Jakob Nordström

Curriculum Vitae

Department of Computer Science (DIKU)
University of Copenhagen
Universitetsparken 1, 2100 Copenhagen, Denmark

Phone: +46 (0)70 742 21 98
E-mail: jn@di.ku.dk
www.jakobnordstrom.se

Research Interests

Computational complexity, combinatorial optimization, proof logging, certifying algorithms

Education and Degrees

2015	Docent degree (habilitation) in Computer Science at KTH Royal Institute of Technology, Stockholm, Sweden
2008	PhD in Computer Science at KTH under the supervision of Professor Johan Håstad
2001	MSc in Computer Science and Mathematics at Stockholm University, Sweden
1999-2003	Russian studies up to finished C-level (equivalent of one and a half year's full-time studies) at Uppsala University and Stockholm University, Sweden
Summer 1993	Karolinska Institute Biomedical Research School, Stockholm, Sweden
1993	Higher Certificate from the Natural Sciences Programme with extended music education at Stockholm Music Upper Secondary School, Sweden
1992	Diploma in Choir Conducting with extended Music Theory from Tallinn Music Upper Secondary School and the Tallinn Conservatory, Estonia

Positions Held

Spring 2021	Visiting Scientist at the Simons Institute for the Theory of Computing at UC Berkeley *[program converted to virtual format due to the Covid-19 pandemic]*
2020-present	Professor at the University of Copenhagen
2020-present	Professor at Lund University (part-time affiliation)
2019-2020	Associate Professor at the University of Copenhagen
Autumn 2018	Visiting Scientist at the Simons Institute for the Theory of Computing at UC Berkeley
2015-2019	Associate Professor at KTH Royal Institute of Technology
2011-2015	Assistant Professor at KTH
2008-2010	Postdoctoral researcher at the Massachusetts Institute of Technology hosted by Professor Madhu Sudan
2002-2008	Research assistant position sponsored by the President of KTH (one of 5-7 “excellence PhD positions” awarded yearly based on undergraduate record)
2000/2001	Master’s thesis project at Prover Technology
1996-1999	Teaching assistant at the Department of Mathematics, Stockholm University

Teaching

Lecturer on the following courses at the University of Copenhagen:

- Computability and Complexity, MSc level, 2021/22
- Discrete Mathematics and Algorithms, BSc level, 2020/21
- Discrete Mathematics and Formal Languages, BSc level, 2019/20, 2020/21, 2021/2022
- Logics in Computer Science, BSc level, 2021/22

Main lecturer on the following courses at KTH:

- Complexity Theory, MSc/PhD level, 2013/14, 2015/16, 2017/18
- Seminars on Theoretical Computer Science: Proof Complexity, MSc/PhD level, 2016/17

- Seminars on Theoretical Computer Science: Algebraic Gems in TCS, MSc/PhD level, 2014/15
- Seminars on Theoretical Computer Science: Communication Complexity, MSc/PhD level, 2012/13
- Current Research in Proof Complexity, MSc/PhD level, 2011/12

Lecturer on other courses:

- International Summer School on Satisfiability, Satisfiability Modulo Theories, and Automated Reasoning, Lisbon, Portugal, 2016
- Estonian Winter School in Computer Science (EWSCS '12), Palmse, Estonia, 2012

Teaching assistant on the following courses at KTH:

- Advanced Algorithms, MSc level, 2005/06
- Algorithms, Data Structures and Complexity, BSc level, 2002/03, 2003/04, 2004/05, 2005/06
- Fundamentals of Computer Science, BSc level, 2002/03, 2003/04, 2004/05
- Complexity Theory, MSc/PhD level, 2003/04

Teaching assistant on the following courses at Stockholm University:

- Algebra and Geometry part 1, BSc level, 1998/99
- Using Computers in Mathematics, MSc level, 1998/99
- Introductory Level course in Mathematics 1996/97
- Mathematical Analysis parts 1 and 2, BSc level, 1996/97

Supervision

PhD students:

- Stephan Gocht (PhD June 2022)
- Susanna Figueiredo de Rezende (PhD June 2019) — recipient of Stockholm Mathematics Centre Excellent PhD Thesis Award
- Marc Vinyals (PhD June 2017)
- Mladen Mikša (PhD January 2017)

Postdoctoral researchers:

