

Jeremias Berg

Curriculum Vitae

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Born 1989, Finland



Degrees

2018 **Doctor of Philosophy, Computer Science**, *Faculty of Science*, University of Helsinki.

PhD Thesis

Title *Solving Optimization Problems via Maximum Satisfiability: Encodings and Re-encodings.*

Accepted with distinction on 12.6.2018.

Supervisors Associate Professor Matti Järvisalo & Professor Petri Myllymäki.

Pre- Professor Lakhdar Sais, Université d'Artois, France &

examiners Professor Peter Stuckey, University of Melbourne, Australia.

Opponent Professor Inês Lynce, Universidade de Lisboa, Portugal.

2014 **Master of Science, Applied Mathematics**, *Faculty of Science*, University of Helsinki, *GPA – 4.7 / 5.*

Specialized in Logic and Statistical Machine Learning.

2013 **Bachelor of Science, Mathematics**, *Faculty of Science*, University of Helsinki, *GPA – 4.9 / 5.*

An extended (60 cr.) minor in Computer Science.

2009 **Military Service**, *Finnish Defense Forces*, Tammissaari, 362 days.
Completed officer's training (RUK) course 234.

2008 **International Baccalaureat**, *Mattlidens Gymnasium*, Espoo.
Diploma Score 44/45.

Key Academic Merits

International Research visits

2-4/2019 3 month research visit to Professor Fahiem Bacchus at the University of Toronto, Toronto, Canada.

10-12/2018 3 month research visit to Professor Peter Stuckey at the University of Melbourne and Monash University, Melbourne, Australia.

Reviewing experience

2020 PC member of the The 34rd AAAI Conference on Artificial Intelligence (AAAI).

- 2019 PC member of the The 29th International Joint Conference on Artificial Intelligence (IJCAI).
- 2019 PC member of the The 28th International Joint Conference on Artificial Intelligence (IJCAI).
- 2019 PC member of the The 33rd AAAI Conference on Artificial Intelligence (AAAI).
- 2018- Reviewer for Artificial Intelligence Journal and Journal of Approximative Algorithms.

Memberships in scientific organisations

2020 - 2024 Member in Young Academy Finland.

Conference Organisation

7/2013 One of the local organizers of the 16th International Conference on Theory and Applications of Satisfiability Testing (SAT), Helsinki, Finland.

Scientific Talks and Posters

2013-> Several scientific talks and poster presentations at different international venues. For more details please see my webpage.

Scientific Publications

Two journal publications, 17 conference publications, two workshop publications. All publications are peer reviewed.

Journal Publications

- 2018 **Solving Graph Problems via Potential Maximal Cliques: An Experimental Evaluation of the Bouchitté–Todinca Algorithm,**
Tuukka Korhonen, Jeremias Berg, and Matti Järvisalo, Journal of Experimental Algorithmics, volume 24, pages 1-19.
ACM
- 2017 **Cost-Optimal Constrained Correlation Clustering via Weighted Partial Maximum Satisfiability,**
Jeremias Berg and Matti Järvisalo, Artificial Intelligence, volume 244, pages 110-142.
Elsevier

Conference publications

- 2020 **Abstract Cores in Implicit Hitting Set MaxSat Solving,**
Jeremias Berg, Fahiem Bacchus and Alex Poole, Proceedings of the 23rd International Conference on Theory and Applications of Satisfiability Testing (SAT), pages 277-294.
Springer
- 2020 **Core-Guided and Core-Boosted Search for CP,**
Graeme Grange, Jeremias Berg, Emir Demirovic and Peter Stuckey., Proceedings of the 17th International Conference on the Integration of Constraint Programming, Artificial Intelligence, and Operations Research (CPAIOR), pages ??? - ???.
to appear

