

Martin Ulirsch | Curriculum Vitae

University of Michigan, Department of Mathematics
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Academic Positions

University of Michigan

Postdoc Assistant Professor Jan. 2017–now

Fields Institute for Research in Mathematical Sciences

Postdoctoral Fellow, Thematic Program on Combinatorial Algebraic Geometry Fall 2016

University of Bonn

Hausdorff Postdoc, Hausdorff Center for Mathematics 2015–16

Education

Brown University

Ph.D. in Mathematics, Advisor: Dan Abramovich 2015
Thesis: Tropical geometry of logarithmic schemes

Brown University

M.Sc. in Mathematics 2012

University of Regensburg

Diplom in Mathematics, Advisor: Klaus Künnemann 2010
Thesis: Semistabile \mathcal{O}_K -Moduln und die (Ko-)homologie von $GL_n(\mathcal{O}_K)$

Visiting Positions

Max Planck Institute for Mathematics in the Sciences

Visiting Researcher May–July 2017

Hebrew University of Jerusalem

Visiting Research Fellow May 2012

Brandeis University

Visiting Graduate Student 2008–09

Awards and Grants

- ◇ AMS Simons Travel Grant, 2017–2019.
- ◇ AIM SQuaRE *Tropical moduli stacks* (with Renzo Cavalieri, Melody Chan, and Jonathan Wise). American Institute of Mathematics.
- ◇ Joukowski Family Foundation Outstanding Dissertation Award, Brown University, May 2015.
- ◇ European Postdoctoral Institute Fellowship, 2015 (declined).
- ◇ German Academic Exchange Service (DAAD) Scholarship, Brandeis University, 2008–09.

Publications and Preprints

Preprints

1. *Realizability of tropical canonical divisors* (with Martin Möller and Annette Werner). arXiv:1710.06401
2. *Clutching and glueing in tropical and logarithmic geometry* (with Alana Huszar and Steffen Marcus). arXiv:1706.07554.
3. *A moduli stack of tropical curves* (with Renzo Cavalieri, Melody Chan, and Jonathan Wise). arXiv:1704.03806.
4. *Non-Archimedean geometry of Artin fans*. arXiv:1603.07589.

In press

1. *Logarithmic Picard groups, chip firing, and the combinatorial rank* (with Tyler Foster, Dhruv Ranganathan, and Mattia Talpo). *Mathematische Zeitschrift*, to appear.
2. *Towards a tropical Hodge bundle* (with Bo Lin). *Combinatorial Algebraic Geometry*, Fields Institute Communications, Editors: Greg Smith and Bernd Sturmfels, to appear.
3. *Tropicalization is a non-Archimedean analytic stack quotient*. *Mathematical Research Letters*, to appear.

Publications

1. *Functorial tropicalization of logarithmic schemes: The case of constant coefficients*. *Proceedings of the London Mathematical Society* (2017) 114 (6): 1081-1113.
2. *Skeletons and fans of logarithmic structures* (with Dan Abramovich, Qile Chen, Steffen Marcus, and Jonathan Wise). *Non-Archimedean and Tropical Geometry*, Simons Symposia (2016), Editors: Matt Baker and Sam Payne, pp. 287-336.
3. *Faithful realizability of tropical curves* (with Man-Wai Cheung, Lorenzo Fantini, and Jennifer Park). *International Mathematical Research Notices* (2016) 2016 (15): 4706-4727.
4. *Tropical geometry of moduli spaces of weighted stable curves*. *Journal of the London Mathematical Society* (2015) 92 (2): 427-450.
5. *Tropical compactification in log-regular varieties*. *Mathematische Zeitschrift*, June 2015, Volume 280, Issue 1-2, pp 195-210.

Non-refereed Publications, Theses, and Reports

1. *Newton-Okounkov bodies and reified valuations of higher rank* (with Alberto Camara, Iago Giné, Roberto Gualdi, Nikita Kalinin, Joachim Roé, Stefano Urbinati, and Xavier Xarles). *Research Perspectives CRM Barcelona*, to appear.
2. *Logarithmic structures, Artin fans, and tropical compactifications*. *Oberwolfach Reports* Volume 12, Issue 4, 2015, pp. 3271-3331.
3. *Tropical geometry of logarithmic schemes*. Ph.D. Thesis, Brown University.
4. *Semistabile \mathcal{O}_K -Moduln und die (Ko-)Homologie von $GL_N(\mathcal{O}_K)$* , University of Regensburg.

Teaching Experience

Main Instructor.....

- ◇ *Linear Algebra*, University of Michigan, Fall 2017.
- ◇ *Calculus I*, University of Michigan, Winter 2017.
- ◇ *Intermediate Calculus (Physics/Engineering)*, Brown University, Spring 2015.
- ◇ *Linear Algebra*, Brown University, Fall 2013.
- ◇ *Introductory Calculus II*, Brown University, Spring 2013.

