

# Marie-Louise Lackner (née Bruner)

## Curriculum Vitae

Databases and Artificial  
Intelligence Group  
TU Wien Informatics  
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### Personal information

Birth date 27 July 1987  
Nationality Austrian  
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### Education

Oct 2011 – **PhD studies in Mathematics**, *TU Wien*, PhD thesis “Patterns in labelled combinatorial objects” supervised by Alois Panholzer.  
Jun 2015 Academic title: Dr.techn.  
Graduated with distinction  
Jun 2012 **“Dr. Maria Schaumayer”-prize**, *awarded for the diploma thesis*.  
Oct 2005 – **Studies of “Technische Mathematik”**, *TU Wien*, Area of concentration:  
Jun 2011 “Mathematics in Science”, Master thesis (Diplomarbeit) “Restricted Permutations on Multisets” supervised by Alois Panholzer.  
Academic title: Dipl.-Ing. (equivalent to MSc)  
Graduated with distinction  
Aug 2008 – **Erasmus exchange term**, *Royal Institute of Technology in Stockholm (KTH)*,  
Dec 2008 *Sweden*.  
Aug 1993 – **Lycée Français de Vienne**, *Ecole primaire, collège, lycée, Section S*  
Jun 2005 (scientifique/sciences).  
French Baccaauréat passed with distinction  
Austrian Matura passed with distinction

### Employment history (selection)

Mar 2019 – **Postdoctoral researcher**, *TU Wien, Databases and Artificial Intelligence Group*,  
present Christian Doppler Laboratory for Artificial Intelligence and Optimization for Planning and Scheduling, project led by Nysret Musliu.  
Application-oriented and fundamental research in the area of production planning and scheduling  
Aug 2019 **Birth of my daughter**, *followed by 12 months parental leave (“Karenz”)*.  
2018 **Sabbatical**, *hiking and skiing 3000km in Scandinavia*.

- Jun 2016 – **Research Facilitator**, *University of Oxford, Department of Statistics.*
- Apr 2017 Supporting academics both pre-award and post-award: identifying best funding opportunities, assisting with the preparation of proposals, managing research grants.
- Oct 2016 – **Tutor**, *University of Oxford, Balliol College.*
- Dec 2016 College tutorials "Linear Algebra" and "Discrete Mathematics" for first year students in computer science
- Sep 2014 – **External lecturer**, *Karl Landsteiner Privatuniversität Krems, Austria.*
- Nov 2017 Part-time lecturer with full responsibility for the course "Mathematics for Medicine"
- Jul 2015 – **Postdoctoral researcher**, *TU Wien, Institute of Discrete Mathematics and*
- May 2016 *Geometry.*  
Identifying and investigating research questions in combinatorics, disseminating research (talks and scientific publications), writing project reports and lecturing introductory mathematics
- Jun 2011 – **Graduate teaching and research assistant**, *TU Wien, Institute of Discrete*
- Jun 2015 *Mathematics and Geometry.*  
Independent research towards obtaining a PhD in mathematics, disseminating research results, teaching and grading, active participation in proposal writing
- Sep 2012 – **External lecturer**, *FH Campus Wien – University of Applied Sciences.*
- Jan 2015 Small group tutoring in "Calculus 1" for electrical engineering students
- Mar 2012 – **Consultancy work**, *Vienna Science and Technology Fund WWTF.*
- Nov 2012 Policy analysis for the report "OECD Reviews of Innovation Policy for Sweden"
- Mar 2009 – **Undergraduate teaching assistant**, *TU Wien, Institute of Discrete Mathematics*
- Jun 2011 *and Geometry.*  
Small group tutoring in mathematics for mechanical and civil engineering students
- Sep 2006 **Summer intern**, *Vienna Science and Technology Fund WWTF.*  
Performing internet searches, evaluating ongoing research projects, and providing administrative support

## Research areas

My research lies at the interplay of Algorithms and Combinatorics. I am interested in the design of efficient algorithms for combinatorial problems, in particular for combinatorial optimization problems. I have also worked on enumerative aspects of labelled combinatorial objects.