- 2020 **Preprocessing in Incomplete MaxSAT solving**,
Marcus Leivo, Jeremias Berg, Matti Järvisalo., Proceedings of the 24th European Conference on Artificial Intelligence (ECAI).
IOS PRESS
- 2019 **Enumerating Potential Maximal Cliques via SAT and ASP**,
Tuukka Korhonen, Jeremias Berg, and Matti Järvisalo, Proceedings of the 28th International Joint Conference on Artificial Intelligence (IJCAI), pages 1116-1122.
AAAI Press
- 2019 **Core-Boosted Linear Search for Incomplete MaxSAT**,
Jeremias Berg, Emir Demirović, and Peter Stuckey, Proceedings of the 16th International Conference on the Integration of Constraint Programming, Artificial Intelligence, and Operations Research (CPAIOR), volume 11494, pages 39-56 of the Lecture Notes in Computer Science.
Springer
- 2019 **Unifying Reasoning and Core-Guided Search for Maximum Satisfiability**,
Jeremias Berg and Matti Järvisalo, Proceedings of the 16th Edition of the European Conference on Logics in Artificial Intelligence (JELIA), volume 11468, pages 287-303 of the Lecture Notes in Computer Science.
Springer
- 2017 **Minimum-Width Confidence Bands via Constraint Optimization**,
Jeremias Berg, Emilia Oikarinen, Matti Järvisalo, and Kai Puolamäki, Proceedings of the 23rd International Conference on Principles and Practice of Constraint Programming (CP), volume 10416, pages 443-459 of the Lecture Notes in Computer Science.
Springer
- 2017 **Weight-Aware Core Extraction in SAT-Based MaxSAT Solving**,
Jeremias Berg and Matti Järvisalo, Proceedings of the 23rd International Conference on Principles and Practice of Constraint Programming (CP), volume 10416, pages 652-670 of the Lecture Notes in Computer Science.
Springer
- 2017 **MaxPre: An Extended MaxSAT Preprocessor**,
Tuukka Korhonen, Jeremias Berg, Paul Saikko and Matti Järvisalo, Proceedings of the 20th International Conference on Theory and Applications of Satisfiability Testing (SAT), volume 10416, pages 443-459 of the Lecture Notes in Computer Science.
Springer
- 2016 **Impact of SAT-Based Preprocessing on Core-Guided MaxSAT Solving**,
Jeremias Berg and Matti Järvisalo, Proceedings of the 22nd International Conference on Principles and Practice of Constraint Programming (CP), volume 9892, pages 66-85 of the Lecture Notes in Computer Science.
Springer

- 2016 **Subsumed Label Elimination for Maximum Satisfiability**,
Jeremias Berg, Paul Saikko and Matti Järvisalo, Proceedings of the 22nd European Conference on Artificial Intelligence (ECAI), volume 285, pages 630-638 of the Frontiers in Artificial Intelligence and Applications.
IOS Press
- 2016 **LMHS: A SAT-IP Hybrid MaxSAT Solver**,
Paul Saikko, Jeremias Berg and Matti Järvisalo, Proceedings of the 19th International Conference on Theory and Applications of Satisfiability Testing (SAT), volume 9710, pages 539-546 of the Lecture Notes in Computer Science.
Springer
- 2015 **Re-using Auxiliary Variables for MaxSAT Preprocessing**,
Jeremias Berg, Paul Saikko, and Matti Järvisalo, Proceedings of the IEEE 27th International Conference on Tools with Artificial Intelligence (ICTAI), pages 813-820.
IEEE Computer Society
- 2015 **Improving the Effectiveness of SAT-Based Preprocessing for MaxSAT**,
Jeremias Berg, Paul Saikko, and Matti Järvisalo, Proceedings of the 24th International Joint Conference on Artificial Intelligence (IJCAI), pages 239-245.
AAAI Press
- 2014 **SAT-Based Approaches to Treewidth Computation: An Evaluation**,
Jeremias Berg and Matti Järvisalo, Proceedings of the 2014 IEEE 26th International Conference on Tools with Artificial Intelligence (ICTAI), pages 328-335.
IEEE Computer Society
- 2014 **Optimal Neighborhood Preserving Visualization by Maximum Satisfiability**,
Kerstin Bunte, Matti Järvisalo, Jeremias Berg, Petri Myllymäki, Jaakko Peltonen, and Samuel Kaski, Proceedings of the 28th AAAI Conference on Artificial Intelligence (AAAI), pages 1694-1700.
AAAI Press
- 2014 **Learning Optimal Bounded Treewidth Bayesian Networks via Maximum Satisfiability**,
Jeremias Berg, Matti Järvisalo, and Brandon Malone, Proceedings of the 17th International Conference on Artificial Intelligence and Statistics (AISTATS), volume 33, pages 86-95 of the JMLR Workshop and Conference Proceedings.
JMLR
- Workshop Publications**
- 2015 **Applications of MaxSAT in Data Analysis**,
Jeremias Berg, Antti Hyttinen, and Matti Järvisalo, Proceedings of Pragmatics of SAT (PoS) 2015 and 2018, volume 59, pages 50-64 of the EPiC Series in Computing.
EasyChair
- 2013 **Optimal Correlation Clustering via MaxSAT**,
Jeremias Berg and Matti Järvisalo, Proceedings of the 2013 IEEE 13th International Conference on Data Mining Workshops (ICDMW), pages 750-757.
IEEE Computer Society