Teaching Assistant.....

- ◇ *Graduate Summer School*, Thematic Program on Combinatorial Algebraic Geometry, Fields Institute, July 2016.
- ◇ *Introductory Calculus I*, Brown University, Fall 2011.
- ◇ *Axiomatic Geometry and Elementary Differential Geometry*, University of Regensburg, Summer 2010.
- ◇ *Numerical Mathematics*, University of Regensburg, Winter 2009–10.
- ◇ *Introduction to the Theory of Probability and Statistics*, University of Regensburg, Summer 2008.
- ◇ *Numerical Mathematics*, University of Regensburg, Winter 2007–08.

Advising.....

Co-advisor (with Daniel Huybrechts) of two undergraduate theses at the University of Bonn.

- ◇ Thorsten Beckmann, *Motivic Integration*, Summer 2016 (winner of a Bachelor prize).
- ◇ Max Rath, *Motivic Zeta Functions*, Summer 2016.

Co-advisor (with Steffen Marcus) of an undergraduate thesis at the College of New Jersey.

- ◇ Alana Huszar, Spring 2016 (now a graduate student at the University of Michigan). Her project led to a collaborative preprint that is currently under review at a journal.

Talks and Presentations

Conferences.....

- ◇ *Tropical moduli stacks*. Tropical geometry and moduli spaces, ICM Satellite Conference, Rio de Janeiro, August 2018.
- ◇ *Tropical geometry of the Hodge bundle*. Toric Geometry, Special Session at the Canadian Mathematical Society Winter Meeting, Waterloo, Ontario, December 2017.
- ◇ *Tropical geometry of the Hodge bundle*. Recent Advances in the Geometry of Valuations, University of Frankfurt, November 2017.
- ◇ *Tropical geometry of toric stacks*. MEGA 2017, Université Nice Sophia Antipolis, June 2017.
- ◇ *Logarithmic structures and tropical geometry*. Foundations of Tropical Schemes, American Institute of Mathematics, April 2017.

- ◇ *Tropical and non-Archimedean geometry of toric stacks – with a view towards twisted Losev-Manin spaces.* Combinatorial Algebraic Geometry, Special Session at the Canadian Mathematical Society Winter Meeting, Niagara Falls, Ontario, December 2016.
- ◇ *Logarithmic structures, Artin fans, and the moduli stack of tropical curves.* Algebraic, Tropical, and Nonarchimedean Analytic Geometry of Moduli Spaces, CMO-BIRS Oaxaca, May 2016.
- ◇ *Logarithmic structures, Artin fans, and tropical compactifications.* Non-Archimedean Geometry and Applications, Mathematisches Forschungsinstitut Oberwolfach, December 2015.
- ◇ *The moduli stack of tropical curves.* Students' Workshop on Tropical and non-Archimedean Geometry, University of Regensburg, August 2015.
- ◇ *Non-Archimedean geometry of Artin fans.* Non-Archimedean geometry and its applications, University of Michigan, Ann Arbor, June 2015.
- ◇ *Artin fans in tropical geometry.* AMS Fall Western Sectional Meeting, Special Session on Combinatorics and Algebraic Geometry, San Francisco State University, October 2014.
- ◇ *Tropical geometry of logarithmic schemes.* Utah Tropical Geometry Conference, University of Utah, May 2014.
- ◇ *Logarithmic geometry and the tropical geometry of moduli spaces.* Student Tropical Algebraic Geometry Symposium (STAGS), Yale University, May 2014.

Seminars.....

- ◇ *Tropical geometry of the Hodge bundle.* Analysis and Geometry Seminar, Central Michigan University, October 2017.
- ◇ *Realizability of tropical canonical divisors.* Arithmetic Seminar, Binghamton University, September 2017.
- ◇ *Realizability of tropical abelian differentials.* Seminar on Non-Linear Algebra, Max Planck Institute for Mathematics in the Sciences, July 2017.
- ◇ *Tropical and logarithmic moduli theory.* Chemnitz University of Technology, July 2017.
- ◇ *A moduli stack of tropical curves.* Emmy-Noether Colloquium, University of Mainz, June 2017.
- ◇ *A moduli stack of tropical curves.* Oberseminar Algebra und Geometrie, University of Frankfurt, June 2017.
- ◇ *The moduli stack of tropical curves.* Algebraic Geometry Seminar, Brown University, March 2017
- ◇ *The moduli stack of tropical curves.* Algebraic Geometry Seminar, Ohio State University, Columbus, March 2017.
- ◇ *The moduli stack of tropical curves.* Algebraic Geometry Seminar, University of Michigan, Ann Arbor, February 2017.
- ◇ *The combinatorics of Artin fans.* Seminar of the Thematic Program on Combinatorial Algebraic Geometry, Fields Institute for Research in Mathematical Sciences, August 2016.
- ◇ *Logarithmic structures, Artin fans, and the moduli stack of tropical curves.* Geometry Seminar. Università degli Studi Roma Tre, April 2016.
- ◇ *The moduli stack of tropical curves.* Réseau d'Étudiants en Géométrie Algébrique (RéGA). Institut Henri Poincaré, Paris, March 2016.

