials in <i>Linear Algebra I</i>
Summer 2002	Tutorials in <i>Linear Algebra II</i>
Winter 2001/02	Tutorials in <i>Linear Algebra I</i>

## SUPERVISED THESES

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### POSTDOC MENTOR

2020–2022                      Mike Pereira (Chalmers), postdoc in STONE project

### PHD LEVEL

2023–                              PhD thesis Björn Müller (Chalmers (ERC), supervisor)  
2021–                              PhD thesis Ioanna Motschan-Armen (Chalmers (VR), supervisor)  
2021–                              PhD thesis Sondre Wiersdalen (Chalmers, co-supervisor)  
2021–                              PhD thesis Johan Ulander (Chalmers, co-supervisor)

2020–	PhD thesis Oskar Eklund (Chalmers (CHAIR), supervisor)
2020–	PhD thesis Kasper Bågmak (Chalmers (WASP), supervisor)
2020–	PhD thesis Erik Jansson (Chalmers (WASP), co-supervisor)
2019–	PhD thesis Malin Nilsson (GU, co-supervisor)
2015–2019	PhD thesis Andreas Petersson (Chalmers), title “Approximating Stochastic Partial Differential Equations with Finite Elements: Computation and Analysis”, 12/2019)
2013–2018	PhD thesis Kristin Kirchner (Chalmers, co-supervisor, with Stig Larsson and Mihály Kovács, title “Numerical Approximation of Solutions to Stochastic Partial Differential Equations and Their Moments”, 05/2018)
PhD defenses	Magnus Önnheim (Chalmers, 2016, committee), Fredrik Hellman (Uppsala, 2017, committee), Christin Rhén (Chalmers, 2017, committee), Rikard Anton (Umeå, 2018, opponent), Ricardo Carrizo Vergara (Ecole des Mines de Paris, 2018, referee (“rapporteur”)), Mike Pereira (Ecole des Mines de Paris, 2019, committee), Olof Elias (Chalmers, 2020, suppleant), Milo Viviani (Chalmers, 2020, suppleant), Gregor Pasemann (TU Berlin, 2021, referee (“externe Gutachterin”)), Fredrik Hellström (Chalmers, 2023, suppleant), Carmina Fjellström (Uppsala, 2023, committee), Stuart Campbell (Heriot-Watt University, Edingburgh, 2023, external examiner)

#### MASTER LEVEL

2023	Examiner (Sensor) Master’s thesis Simen Knutsen Furset (NTNU): <i>Existence, smoothness and numerical approximation for two generalizations of the stochastic heat equation</i>
2023	Examiner Master’s thesis Samuel Wagner (Chalmers in cooperation with Danske Bank, Copenhagen): <i>Differential Machine Learning for Counterparty Credit Risk Applications</i>
2022	Master’s thesis Max Sonnelid (Chalmers in cooperation with NTT Data, Munich): <i>Advancing demand forecasting for the automotive industry with probabilistic forecasting</i>
2021/22	Master’s thesis Emil Hietanen (University of Gothenburg): <i>Artificial Intelligence for Option Pricing</i>

- 2021 Examiner Master's thesis Anne Engström (Chalmers): *Spatial Extreme Value Analysis Using Point Processes: A Spatio-temporal Approach to Modeling Extreme Wildfire Activity*
- 2020 Examiner Master's thesis Oskar Eklund (Chalmers): *Computing Failure Probabilities for PDEs with Random Data*
- 2020 Master's thesis Johan Ramne (Chalmers in cooperation with Volvo): *AI Enabled Service Market Logistics: Forecasting Supplier Delivery Performance with Recurrent Neural Networks*
- 2020 Examiner Master's thesis Jesper Olsson (GU): *Representation receipt classification using face recognition*
- 2019/20 Master's thesis Kasper Bågmark (Chalmers): *Approximation of Non-Stationary Fractional Gaussian Random Fields*
- 2019/20 Master's thesis Erik Jansson (Chalmers): *Generation of Gaussian Random Fields on the Sphere: A Surface Finite Element Method for a Type of Fractional Elliptic Stochastic Partial Differential Equation on the Sphere*
- 2019 Master's thesis Mario Iniguez Ordonez (Chalmers): *An Implementation of a Stochastic Partial Differential Equation in FEniCS*
- 2018/19 Master's thesis Georg Bökman (Chalmers): *Stochastic Inference for the Stochastic Heat Equation*
- 2018 Examiner Master's thesis Kristoffer Andersson (Chalmers): *Approximate Stochastic Control Based on Deep Learning and Forward Backward Stochastic Differential Equations*
- 2017/18 Master's thesis Hans-Christian Manthey (University of Gothenburg & TU Braunschweig): *Stochastic Partial Differential Equations in FEniCS*
- 2017 Master's thesis Hörtur Hjartarson (Chalmers in cooperation with NEVS): *Learning Algorithms for Driver Attitude Determination*
- 2015/16 Master's thesis Maryam Taghavianfar (University of Gothenburg): *A Continuous Time Model in Finance: Estimation and Simulation*
- 2014/15 Master's thesis Andreas Petersson (University of Gothenburg): *Stochastic Partial Differential Equations with Multiplicative Noise: Numerical simulations of strong and weak approximation errors*
- 2014 Master's thesis Martynas Šeškaitis (University of Gothenburg): *Multilevel Monte Carlo Methods and Applications in Finance*