- Jo Devriendt (2018-2020)
- Janne Kokkala (2018-2020)
- Dmitry Sokolov (2017-2020)
- Guillaume Lagarde (2018-2019) [hosted jointly with Johan Håstad and Per Austrin]
- Meysam Aghighi (2017-2018)
- Sagnik Mukhopadhyay (2017-2018)
- Aaron Potechin (2017-2018) [hosted jointly with Johan Håstad and Per Austrin]
- Ilario Bonacina (2015-2017)
- Jesús Giráldez Crú (2016-2017)
- Christoph Berkholz (Feb-Aug 2015)
- Massimo Lauria (2012-2015)

Currently advising 3 PhD students and in the process of hiring new postdocs and PhD students

Professional Service

Workshops, PhD courses, et cetera:

- Main organizer of the workshop “Theory and Practice of SAT and Combinatorial Solving” at Schloss Dagstuhl – Leibniz Center for Informatics, Oct 2022 *[rescheduled from Sep 2020 due to the Covid-19 pandemic]*

- Member of organizing committee for the semester program "Satisfiability: Theory, Practice and Beyond" at the Simons Institute for the Theory of Computing at UC Berkeley in spring 2021 *[converted to virtual format due to the Covid-19 pandemic]*
- Main organizer of the workshop "Proof Complexity" at the Banff International Research Station, Jan 2020
- Main organizer of "Swedish Summer School in Computer Science" 2014-2019 (s3cs.eecs.kth.se)
- Main organizer of the workshop "Theory and Practice of Satisfiability Solving" at Casa Matemática Oaxaca (affiliated with BIRS), Aug 2018
- Main organizer of the workshop "Proof Complexity" at Schloss Dagstuhl – Leibniz Center for Informatics, Jan-Feb 2018
- Main organizer of the workshop "Proof Complexity and Beyond" at Mathematisches Forschungsinstitut Oberwolfach, Aug 2017
- Member of organizing committee for the workshop "Theoretical Foundations of SAT Solving" at the Fields Institute, Aug 2016
- Member of program committee for the workshop "Beyond NP" affiliated with the 30th AAAI Conference on Artificial Intelligence (AAAI '16), Feb 2016
- Main organizer of the workshop "Theory and Practice of SAT Solving" at Schloss Dagstuhl – Leibniz Center for Informatics, Apr 2015
- Main organizer of the workshop "Theoretical Foundations of Applied SAT Solving" at the Banff International Research Station, Jan 2014

Conference committees:

- AAAI Conference on Artificial Intelligence (AAAI) 2019-2022
- ACM Symposium on Theory of Computing (STOC) 2016
- Computational Complexity Conference (CCC) 2013, 2016
- Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM) 2013
- Conference on Theory and Applications of Satisfiability Testing (SAT) 2013-2016, 2018-2020
- International Colloquium on Automata, Languages and Programming (ICALP) 2020
- International Computer Science Symposium in Russia (CSR) 2018
- International Conference on Tests and Proofs (TAP) 2022
- International Conference on the Integration of Constraint Programming, Artificial Intelligence, and Operations Research (CPAIOR) 2021
- International Joint Conference on Artificial Intelligence (IJCAI) 2018-2021; program committee board 2022-2024
- International Symposium on Theoretical Aspects of Computer Science (STACS) 2019

Editorial boards:

- Electronic Colloquium on Computational Complexity
- Journal on Satisfiability, Boolean Modeling and Computation
- Progress in Computer Science and Applied Logic (Springer book series)
- Theory of Computing

Scientific evaluations:

- Member of the Expert Panel on Mathematics, Computer Science, and Informatics of the Estonian Research Council (ETAg) 2022
- Examination committee member for PhD thesis of Jing Yang, Lund University
- External reviewer for PhD thesis of Tuomas Hakoniemi, Universitat Politècnica de Catalunya, 2021
- External reviewer of research proposal for the Natural Sciences and Engineering Research Council of Canada (NSERC), 2021

- Chair of examination committee for PhD thesis of Maximilian Probst Gutenberg, University of Copenhagen, 2020
- External reviewer for PhD thesis of Romain Wallon, Université d'Artois, 2020
- External reviewer for PhD thesis of Daniela Kaufmann, JKU Linz, 2020
- External reviewer of research proposal for the Czech Science Foundation (GAČR), 2018
- Examination committee member for PhD thesis of Joel Larsson, Umeå University, 2018
- Examination committee member for PhD thesis of Simon Ståhlberg, Linköping University, 2017
- External reviewer of research proposal for the Austrian Science Fund (FWF), 2016
- External reviewer of research proposal for the Swiss National Science Foundation (SNSF), 2016
- External reviewer for PhD thesis of Bangsheng Tang, Tsinghua University, Beijing, 2013

