

Education

- 2017–2022 **Georgia Institute of Technology, Atlanta, Georgia, USA.**
PhD, School of Mathematics. Advisor: Anton Leykin. Thesis title: Dual representations of polynomial modules with applications to partial differential equations.
- 2016–2017 **The University of Tokyo, Tokyo, Japan.**
Exchange studies, Master's thesis. Supervisor: Associate Professor Tomonari Sei, Department of Mathematical Informatics, Graduate School of Information Science and Technology.
- 2015–2017 **Aalto University School of Science, Espoo, Finland, MSc..**
Master's Programme in Mathematics and Operations Research. GPA 5/5. Thesis title: Holonomic extended least angle regression. Co-supervised by Tomonari Sei and Kaie Kubjas
- 2014–2015 **The University of Hong Kong, Hong Kong, China.**
Exchange studies: mathematics, computer science, Cantonese
- summer 2014 **Stanford University, Stanford, California, USA.**
Stanford Summer International Honors Program: computer science & scientific computing.
- 2012–2015 **Aalto University School of Science, Espoo, Finland, BSc. (pass with Distinctions).**
Engineering Physics and Mathematics, Mathematics major. GPA 4.96/5. Thesis title: Distributed storage systems and product matrix codes. Supervised by Camilla Hollanti.

Work Experience

- 2022 **Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany.**
Postdoctorate researcher in the nonlinear algebra group. Mentor: Bernd Sturmfels.
- 2017–2022 **Georgia Institute of Technology, Atlanta, Georgia, USA.**
Graduate student instructor and graduate teaching assistant.
- 2016 **Aalto University, School of Science, Espoo, Finland.**
Teaching assistant, Introduction to abstract algebra & Introduction to discrete mathematics
- summer 2015 **CERN (Helsinki Institute of Physics), Geneva, Switzerland.**
Summer trainee, Diffractive Physics in the ALICE collaboration.
- summer 2014 **Aalto University, School of Science, Espoo, Finland.**
Research assistant, Algebra, Number Theory and Applications Research Group
- summer 2013 **Aalto University, School of Chemical Technology, Espoo, Finland.**
Research assistant, Novel Materials via Self-Assembly Research Group

Publications

Published

- 2022 J.Chen, M.Härkönen, R.Krone, A.Leykin: Noetherian operators and primary decomposition. *Journal of Symbolic Computation*, <https://doi.org/10.1016/j.jsc.2021.09.002>
- 2021 R.Ait el Manssour, M.Härkönen, B.Sturmfels: Linear PDE with Constant Coefficients. *Glasgow Mathematical Journal*, <https://doi.org/10.1017/S0017089521000355>
- 2020 M.Härkönen, Y.Hirose, T.Sei: Holonomic extended least angle regression, *Information Geometry*, <https://doi.org/10.1007/s41884-020-00035-1>
- 2020 M.Härkönen, B.Hollering, F.Tarashi Kashani, J.I.Rodriguez: Algebraic Optimization Degree, *ACM Communications in Computer Algebra*, <https://doi.org/10.1145/3427218.3427222>
- 2015 H.Antila, M.Härkönen, M.Sammalkorpi: Chemistry specificity of DNA-polycation complex salt response: A simulation study of DNA, polylysine and polyethyleneimine, *Physical Chemistry Chemical Physics*, <https://doi.org/10.1039/C4CP04967E>

Preprints

- 2021 M.Härkönen, B.Raiță, L.Nicklasson: Syzygies, constant rank, and beyond. arXiv preprint arXiv:2112.12663. Submitted for publication
- 2021 M.Härkönen, J.Hirsch, B.Sturmfels: Making Waves. arXiv preprint arXiv:2111.14045. Submitted for publication

2021 J.Chen, Y.Cid-Ruiz, M.Härkönen, R.Krone, A.Leykin: Noetherian Operators in Macaulay2. arXiv preprint arXiv:2101.01002. Submitted for publication

Software and other activities

- Service I organized the Student Algebra Seminar at Georgia Tech (2020-2022). In June 2022 I organized the Workshop on Differential Algebra at the Max Planck Institute, Leipzig, Germany
- Peer-review I have reviewed manuscripts for the following journals: Journal of the Royal Statistical Society Series B (Statistical Methodology), Algebraic Statistics.
- Open source I contribute to Macaulay2 and attend internal meetings
- Other I was a member of the Aalto University Algorithmic Problem Solving team, and attended the 2015 Northwestern Europe Regional Contest (NWERC) in Linköping, Sweden.