Theses

- 2018 **Solving Optimization Problems via Maximum Satisfiability: Encodings and Re-Encodings**, *Jeremias Berg*, PhD Thesis, University of Helsinki.
Accepted with distinction on 12.6.2018.
- 2014 **Cost-Optimal Correlation Clustering via Partial Maximum Satisfiability**, *Jeremias Berg*, Master's Thesis, University of Helsinki.
Accepted with Eximia Cum Laude Approbatur; the second possible highest grade on 3.6.2014.
- 2012 **Kromaattinen korrelaatioklusterointi Max-Sat-ongelmana (*Chromatic Correlation Clustering as a MaxSAT problem, in Finnish*)**, *Jeremias Berg*, Bachelor's Thesis, The University of Helsinki.
Accepted with the grade 5/5 on 26.11.2012.

Grants and Awards

Only the most important ones listed. Total value 250 kEUR.

- 2020 ACP Doctoral Research Award from the Association for Constraint Programming.
- 2020 Best Paper Award at SAT 2020
- 2020 Grant for postdoctoral research from Helsinki Institute for Information Technology, 84 000 EUR.
- 2019 Doctoral dissertation award from the University of Helsinki, 4000 EUR.
- 2018 Outstanding thesis award from the Doctoral School of Natural Sciences, University of Helsinki, 1000 EUR.
- 2018 Grant for pilot postdoc period and international visits from Helsinki Institute for Information Technology, 27 000 EUR.
- 2017 Best junior researcher of the year from the Department of Computer Science, University of Helsinki.
- 2017 Grant for successful postgraduate studies from the Nokia Foundation, 5000 EUR.
- 2015 Doctoral program position for four years from the Doctoral Programme in Computer Science (DoCS), University of Helsinki, 160 000 EUR.
- 2015 Grant for successful postgraduate studies from Emil Aaltonen Foundation, 5000 EUR.
- 2015 Student grant for successful graduate studies from Nylands Nation, 1500 EUR.

Teaching Experience

Only the most important ones listed. More information can be found on my webpage.

- 2020 **Pedagogy Training**, 10 credits completed, Faculty of Science, University of Helsinki.
- 2020 **Thesis Instruction**, Three graduate theses, Dept. of Computer Science, University of Helsinki.
Co-supervising three different master's level (pro gradu) theses.
More information can be found on mw webpage.

- 2015 - **Thesis Instruction**, *Twelve bachelor's theses*, Dept. of Computer Science, University of Helsinki.
More information can be found on mw webpage.
- 2014 -> **Course Assistant**, *Graduate & Undergraduate level courses in mathematics and computer science*, Dept. of Mathematics and Statistics & Dept. of Computer Science, University of Helsinki.
Several different undergraduate and graduate level courses in Mathematics and Computer Science. More information can be found on mw webpage
- 2011 **Course lecturer**, *Introduction to discrete mathematics*, Dept. of Mathematics and Statistics, University of Helsinki.

Work Experience

- 6/2018- **Postdoctoral Researcher**, *Constraint Reasoning and Optimization Group*, Department of Computer Science, University of Helsinki.
- 1/2015- **Doctoral Student**, *Constraint Reasoning and Optimization Group*,
6/2018 Department of Computer Science, University of Helsinki.
- 5/2012- **Research Assistant**, *Constraint Reasoning and Optimization Group*,
12/2014 Department of Computer Science, University of Helsinki.
- 6/2011- **Data analyst**, *DealDash Oy*, Helsinki.
12/2012
- 2010 **Driver**, *Kuljetus Oy Kalliomaa*, Helsinki.
- 2009 **Military Service**, *Finnish Defense Forces*, Tammissaari.
- 2008 **Warehouse Assistant**, *EnerSys Europe*, Espoo.
- 2007 **Driver**, *Fazer Bageri*, Uppsala.

Other Positions of Trust

- 2012-2013 **Student member of the Faculty Council**, *Faculty of Science*, University of Helsinki.
- 2010-2012 **Chairman & member of the board**, *Spektrum rf*, Student Union of the University of Helsinki.
Description: Chairman of the board in 2012.
- 2010-2011 **Head of Swedish speaking tutoring**, *Faculty of Science*, The University of Helsinki.
Description: Contact person between the faculty and the Swedish speaking tutors.
- 2010 **Mathematics tutor**, *Faculty of Science*, The University of Helsinki.
- 2009 **Head of the course book department**, *RUK Student Union*, Hamina.
Description: Responsible for the creation of the course book of the 234th reserve officer course.

Languages

- Finnish **Mother tongue**
Swedish **Mother tongue**

English **Fluent**

Both in spoken and written language