Community service:

- Mentor for the Swedish Youth National Research Team (Sveriges unga forskningslandslag), 2020
- Member of Swedish jury for the Research Science Institute program for high school students, 2019

Commissions of Trust

2018-2023	Member of the Young Academy of Sweden
2020-2023	Member of the board of the Young Academy of Sweden
2021-2023	Member of the finance committee of the Young Academy of Sweden
2004-2007	President of the PhD Students' Council and PhD student representative in the Board and the Executive Group at the School of Computer Science and Communication, KTH

Awards

2022	Distinguished Paper Award at the 36th AAAI Conference on Artificial Intelligence
2009	Ackermann Award for outstanding dissertation in Logic in Computer Science from the European Association for Computer Science Logic
2006	Danny Lewin Best Student Paper Award at the 38th ACM Symposium on Theory of Computing
2006	The 2006 Meritorious Achievement Award at the School of Computer Science and Communication, KTH

Grants

2021-2026	Academic Doctoral Student Grant from the Wallenberg AI, Autonomous Systems and Software Program (WASP)
2020-2024	Research project 2 grant from the Independent Research Fund Denmark
2017-2022	Consolidator Grant from the Swedish Research Council
2017-2022	Grant for Research Projects with High Scientific Potential from the Knut and Alice Wallenberg Foundation (co-PI)
2017-2020	Postdoctoral Scholarship Program in Mathematics Grant from the Knut and Alice Wallenberg Foundation
2013-2018	Breakthrough Research Grant from the Swedish Research Council
2012-2018	Starting Independent Researcher Grant from the European Research Council
2011-2014	Junior Researcher Position (forskarassistenttjänst) from the Swedish Research Council

Selected Invited Presentations

Sep 2021	Extending the Synergies Between SAT and Description Logics, Dagstuhl, Germany *[virtual presentation]*

Mar 2021	Theoretical Foundations of SAT/SMT Solving workshop at the at the Simons Institute for the Theory of Computing, UC Berkeley, USA *[virtual presentation]*
Feb 2021	Boot Camp for the Satisfiability: Theory, Practice, and Beyond program at the Simons Institute for the Theory of Computing, UC Berkeley, USA *[virtual presentation]*
Dec 2019	Lower Bounds in Computational Complexity Reunion workshop, Simons Institute for the Theory of Computing, UC Berkeley, USA
Dec 2019	Imperial College London, UK
Sep 2019	Katholieke Universiteit Leuven, Belgium
May 2019	NordConsNet workshop 2019, Oslo, Norway
Mar 2019	Computational Complexity of Discrete Problems, Dagstuhl, Germany
Feb 2019	Bringing CP, SAT and SMT Together: Next Challenges in Constraint Solving, Dagstuhl, Germany
Dec 2018	Algebraic Methods, Simons Institute for the Theory of Computing, UC Berkeley, USA
Mar 2017	Computational Complexity of Discrete Problems, Dagstuhl, Germany
Sep 2016	SAT and Interactions, Dagstuhl, Germany
Aug 2016	Theoretical Foundations of SAT Solving, Fields Institute, Toronto, Canada
May 2016	Proof complexity workshop during the Special Semester Program on Computational and Proof Complexity, St. Petersburg State University, Russia
Apr 2016	Workshop on Algorithms in Communication Complexity, Property Testing and Combinatorics, Skolkovo Institute of Science and Technology, Moscow, Russia
Apr 2016	Workshop on Theoretical Computer Science at the National Research University Higher School of Economics, Moscow, Russia
Feb 2016	Semidefinite and Matrix Methods for Optimization and Communication, Institute for Mathematical Sciences, Singapore
Oct 2014	Algorithms, Complexity and Machine Learning: A Tribute to Kurt Mehlhorn, Chalmers University of Technology, Göteborg, Sweden
Jul 2014	17th International Conference on Theory and Applications of Satisfiability Testing (SAT '14), Vienna, Austria
Jul 2014	Proof Complexity 2014, workshop at the Federated Logic Conference (FLoC '14), Vienna, Austria
May 2013	1st Symposium on Structure in Hard Combinatorial Problems, Vienna Center for Logic and Algorithms, Austria
Nov 2012	SAT Interactions, Dagstuhl, Germany
Sep 2012	Limits of Theorem Proving, IASI–CNR, Rome, Italy
Nov 2011	Mathematical Logic: Proof Theory, Constructive Mathematics, Oberwolfach, Germany
Oct 2011	Proof complexity workshop, Banff International Research Station, Banff, Canada
Jun 2011	Synergies in Lower Bounds, Aarhus University, Denmark
Jun 2011	Complexity and Finite Models (CMF '11), Paris, France
Mar 2011	Computational Complexity of Discrete Problems, Dagstuhl, Germany
Jul 2010	Propositional Proof Complexity: Theory and Practice, workshop at the Federated Logic Conference (FLoC '10), Edinburgh, UK
Jul 2010	International Workshop on Tractability, Microsoft Research, Cambridge, UK
Sep 2009	18th EACSL Conference on Computer Science Logic (CSL '09), Coimbra, Portugal
Aug 2009	Barriers in Computational Complexity, Princeton, USA
Sep 2008	Computational Complexity of Discrete Problems, Dagstuhl, Germany
May 2008	Physics of distributed information systems (PhysDIS), Stockholm, Sweden
Sep 2007	Fall School of Logic and Complexity, Třešť, Czech Republic
Apr 2006	New Directions in Proof Complexity, Isaac Newton Institute, Cambridge, UK