Computer skills

- Advanced Linux, Macaulay2
- Intermediate \LaTeX , C++ , R, Python
- Basic Mathematica, C, Rust

Languages

- Fluent **Finnish, French, English**
- Others **Japanese (intermediate), Swedish (basic), Cantonese (basic), Mandarin (basic)**

Awards

- 2021 Outstanding Teaching Assistant Award, *Georgia Tech*, Atlanta, GA
- 2020 Outstanding MathLab Tutor Award, *Georgia Tech*, Atlanta, GA
- 2019 Chateaubriand Fellowship, *Embassy of France*, Washington D.C.
- 2019 SIAM Student Travel Award, *Society for Industrial and Applied Mathematics*
- 2019 Vilho, Yrjö and Kalle Väisälä Foundation scholarship, *Finnish Academy of Sciences and Letters*, Helsinki, Finland
- 2018 Bob Price Travel award, *Georgia Tech*, Atlanta, GA
- 2012 Commendable Service as Electronic Warfare NCO, *Air Force Academy*, Tikkakoski, Finland

Selected talks, conferences, workshops, summer schools

- 2022/06 **Workshop on Differential Algebra**, *Max Planck Institute for Mathematics in the Sciences*, Leipzig, Germany.
Organizer
- 2021/08 **SIAM Conference on Applied Algebraic Geometry**, *Texas A&M*, College Station, TX, USA.
Invited talk
- 2021/07 **ACA 2021, Algebraic and Algorithmic Aspects of Differential and Integral Operators**, *Online*.
Invited talk
- 2021/07 **Math-to-Industry workshop**, *University of Minnesota*, Minneapolis, MN, USA.
- 2021/06 **Workshop on Software and Applications of Numerical Nonlinear Algebra**, *Max Planck Institute*, Leipzig, Germany.
- 2020/06 **ISSAC 2020 (virtual)**, Kalamata, Greece.
Software presentation
- 2020/05 **Macaulay2 Workshop (virtual)**, *Cleveland State University*, Cleveland, OH.
- 2019/12 **PGMO Days**, *EDF'Lab Paris-Sarclay*, Paris, France.
Invited talk
- 2019/07 **SIAM Conference on Applied Algebraic Geometry**, *University of Bern*, Bern, Switzerland.
Invited talk in Algebraic Statistics mini-symposium
- 2019/04 **Meeting on Applied Algebraic Geometry**, *Georgia Institute of Technology*, Atlanta, USA.
- 2018/09 **Nonlinear Algebra in Applications**, *ICERM (Brown University)*, Providence, USA.
Part of the semester program in Nonlinear Algebra
- 2018/09 **Real Algebraic Geometry and Optimization**, *ICERM (Brown University)*, Providence, USA.
Part of the semester program in Nonlinear Algebra
- 2018/09 **Core computational methods**, *ICERM (Brown University)*, Providence, USA.
Part of the semester program in Nonlinear Algebra

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- 2018/09 **Nonlinear Algebra Bootcamp**, *ICERM (Brown University)*, Providence, USA.
Part of the semester program in Nonlinear Algebra
- 2018/08 **Hyperplane arrangements and computations with CoCoA**, *Hokkaido University*, Sapporo, Japan.
- 2018/04 **Meeting on Applied Algebraic Geometry**, *Georgia Tech*, Atlanta, USA.
- 2018/02 **TAGS - Linking Topology to Algebraic Geometry and Statistics**, *Max Planck Institute for Mathematics in the Sciences*, Leipzig, Germany.
Poster presented: Holonomic extended least angle regression
- 2017/01 **Workshop on Non-Linear Algebra**, *Max Planck Institute for Mathematics in the Sciences*, Leipzig, Germany.
- 2016/08 **26th Jyväskylä Summer School**, Jyväskylä, Finland.
Attended course MA4: Lévy and Feller Processes and Applications
- 2016/06 **Summer School on Algebra, Statistics and Combinatorics**, Helsinki, Finland.
- 2015/08 **WE-Heraeus Physics School**, *Diffraction and Electromagnetic processes at high energies*, Bad Honnef, Germany.
Poster presented: Soft classification for particle identification in central exclusive production