- 2013 Master's thesis Lukas Herrmann (ETH Zürich): *Random PDEs on the Sphere* with Ch. Schwab
- 2012/13 Exam thesis ("Semesterarbeit") Lukas Herrmann (ETH Zürich): *Gaussian Random Fields on the Sphere* with Ch. Schwab
- 2010 Exam thesis ("Zulassungsarbeit") Christina Partl (Universität Mannheim): *Markovsche Verzweigungsprozesse / Galton-Watson-Prozesse in Theorie, Simulation und Anwendung* (Markovian Branching Processes / Galton-Watson Processes in Theory, Simulation, and Applications) with J. Potthoff

## BACHELOR LEVEL

- 2022 Bachelor project S. Lindeberg Skoglund (GU), S. Moqvist (Chalmers), C. Cronhamn (GU), K. Westlund (GU): *Simulering av stokastiska fält på sfären* with D. Cohen
- 2022 Bachelor project G. Merila Kyhn (GU), E. Sahlin (Chalmers), William Karlander (Chalmers): *Geometric Numerical Integration of Differential Equations* with D. Cohen
- 2021 Bachelor project T. Doran (University of Gothenburg), A. Ivehag (University of Gothenburg), L. Jakobsson (Chalmers), J. Quach (University of Gothenburg): *Numeriska simuleringar av stokastiska differentialekvationer* with D. Cohen
- 2019 Bachelor project S. Andersson (University of Gothenburg), J. Brandby (University of Gothenburg), T. Gardell (Chalmers), J. Wennerblom (Chalmers): *Att mäta SVT program* with M. Roginskaya
- 2016/17 Bachelor project F. Wikman (Chalmers): *Stochastic Processes: Exploring Numerical Methods for the Heston Model*
- 2016/17 Bachelor project K. Andersson (Chalmers): *Simulations of Cox–Ingersoll–Ross processes*
- 2016 Bachelor project K. Andersson (Chalmers), E. Hegnar (Chalmers), A. Krokdal (University of Gothenburg): *Simulations of Cox–Ingersoll–Ross processes with applications in finance*
- 2016 Bachelor project M. Iniguez Ordonez (Chalmers), K. Larsson (Chalmers), D. Sergejev (Chalmers): *Multilevel Monte Carlo med tillämpning på elliptiska PDE med stokastiska komponenter* (Multilevel Monte Carlo with application to elliptic PDEs with stochastic components)

2008/09 Bachelor thesis J. Berger (Universität Mannheim): *Geometrische Brownsche Bewegung — Diskretisierung und Simulation* (Geometric Brownian Motion — Discretization and Simulation) with J. Potthoff

#### OTHER SKILLS & ACTIVITIES

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Pedagogical courses: Diploma of Higher Education (15 hec), Handledarforum II, GU PhD examiner course

Leadership courses: Chalmers management and leadership courses (Arbetsmiljö, Rekrytera rätt- att kompetensförsörja din verksamhet, Att hålla medarbetarsamtal, 2018, Praktisk konflikthantering, 2019), Chalmers ledarskapsprogram 14 (2018/19)

Board work: In Mannheim member of faculty council and different committees (2001–2010).  
In Gothenburg committee for PhD student selection (2015, 2018), vice-head of MV-kollegiet (2015–2018).  
Head of unit consisting of PhD students, postdocs, and guest teacher within the division of *Applied Mathematics and Statistics* and at the same time vice-head of the division, Department of Mathematical Sciences, Chalmers & University of Gothenburg (08/2019–08/2023).  
Board member and secretary of the Cramér Society (03/2020–03/2023), advisory board of e-commons (2020–), CHAIR research committee and CHAIR Faculty (2022–).

October 20, 2023