

Curriculum Vitae

Marvin Anas Hahn

WORK EXPERIENCE

- Assistant professor (Tenure track)** August 2022 –
Trinity College Dublin
- Research assistant (Postdoc)** October 2021 – July 2020
Institut de mathématiques de Jussieu (Sorbonne Université)
Mentor: Ilia Itenberg
- Research assistant (Postdoc)** July 2020 – September 2021
Max Planck Institute for Mathematics in the Sciences
Mentor: Bernd Sturmfels
- Research assistant (Postdoc)** September 2018 – June 2020
Goethe University Frankfurt am Main
Mentor: Annette Werner
- Research assistant (PhD student)** March 2016 – August 2018
University of Tübingen
Mentor: Hannah Markwig

EDUCATION

- Visiting PhD Student** October 2017 – December 2017
University of Warwick
Mentor: Diane Maclagan
- PhD Student** March 2016 – July 2018
University of Tübingen
Mentor: Hannah Markwig
Thesis: Combinatorics and degenerations in algebraic geometry: Hurwitz numbers, Mustafin varieties and tropical geometry
- M.Sc. in Mathematics (Honour's Degree)** October 2014 – October 2015
Saarland University
Mentor: Hannah Markwig
Thesis: Pruned Hurwitz numbers
- B.Sc. in Mathematics** October 2011 – July 2014
Saarland University
Mentor: Hannah Markwig
Thesis: Correspondence theorems for tropical Hurwitz numbers with special ramification profiles

SCHOLARSHIPS AND GRANTS

- IRC Postgraduate Scholarship** September 2024 – August 2028
Role: Supervisor
Funding: €106,750
- Research in Paris – Research stay at the Institute Henri Poincaré** September 2019
- SIAM conference on applied algebraic geometry: Travel grant** July 2019
- MEGA2019: Lodging grant** June 2019
- Oberwolfach Leibniz Graduate Student** May 2019
- Funded research stay** February and April 2018
Research programme "Tropical geometry, Amoebas and Polytopes" at Institute Mittag-Leffler

Funded research stay

March 2017

Thematic trimester on "Combinatorics and interactions" at Institute Henri Poincaré

Partial support by DFG SFB TRR 195 (INST 248/235-1)

January 2017 – August 2018

Scholarship for PhD students from Foundation of German Business

January 2016 – July 2018

Scholarship for students from Foundation of German Business

December 2011 – October 2015

RESEARCH INTEREST

My research interests lie in the application of combinatorial and constructive methods to problems in algebraic and arithmetic geometry. Below is a list of my papers. The five strongest manuscripts are marked by (*).