- Combinatorial optimization: Real-world problems from production scheduling and planning that require tailored solutions, e.g. using AI-techniques
- Complexity analysis: classical and parametrized complexity theory, design of algorithms
- Enumeration: permutation patterns, generalized parking functions, patterns in trees and mappings; exact and asymptotic results, generating functions and bijections, log-concavity of combinatorial sequences
- Social Choice Theory: Connection between domain restrictions and permutation patterns, likelihood of domain restrictions; combinatorial and probabilistic methods

## Scientific activity

- Publications 17 peer-reviewed publications, one journal article currently under revision, one publication in recreational mathematics: “Mountainous patterns”, a playful introduction to some of my research  
see the section “Publications” for details
- International collaborations Miklós Bóna and Vincent Vatter, University of Florida, U.S.A.  
Bruce Sagan, Michigan State University, U.S.A  
Michael H. Albert, University of Otago, New Zealand  
Cyril Banderier, Université de Paris 13, France  
Paul Harrenstein, University of Oxford, U.K.
- Talks Extensive experience giving scientific presentations in English  
20 talks at international events
- Reviews Article Reviewing for 10 international journals and conferences
- Teaching Teaching at TU Wien 2009–2015 (mostly mathematics for students of other disciplines); teaching at Vienna University of Applied Sciences for three years; teaching at University of Oxford in 2016; responsible for the mathematics course at KLPU Krems 2014–2017
- Organisation Co-organisation of three international scientific meetings: CSASC 2011 (Krems, Austria), AofA 2015 (Strobl, Austria), CPAIOR 2021 (hybrid event, online and in Vienna, Austria)

## Publications

- Under review *Exact methods and lower bounds for the Oven Scheduling Problem*  
with Christoph Mrkvicka, Nysret Musliu, Daniel Walkiewicz and Felix Winter,  
preprint available at [arxiv.org/abs/2203.12517](https://arxiv.org/abs/2203.12517)
- 2022 *Solving an Industrial Oven Scheduling Problem with a Simulated Annealing Approach*  
with Nysret Musliu and Felix Winter, accepted for publication in Proceedings of the 13th International Conference on the Practice and Theory of Automated Timetabling - PATAT 2022
- 2022 *Exact and meta-heuristic approaches for the production leveling problem*  
with Johannes Vass, Christoph Mrkvicka, Nysret Musliu and Felix Winter, Journal of Scheduling, 1 (2022), 1; 1-32.
- 2021 *Minimizing Cumulative Batch Processing Time for an Industrial Oven Scheduling Problem*  
with Christoph Mrkvicka, Nysret Musliu, Daniel Walkiewicz and Felix Winter, in Proceedings of the 27th International Conference on Principles and Practice of Constraint Programming (CP 2021), 37:1–37:18.
- 2020 *A Mathematical Analysis of an Election System Proposed by Gottlob Frege*  
with Paul Harrenstein and Martin Lackner, Erkenntnis, 1 (2020), 1-36
- 2020 *Runs in labelled trees and mappings*  
with Alois Panholzer, Discrete Mathematics, 343(9): 111990

- 2020 *Latticepathology and Symmetric Functions (Extended Abstract)*  
with Cyril Banderier, and Michael Wallner, in Proceedings of the 31st International Conference on Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms (AofA 2020)
- 2017 *On the Likelihood of Single-peaked Preferences*  
with Martin Lackner, Social Choice and Welfare, 48(4), 717-745
- 2017 *Longest Increasing Subsequences and Log Concavity*  
with Miklós Bóna and Bruce Sagan, Annals of Combinatorics volume 21, 535–549
- 2016 *Mountainous patterns*  
self-published by Marie-Louise Lackner and printed by epubli, Berlin;  
ISBN: 9783741817038,
- 2016 *The Complexity of Pattern Matching for 321-Avoiding and Skew-Merged Permutations*  
with Michael H. Albert, Martin Lackner and Vincent Vatter, Discrete Mathematics & Theoretical Computer Science, vol. 18 no. 2, Permutation Patterns 2015
- 2016 *Parking Functions for Mappings*  
with Alois Panholzer, Journal of Combinatorial Theory, Series A, 142, 1-28.
- 2016 *A Fast Algorithm for Permutation Pattern Matching Based on Alternating Runs*  
with Martin Lackner, Algorithmica: 75(1), 84-117
- 2015 *Patterns in Labelled Combinatorial Objects*, PhD thesis, TU Wien
- 2014 *The Likelihood of Structure in Preference Profiles*  
with Martin Lackner, in Proceedings of the 8th Multidisciplinary Workshop on Advances in Preference Handling (MPref 2014)
- 2013 *On Restricted Permutations on Regular Multisets*  
in Permutation Patterns 2012 Proceedings, Special Issue of Pure Mathematics and Applications, 24 (2): 59-82.
- 2013 *The Computational Landscape of Permutation Patterns*  
with Martin Lackner, in Permutation Patterns 2012 Proceedings, Special Issue of Pure Mathematics and Applications, 24 (2): 83-101.
- 2012 *From Peaks to Valleys, Running Up and Down: Fast Permutation Pattern Matching*  
with Martin Lackner, Tiny Transactions on Computer Science
- 2012 *A Fast Algorithm for Permutation Pattern Matching Based on Alternating Runs*  
with Martin Lackner, Algorithm Theory – SWAT 2012
- 2011 *Restricted Permutations on Multisets*, Master's thesis, TU Wien