Mar 2006 Complexity of Boolean Functions, Dagstuhl, Germany

Peer-Reviewed Conference Publications

In computer science, the most important publication venues are conferences and not journals.

1. Stephan Gocht, Ciaran McCreesh, and Jakob Nordström. **An Auditable Constraint Programming Solver.** To appear in *Proceedings of the 28th International Conference on Principles and Practice of Constraint Programming (CP '22)*, August 2022.
2. Stephan Gocht, Ruben Martins, Jakob Nordström, and Andy Oertel. **Certified CNF Translations for Pseudo-Boolean Solving.** To appear in *Proceedings of the 25th International Conference on Theory and Applications of Satisfiability Testing (SAT '22)*, August 2022.
3. Daniela Kaufmann, Paul Beame, Armin Biere and Jakob Nordström. **Adding Dual Variables to Algebraic Reasoning for Gate-Level Multiplier Verification.** In *Proceedings of the 25th Design, Automation and Test in Europe Conference (DATE '22)*, pages 1435-1440, March 2022.
4. Bart Bogaerts, Stephan Gocht, Ciaran McCreesh, and Jakob Nordström. **Certified Symmetry and Dominance Breaking for Combinatorial Optimisation.** To appear in *Proceedings of the 36th AAAI Conference on Artificial Intelligence (AAAI '22)*, February 2022.
5. Susanna F. de Rezende, Massimo Lauria, Jakob Nordström, and Dmitry Sokolov. **The Power of Negative Reasoning.** In *Proceedings of the 36th Annual Computational Complexity Conference (CCC '21)*, pages 40:1-40:24, July 2021.
6. Susanna F. de Rezende, Mika Göös, Jakob Nordström, Toniann Pitassi, Robert Robere, and Dmitry Sokolov. **Automating Algebraic Proof Systems is *NP*-Hard.** In *Proceedings of the 53rd Annual ACM Symposium on Theory of Computing (STOC '21)*, pages 209-222, June 2021.
7. Jo Devriendt, Stephan Gocht, Emir Demirović, Jakob Nordström, and Peter Stuckey. **Cutting to the Core of Pseudo-Boolean Optimization: Combining Core-Guided Search with Cutting Planes Reasoning.** In *Proceedings of the 35th AAAI Conference on Artificial Intelligence (AAAI '21)*, pages 3750-3758,February 2021.
8. Stephan Gocht and Jakob Nordström. **Certifying Parity Reasoning Efficiently Using Pseudo-Boolean Proofs.** In *Proceedings of the 35th AAAI Conference on Artificial Intelligence (AAAI '21)*, pages 3768-3777, February 2021.
9. Susanna F. de Rezende, Or Meir, Jakob Nordström, Toniann Pitassi, Robert Robere, and Marc Vinyals. **Lifting with Simple Gadgets and Applications to Circuit and Proof Complexity.** In *Proceedings of the 61st Annual IEEE Symposium on Foundations of Computer Science (FOCS '20)*, pages 24-30, November 2020.
10. Susanna F. de Rezende, Or Meir, Jakob Nordström, Toniann Pitassi, and Robert Robere. **KRW Composition Theorems via Lifting.** In *Proceedings of the 61st Annual IEEE Symposium on Foundations of Computer Science (FOCS '20)*, pages 43-49, November 2020.
11. Stephan Gocht, Ross McBride, Ciaran McCreesh, Jakob Nordström, Patrick Prosser, and James Trimble. **Certifying Solvers for Clique and Maximum Common (Connected) Subgraph Problems.** In *Proceedings of the 26th International Conference on Principles and Practice of Constraint Programming (CP '20)*, pages 338-357, September 2020.
12. Janne I. Kokkala and Jakob Nordström. **Using Resolution Proofs to Analyse CDCL Solvers.** In *Proceedings of the 26th International Conference on Principles and Practice of Constraint Programming (CP '20)*, pages 427-444, September 2020.
13. Buser Say, Jo Devriendt, Jakob Nordström, and Peter Stuckey. **Theoretical and Experimental Results for Planning with Learned Binarized Neural Network Transition Models.** In *Proceedings of the 26th International Conference on Principles and Practice of Constraint Programming (CP '20)*, pages 917-934, September 2020.
14. Vincent Liew, Paul Beame, Jo Devriendt, Jan Elffers, and Jakob Nordström. **Verifying Properties of Bit-vector Multiplication Using Cutting Planes Reasoning.** In *Proceedings of the 20th Conference on Formal Methods in Computer-Aided Design (FMCAD '20)*, pages 194-204, September 2020.
15. Jo Devriendt, Ambros Gleixner, and Jakob Nordström. **Learn to Relax: Integrating 0-1 Integer Linear Programming with Conflict-Driven Pseudo-Boolean Search.** In *Proceedings of the*