ACCEPTED AND PUBLISHED PAPERS

17. **Twisted Hurwitz numbers: Tropical and polynomial structures** (with Hannah Markwig) in *Algebr. Comb.* (2024), 27pp
16. **Subspaces Fixed by a Nilpotent Matrix** (with Gabriele Nebe, Mima Stanojkovski, Bernd Sturmfels) in *Orbita Mathematicae* 1.1 (2024), 15pp
15. **Intersecting psi-classes on tropical Hassett spaces** (with Shiyue Li) in *Combinatorial Theory* (2022), 25pp
14. **Orders and Polytopes: Matrix Algebras from Valuations.** (with Yassine El Maazouz, Gabriele Nebe, Mima Stanojkovski, Bernd Sturmfels) in *Beitr. Algebra Geom.* (2021), 14pp
13. **Valued rank metric codes** (with Yassine El Maazouz, Alessandro Neri, Mima Stanojkovski) in *J. Algebra Appl.* (2023), 39pp
12. (*) **Mustafin models of projective varieties and vector bundles.** in *Int. Math. Res. Not.* (2021), 37pp
11. **A short note on Cayley-Salmon equations.** (with Sara Lamboglia and Alejandro Vargas) in *Matematiche (Catania)* 75.2 (2020), p. 559-574, 16pp
10. (*) **Strongly semistable reduction of syzygy bundles on plane curves.** (with Annette Werner) *to appear in J. Lond. Math. Soc.* (2021), 21pp
9. **Wall-crossing and recursion formulae for tropical Jucys covers.** (with Danilo Lewanski) in *Trans. Amer. Math. Soc.* 373 (2020), p. 4685-4711, 27pp
9. (*) **Triply mixed coverings of arbitrary base curves: Quasimodularity, quantum curves and a mysterious topological recursions.** (with Jan-Willem van Ittersum and Felix Leid) *to appear in Ann. Inst. Henri Poincaré D, Comb. Phys. Interact. (AIHPD)* (2020), 41pp
7. **Bi-pruned Hurwitz numbers.** in *J. Combin. Theory Ser. A* 174 (2020), 22pp
6. **Tropical Jucys Covers.** (with Danilo Lewanski) *to appear in Math. Z.* (2021), 15pp
5. (*) **Tropicalized quartics and canonical embeddings for tropical curves of genus 3.** (with Hannah Markwig, Yue Ren, Ilya Tyomkin) in *Int. Math. Res. Not.* 12 (2021) 31pp
4. (*) **Wall-crossing formulae and strong piecewise polynomiality for mixed Grothendieck dessins d'enfant, monotone, and simple double Hurwitz numbers.** (with Reinier Kramer, Danilo Lewanski) in *Adv. Math.* 336 (2018), 31pp
3. **Mustafin varieties, moduli spaces and tropical geometry.** (with Binglin Li) *to appear in Manuscripta Math.* (2020), 31pp
2. **A monodromy graph approach to the piecewise polynomiality of simple, monotone and Grothendieck dessins d'enfants double Hurwitz numbers.** in *Graphs Comb.* 35 (2019), 37pp
1. **Pruned double Hurwitz numbers.** in *Electron. J. Comb.* 24.3 (2017): P3-66, 32pp.

PREPRINTS

5. **Universal piecewise polynomiality for counting curves in toric surfaces** (with Vincenzo Reda) *Submitted.* (2024), 13pp

4. **Order-One Rolling Shutter Cameras** (with Kathlén Kohn, Orlando Marigliano, Tomas Pajdla) *Submitted.* (2024), 13pp
3. **Tropical twisted Hurwitz numbers for elliptic curves** (with Hannah Marwki) *Submitted.* (2024), 15pp
2. **Combinatorics of Pruned Hurwitz numbers** (with Sean Gearoid Fitzgerald, Síofra Kelly) *Submitted.* (2023), 43pp
1. **One-parameter families of multiview varieties and Bruhat–Tits buildings.** *Submitted.* (2020), 13pp

CONFERENCE PROCEEDINGS

Tropical Jucys Covers and applications. in Oberwolfach Rep. 16/2 (2020), p. 1278-1281

RESEARCH TALKS

Mathematical Sciences Seminar Series <i>University College Dublin</i> Title: A tropical perspective on twisted Hurwitz numbers	October 2024
Tropical geometry: Moduli spaces and matroids <i>Goethe University Frankfurt am main</i> Title: A tropical twist on Hurwitz numbers	October 2024
Algebra and Number Theory Seminar <i>University College Dublin</i> Title: Tropical combinatorics and enumerative geometry	February 2024
Boston College – TCD Mathematics Colloquium Series <i>Trinity College Dublin</i> Title: An invitation to tropical enumerative geometry	December 2023
Algebraic Geometry Seminar <i>University of Warwick</i> Title: Mustafin degenerations of syzygy bundles	November 2023
Algebra and Number Theory Seminar <i>University of Vienna</i> Title: Mustafin degenerations of syzygy bundles	May 2023
Non-commutative Geometry meets Topological Recursion <i>Erwin Schrödinger International Institute for Mathematical Physics</i> Title: Combinatorics of pruned Hurwitz numbers	April 2023
Department of Mathematics & Statistics Colloquia <i>Maynooth University</i> Title: Tropical combinatorics and enumerative geometry	November 2022
COMB in CAMB <i>University of Cambridge</i> Lecture series on "Tropical Geometry of Bruhat–Tits buildings"	September 2022
Algebraic Geometry Seminar <i>University of Tübingen</i> Title: Orders, polytopes and matrix algebras	May 2022
Nonlinear Algebra Day <i>RWTH Aachen</i> Title: Intersecting psi-classes on tropical Hassett spaces	April 2022
Combinatorial Coworkspace <i>Haus Bergkranz (Goethe University Frankfurt am Main)</i> Title: Intersecting psi-classes on tropical Hassett spaces	March 2022
Seminar in Real & Complex Geometry <i>Tel Aviv University</i> Title: Intersecting psi-classes on tropical Hassett spaces	March 2022

Nonlinear Algebra Seminar Online <i>Max Planck Institute for Mathematics in the Sciences</i> Title: Degenerations in algebraic and applied geometry	February 2022
Online Algebraic Geometry Seminar <i>University of Nottingham</i> Title: The tropical geometry of monotone Hurwitz numbers	January 2022
Tropical Curves, Logarithmic Structures, and Enumerative Geometry <i>Mathematisches Institut Oberwolfach</i> Title: Quasimodularity of weighted Hurwitz numbers	October 2021
MEGA 2021: Effective Methods in Algebraic Geometry (Contributed talk with peer-review process) <i>CUiT – The Arctic University of Norway</i> Title: Mustafin degenerations: Between applied and arithmetic geometry	June 2021
Antwerp Algebra Colloquium <i>University of Antwerp</i> Title: Mustafin degenerations: Between applied and arithmetic geometry	March 2021
NASO – Nonlinear Algebra Seminar Online <i>Max Planck Institute for Mathematics in the Sciences</i> Title: Mustafin degenerations: Between applied and arithmetic geometry	January 2021
Weihnachtsworkshop zur Geometrie und Zahlentheorie <i>Karlsruhe Institute for Technology</i> Title: Mustafin models of plane curves and syzygy bundles	December 2019
Research seminar algebra <i>University of Osnabrück</i> Title: Strongly semistable reduction of syzygy bundles on plane curves	December 2019
Tropicalizing flag varieties <i>RWTH Aachen</i> Title: Mustafin degenerations - A tropical interface for the degeneration of flag varieties	November 2019
Buildings and Affine Grassmannians <i>Centre International de Rencontres Mathématiques (CIRM)</i> Title: Strongly semistable reduction of syzygy bundles on plane curves	August 2019
Geometry, integrability and moduli <i>Max Planck Institute for Mathematics</i> Title: Monotone coverings of arbitrary base curves (Poster)	August 2019
IRTG Seminar (SFB-TRR 195) <i>Neumühle in Mettlach-Tünsdorf</i> Title: Introduction to tropical geometry	July 2019
SIAM Conference on Applied Algebraic Geometry <i>University of Bern</i> Title: Tropical Jucys Covers and Applications	July 2019
MEGA 2019: Effective Methods in Algebraic Geometry (Contributed talk with peer-review process) <i>Complutense University of Madrid</i> Title: Hurwitz numbers and piecewise polynomiality properties	June 2019
Oberwolfach Workshop 'Tropical Geometry: New Directions' <i>Mathematisches Institut Oberwolfach</i> Title: Tropical Jucys Covers and applications	May 2019
Free Probability Seminar <i>Saarland University</i> Title:(Strictly) monotone coverings of arbitrary base curves: Quasimodularity, quantum curves and recursions	April 2019
Geometric Recursion Seminar <i>Max Planck Institute for Mathematics</i> Title: Topological recursion and enumerative problems	December 2018