17th International Conference on the Integration of Constraint Programming, Artificial Intelligence, and Operations Research (CPAIOR '20), pages xxiv-xxv, September 2020.

16. Susanna F. de Rezende, Jakob Nordström, Kilian Risse, and Dmitry Sokolov. **Exponential Resolution Lower Bounds for Weak Pigeonhole Principle and Perfect Matching Formulas over Sparse Graphs.** In *Proceedings of the 35th Annual Computational Complexity Conference (CCC '20)*, pages 28:1-28:24, July 2020.
17. Marc Vinyals, Jan Elffers, Jan Johannsen, and Jakob Nordström. **Simplified and Improved Separations Between Regular and General Resolution by Lifting.** In *Proceedings of the 23rd International Conference on Theory and Applications of Satisfiability Testing (SAT '20)*, pages 182-200, July 2020.
18. Stephan Gocht, Ciaran McCreesh, and Jakob Nordström. **Subgraph Isomorphism Meets Cutting Planes: Solving with Certified Solutions.** In *Proceedings of the 29th International Joint Conference on Artificial Intelligence (IJCAI '20)*, pages 1134-1140, July 2020.
19. Jan Elffers, Stephan Gocht, Ciaran McCreesh, and Jakob Nordström. **Justifying All Differences Using Pseudo-Boolean Reasoning.** In *Proceedings of the 34th AAAI Conference on Artificial Intelligence (AAAI '20)*, pages 1486-1494, February 2020.
20. Jan Elffers and Jakob Nordström. **A Cardinal Improvement to Pseudo-Boolean Solving.** In *Proceedings of the 34th AAAI Conference on Artificial Intelligence (AAAI '20)*, pages 1495-1503, February 2020.
21. Guillaume Lagarde, Jakob Nordström, Dmitry Sokolov, and Joseph Swernofsky. **Trade-offs Between Size and Degree in Polynomial Calculus.** In *Proceedings of the 11th Innovations in Theoretical Computer Science Conference (ITCS '20)*, pages 72:1-72:16, January 2020.
22. Stephan Gocht, Jakob Nordström, and Amir Yehudayoff. **On Division Versus Saturation in Pseudo-Boolean Solving.** In *Proceedings of the 28th International Joint Conference on Artificial Intelligence (IJCAI '19)*, pages 1711-1718, August 2019.
23. Susanna F. de Rezende, Or Meir, Jakob Nordström, and Robert Robere. **Nullstellensatz Size-Degree Trade-offs from Reversible Pebbling.** In *Proceedings of the 34th Annual Computational Complexity Conference (CCC '19)*, pages 18:1-18:16, July 2019.
24. Jan Elffers and Jakob Nordström. **Divide and Conquer: Towards Faster Pseudo-Boolean Solving.** In *Proceedings of the 27th International Joint Conference on Artificial Intelligence (IJCAI '18)*, pages 1291-1299, July 2018.
25. Jan Elffers, Jesús Giráldez-Cru, Stephan Gocht, Jakob Nordström, and Laurent Simon. **Seeking Practical CDCL Insights from Theoretical SAT Benchmarks.** In *Proceedings of the 27th International Joint Conference on Artificial Intelligence (IJCAI '18)*, pages 1300-1308, July 2018.
26. Jan Elffers, Jesús Giráldez-Cru, Jakob Nordström, and Marc Vinyals. **Using Combinatorial Benchmarks to Probe the Reasoning Power of Pseudo-Boolean Solvers.** In *Proceedings of the 21st International Conference on Theory and Applications of Satisfiability Testing (SAT '18)*, pages 75-93, July 2018.
27. Marc Vinyals, Jan Elffers, Jesús Giráldez-Cru, Stephan Gocht, and Jakob Nordström. **In Between Resolution and Cutting Planes: A Study of Proof Systems for Pseudo-Boolean SAT Solving.** In *Proceedings of the 21st International Conference on Theory and Applications of Satisfiability Testing (SAT '18)*, pages 292-310, July 2018.
28. Albert Atserias, Ilario Bonacina, Susanna F. de Rezende, Massimo Lauria, Jakob Nordström, and Alexander Razborov. **Clique Is Hard on Average for Regular Resolution.** In *Proceedings of the 50th Annual ACM Symposium on Theory of Computing (STOC '18)*, pages 866-877, June 2018.
29. Massimo Lauria, Jan Elffers, Jakob Nordström, and Marc Vinyals. **CNFgen: A Generator of Crafted CNF formulas.** In *Proceedings of the 20th International Conference on Theory and Applications of Satisfiability Testing (SAT '17)*, pages 464-473, August-September 2017.
30. Massimo Lauria and Jakob Nordström. **Graph Colouring is Hard for Algorithms Based on Hilbert's Nullstellensatz and Gröbner Bases.** In *Proceedings of the 32nd Annual Computational Complexity Conference (CCC '17)*, pages 2:1-2:20, July 2017.