First joint meeting of the KMS and DMV <i>COEX Seoul</i> Title: Mustafin varieties, tropical geometry and moduli spaces	October 2018
Summer School on Topological Recursion <i>University of Tübingen</i> Title: Tropical Jucys Covers and Quasimodularity of (strictly) monotone elliptic covers	August 2018
Spring School: Tropical Geometry meets Representation Theory <i>University of Cologne</i> Title: Piecewise polynomiality properties of Hurwitz-type counts	March 2018
Workshop on Combinatorics, polytopes, and complexity Mittag-Leffler Institute <i>Mittag-Leffler Institute</i> Title: What is a plane tropical curve?	February 2018
Spring School: Tropical Geometry meets Representation Theory <i>University of Cologne</i> Title: Piecewise polynomiality properties of Hurwitz-type counts	March 2018
Open Source Computer Algebra Research (OSCAR) <i>Max Planck Institute for Mathematics in the Sciences</i> Title: Faithful tropicalisations of plane quartics using linear modifications	December 2017
LMS Workshop in Tropical Mathematics <i>University of Birmingham</i> Title: A tropical approach to the piecewise polynomiality of monotone Hurwitz numbers	November 2017
Workshop "Recent advances on the geometry of valuations" <i>Goethe University Frankfurt</i> Title: Mustafin varieties, moduli spaces and tropical geometry	November 2017
First annual meeting of the DFG collaborative research center SFB-TRR 195 <i>RWTH Aachen</i> Title: Piecewise polynomiality properties of Hurwitz-type counts	September 2017
Stockholm Master Class in Tropical geometry <i>Stockholm University</i> Title: Piecewise polynomiality properties of Hurwitz-type counts	August 2017
Students' Conference on Nonarchimedean and Tropical Geometry <i>University of Regensburg</i> Title: Mustafin varieties, moduli spaces and tropical geometry	August 2017
Computing in tropical geometry <i>TU Berlin</i> Title: A moduli problem for Mustafin varieties	May 2017
Combinatorics and interactions <i>Institute Henri Poincaré</i> Title: Chamber behavior of mixed Hurwitz numbers (Poster)	March 2017

TEACHING

Topics in Combinatorial Algebraic Geometry Lecturer	Michaelmas Term 2024
Algebraic Topology I Lecturer	Michaelmas Term 2024
Discrete Geometry Lecturer	Michaelmas Term 2024
Mathematics, Statistics and Computation Lecturer	Michaelmas Term 2024
Vector Calculus for Science Lecturer	Hilary Term 2023

Mathematics, Statistics and Computation Lecturer	Hilary Term 2023
Mathematics, Statistics and Computation Lecturer	Michaelmas Term 2022
Nonlinear Algebra seminar Co-organiser	August 2020 – December 2020
Non-archimedean geometry Teaching assistant	Summer term 2019
Analysis Teaching assistant	Summer term 2018
Ehrhart theory Teaching assistant	Summer term 2017
Hurwitz theory Teaching assistant	Winter term 2016/2017
Tropical geometry Teaching assistant	Summer term 2016
Linear algebra (review course) Lecturer	Winter term break 2014
Linear algebra (review course) Lecturer	Summer term break 2014
Various courses Student assistant	2013–2015

ACTIVITIES

Minisymposium: Applications of Tropical Geometry <i>SIAM Conference on Applied Algebraic Geometry</i> Organised with Yue Ren and Benjamin Schröter	August 2021
Minisymposium: Foundations of Tropical Geometry <i>SIAM Conference on Applied Algebraic Geometry</i> Organised with Yue Ren and Benjamin Schröter	August 2021
Tropical Geometry in Frankfurt (TGiF) <i>Goethe University Frankfurt am Main</i> Organised with Sara Lamboglia and Martin Ulirsch	June 2019 – June 2020 (quarterly)
Buildings, Varieties and Applications <i>Max Planck Institute for Mathematics in the Sciences</i> Organised with Bernd Sturmfels and Leon Zhang	November 11 – 13, 2019
Summer School on Topological Recursion <i>University of Tübingen</i> Organised with Felix Leid, Hannah Markwig and Roland Speicher	August 27 – 31, 2018
Referee reports for Journal of High Energy Physics, Geometry and Topology, SIAM Journal on Applied Algebra and Geometry, Journal of Combinatorial Theory (Series A), etc.	

LANGUAGES

German	native speaker
English	fluent
French	basic