31. Joël Alwen, Susanna F. de Rezende, Jakob Nordström, and Marc Vinyals. **Cumulative Space in Black-White Pebbling and Resolution.** In *Proceedings of the 8th Innovations in Theoretical Computer Science Conference (ITCS '17)*, January 2017.
32. Susanna F. de Rezende, Jakob Nordström, and Marc Vinyals. **How Limited Interaction Hinders Real Communication (and What It Means for Proof and Circuit Complexity).** In *Proceedings of the 57th Annual IEEE Symposium on Foundations of Computer Science (FOCS '16)*, pages 295-304, October 2016.
33. Christoph Berkholz and Jakob Nordström. **Supercritical Space-Width Trade-offs for Resolution.** In *Proceedings of the 43rd International Colloquium on Automata, Languages and Programming (ICALP '16)*, pages 57:1-57:14, July 2016.
34. Jan Elffers, Jan Johannsen, Massimo Lauria, Thomas Magnard, Jakob Nordström, and Marc Vinyals. **Trade-offs Between Time and Memory in a Tighter Model of CDCL SAT Solvers.** In *Proceedings of the 19th International Conference on Theory and Applications of Satisfiability Testing (SAT '16)*, pages 160-176, July 2016.
35. Christoph Berkholz and Jakob Nordström. **Near-Optimal Lower Bounds on Quantifier Depth and Weisfeiler-Leman Refinement Steps.** In *Proceedings of the 31st Annual ACM/IEEE Symposium on Logic in Computer Science (LICS '16)*, pages 267-276, July 2016.
36. Siu Man Chan, Massimo Lauria, Jakob Nordström, and Marc Vinyals. **Hardness of Approximation in PSPACE and Separation Results for Pebble Games (Extended Abstract).** In *Proceedings of the 56th Annual IEEE Symposium on Foundations of Computer Science (FOCS '15)*, pages 466-485, October 2015.
37. Massimo Lauria and Jakob Nordström. **Tight Size-Degree Bounds for Sums-of-Squares Proofs.** In *Proceedings of the 30th Annual Computational Complexity Conference (CCC '15)*, pages 448-466, June 2015.
38. Mladen Mikša and Jakob Nordström. **A Generalized Method for Proving Polynomial Calculus Degree Lower Bounds.** In *Proceedings of the 30th Annual Computational Complexity Conference (CCC '15)*, pages 467-487, June 2015.
39. Mladen Mikša and Jakob Nordström. **Long Proofs of (Seemingly) Simple Formulas.** In *Proceedings of the 17th International Conference on Theory and Applications of Satisfiability Testing (SAT '14)*, pages 121-137, July 2014.
40. Albert Atserias, Massimo Lauria, and Jakob Nordström. **Narrow Proofs May Be Maximally Long.** In *Proceedings of the 29th Annual IEEE Conference on Computational Complexity (CCC '14)*, pages 286-297, June 2014.
41. Yuval Filmus, Massimo Lauria, Mladen Mikša, Jakob Nordström, and Marc Vinyals. **From Small Space to Small Width in Resolution.** In *Proceedings of the 31st Symposium on Theoretical Aspects of Computer Science (STACS '14)*, pages 300-311, March 2014.
42. Yuval Filmus, Massimo Lauria, Mladen Mikša, Jakob Nordström, and Marc Vinyals. **Towards an Understanding of Polynomial Calculus: New Separations and Lower Bounds (Extended Abstract).** In *Proceedings of the 40th International Colloquium on Automata, Languages and Programming (ICALP '13)*, pages 437-448, July 2013.
43. Chris Beck, Jakob Nordström, and Bangsheng Tang. **Some Trade-off Results for Polynomial Calculus (Extended Abstract).** In *Proceedings of the 45th Annual ACM Symposium on Theory of Computing (STOC '13)*, pages 813-822, June 2013.
44. Matti Järvisalo, Arie Matsliah, Jakob Nordström, and Stanislav Živný. **Relating Proof Complexity Measures and Practical Hardness of SAT.** In *Proceedings of the 18th International Conference on Principles and Practice of Constraint Programming (CP '12)*, pages 316-331, October 2012.
45. Yuval Filmus, Massimo Lauria, Jakob Nordström, Neil Thapen, and Noga Ron-Zewi. **Space Complexity in Polynomial Calculus (Extended Abstract).** In *Proceedings of the 27th Annual IEEE Conference on Computational Complexity (CCC '12)*, pages 334-344, June 2012.
46. Trinh Huynh and Jakob Nordström. **On the Virtue of Succinct Proofs: Amplifying Communication Complexity Hardness to Time-Space Trade-offs in Proof Complexity**

(Extended Abstract). In *Proceedings of the 44th Annual ACM Symposium on Theory of Computing (STOC '12)*, pages 233-248, May 2012.

47. Jakob Nordström and Alexander Razborov. **On Minimal Unsatisfiability and Time-Space Trade-offs for *k*-DNF Resolution.** In *Proceedings of the 38th International Colloquium on Automata, Languages and Programming (ICALP '11)*, pages 642-653, July 2011.
48. Eli Ben-Sasson and Jakob Nordström. **Understanding Space in Proof Complexity: Separations and Trade-offs via Substitutions (Extended Abstract).** In *Proceedings of the 2nd Symposium on Innovations in Computer Science (ICS '11)*, pages 401-416, January 2011.
49. Jakob Nordström. **On the Relative Strength of Pebbling and Resolution (Extended Abstract).** In *Proceedings of the 25th Annual IEEE Conference on Computational Complexity (CCC '10)*, pages 151-162, June 2010.
50. Eli Ben-Sasson and Jakob Nordström. **Short Proofs May Be Spacious: An Optimal Separation of Space and Length in Resolution (Extended Abstract).** In *Proceedings of the 49th Annual IEEE Symposium on Foundations of Computer Science (FOCS '08),* pages 709–718, October 2008.
51. Jakob Nordström and Johan Håstad. **Towards an Optimal Separation of Space and Length in Resolution (Extended Abstract).** In *Proceedings of the 40th Annual ACM Symposium on Theory of Computing (STOC '08),* pages 701–710, May 2008.
52. Jakob Nordström. **Narrow Proofs May Be Spacious: Separating Space and Width in Resolution (Extended Abstract).** In *Proceedings of the 38th Annual ACM Symposium on Theory of Computing (STOC '06),* pages 507–516, May 2006.

Journal Publications

1. Christoph Berkholz and Jakob Nordström. **Near-Optimal Lower Bounds on Quantifier Depth and Weisfeiler-Leman Refinement Steps.** To appear in *Journal of the ACM*, 2022.
2. Mladen Mikša and Jakob Nordström. **A Generalized Method for Proving Polynomial Calculus Degree Lower Bounds.** To appear in *Journal of the ACM*, 2022.
3. Albert Atserias, Ilario Bonacina, Susanna F. de Rezende, Massimo Lauria, Jakob Nordström, and Alexander Razborov. **Clique Is Hard on Average for Regular Resolution.** *Journal of the ACM*, volume 68, issue 4, article 23, pages 1-26, August 2021.
4. Susanna F. de Rezende, Or Meir, Jakob Nordström, and Robert Robere. **Nullstellensatz Size-Degree Trade-offs from Reversible Pebbling.** *Computational Complexity*, February 2021.
5. Jo Devriendt, Ambros Gleixner, and Jakob Nordström. **Learn to Relax: Integrating 0-1 Integer Linear Programming with Conflict-Driven Pseudo-Boolean Search.** *Constraints*, January 2021. (Special issue for *CPAIOR '20*.)
6. Christoph Berkholz and Jakob Nordström. **Supercritical Space-Width Trade-offs for Resolution.** *SIAM Journal on Computing*, volume 49, issue 1, pages 98-118, February 2020.
7. Massimo Lauria and Jakob Nordström. **Tight Size-Degree Bounds for Sums-of-Squares Proofs.** *Computational Complexity*, volume 26, issue 4, pages 911–948, December 2017.
8. Albert Atserias, Massimo Lauria, and Jakob Nordström. **Narrow Proofs May Be Maximally Long.** In *ACM Transactions on Computational Logic*, volume 17, issue 3, article 19, May 2016.
9. Yuval Filmus, Massimo Lauria, Jakob Nordström, Noga Ron-Zewi, and Neil Thapen. **Space Complexity in Polynomial Calculus.** *SIAM Journal on Computing*, volume 44, issue 4, pages 1119-1153, August 2015.
10. Yuval Filmus, Massimo Lauria, Mladen Mikša, Jakob Nordström, and Marc Vinyals. **From Small Space to Small Width in Resolution.** *ACM Transactions on Computational Logic*, volume 16, issue 4, article 28, July 2015.
11. Jakob Nordström and Johan Håstad. **Towards an Optimal Separation of Space and Length in Resolution.** *Theory of Computing*, volume 9, article 14, pages 471-557, May 2013.
12. Jakob Nordström. **On the Relative Strength of Pebbling and Resolution.** *ACM Transactions on Computational Logic*, volume 13, issue 2, article 16, April 2012.

13. Jakob Nordström. **A Simplified Way of Proving Trade-off Results for Resolution.** *Information Processing Letters*, volume 109, number 18, pages 1030-1035, August 2009.
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1. Sam Buss and Jakob Nordström. **Proof Complexity and SAT Solving.** In Armin Biere, Marijn Heule, Hans van Maaren, and Toby Walsh (editors), *Handbook of Satisfiability*, 2nd edition, Chapter 7, pages 233-350. IOS Press, 2021.
2. Jakob Nordström. **On the Interplay Between Proof Complexity and SAT Solving.** *ACM SIGLOG News*, volume 2, number 3, pages 19-44, July 2015.
3. Jakob Nordström. **A (Biased) Proof Complexity Survey for SAT Practitioners.** In Proceedings of the 17th International Conference on Theory and Applications of Satisfiability Testing (SAT '14), pages 1-6, July 2014.
4. Jakob Nordström. **Pebble Games, Proof Complexity, and Time-Space Trade-offs.** *Logical Methods in Computer Science*, volume 9, issue 3, article 15, September 2013.

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1. Jakob Nordström. **New Wine into Old Wineskins: A Survey of Some Pebbling Classics with Supplemental Results.** To appear in *Foundations and Trends in Theoretical Computer Science.* Manuscript in preparation, 2021.
2. Stephan Gocht, Ciaran McCreesh and Jakob Nordström. **VeriPB: The Easy Way to Make Your Combinatorial Search Algorithm Trustworthy.** Presented at *From Constraint Programming to Trustworthy AI*, workshop affiliated with the *26th International Conference on Principles and Practice of Constraint Programming (CP '20)*, September 2020. Paper available at www.jakobnordstrom.se/docs/publications/VeriPB_CPTAI2020.pdf.
3. Arnab Bhattacharyya, Elena Grigorescu, Jakob Nordström, and Ning Xie. **On the Semantics of Local Characterizations for Linear-Invariant Properties.** Manuscript, 2011.

Other Experience

1998-2011	Interpreter and translator between Russian and Swedish/English. Engaged as interpreter for among others HM the King of Sweden, the Prime Minister, and the Speaker of the Swedish Parliament
2002-2005	President of the Swedish Association of Military Interpreters (Befälsföreningen Militärtolkar, www.militartolkar.org)
2001-2002	Secretary of the Swedish Association of Military Interpreters
1994-1999	Artistic director of the vocal ensemble Collegium Vocale Stockholm
1997/98	Compulsory national service as military interpreter at the Swedish Armed Forces Language Institute (Försvarets tolkskola). Graduated as the best student of the 1998 class