- ◇ *Tropical geometry of moduli spaces*. SFB-Transregio-45-Seminar on Algebraic Geometry, University of Bonn, December 2015.
- ◇ *The moduli stack of tropical curves*. Cambridge-Oxford-Warwick (COW) Algebraic Geometry Seminar, University of Oxford, November 2015.
- ◇ *Logarithmic structures, Artin fans, and tropical compactifications*. Algebraic Geometry Seminar, Warwick University, November 2015.
- ◇ *Non-Archimedean geometry of Artin fans*. Oberseminar Algebra und Geometrie, University of Frankfurt, November 2015.
- ◇ *The moduli stack of tropical curves*. Algebraic Geometry Seminar, University of Saarbrücken, November 2015.
- ◇ *Tropical geometry of logarithmic schemes*. Algebraic Geometry Seminar, University of Georgia, Athens, December 2014.
- ◇ *Artin fans in tropical geometry*. Front Range Algebra, GeoMEtry, and Number Theory seminar (FRAGMENT), University of Colorado, Boulder, December 2015.
- ◇ *Tropical geometry of logarithmic schemes*. Algebraic Geometry Seminar, Stony Brook University, November 2014.
- ◇ *Artin fans in tropical geometry*. Biannual Algebraic and Tropical Meeting of Brown and Yale (BATMoBYle), Yale University, November 2014.
- ◇ *Artin fans in tropical geometry*. Algebra Seminar, Georgia Institute of Technology, October 2014.
- ◇ *Tropical geometry of logarithmic schemes*. Oberseminar über Arakelov-Theorie, University of Regensburg, July 2014.
- ◇ *Log-smooth deformation theory and faithful realizability of tropical curves*. Number Theory and Algebraic Geometry Seminar, Katholieke Universiteit Leuven, June 2014.
- ◇ *Tropical geometry of logarithmic schemes*. Valley Geometry Seminar, University of Massachusetts, Amherst, March 2014.
- ◇ *Tropical geometry of logarithmic schemes*. Algebraic Geometry Seminar, Brown University, March 2014.

Poster Presentations.....

- ◇ *Tropical geometry of Hodge bundle* AGNES, Northeastern University, October 2017.
- ◇ *The moduli stack of tropical curves*. Introductory Workshop, Thematic Program on Combinatorial Algebraic Geometry, Fields Institute for Research in Mathematical Sciences, August 2016.
- ◇ *Logarithmic structures and the tropical geometry of moduli spaces*. Cycles on Moduli Spaces, Geometric Invariant Theory, and Dynamics. ICERM, Brown University, August 2016.
- ◇ *Artin fans in tropical geometry*. AGNES, University of Pennsylvania, November 2014.
- ◇ *Tropical compactification in log-regular varieties*. AGNES, Boston College, November 2013.

Invited Expository Talks and Minicourses.....

- ◇ *Tropical and logarithmic moduli theory*. Minicourse at IMPA, Spring 2018.

- ◇ *Tropical and non-Archimedean geometry*. Students' Workshop on Tropical and non-Archimedean Geometry, University of Regensburg, July 2017.
- ◇ *Tropical and non-Archimedean geometry*. SFB-Transregio-45-Seminar on Algebraic Geometry, University of Bonn, December 2015.
- ◇ *Tropical toric varieties and generalizations*. Oberseminar über Arakelov-Theorie, University of Regensburg, June 2012.
- ◇ *Resolution of singularities via principalization*, with Johannes Kolb. Compact Seminar on the Resolution of Singularities, Kleines Walsertal, Germany, August 2009.

Outreach Talks.....

- ◇ *Do metric graphs dream of outer space? A friendly invitation to tropical moduli spaces*. Undergraduate Math Club, University of Michigan, October 2017.

Service and Professional Activities

Conference organizer.....

- ◇ Algebraic and Combinatorial Aspects of Tropical Geometry (with Angelica Cueto and Yoav Len). Special Session at the AMS Sectional Meeting, Ohio State University, March 2018.
- ◇ Student Tropical Algebraic Geometry Symposium (STAGS) 2.0 (with Nathan Pflueger). Brown University, April 2015.

Seminar organizer.....

- ◇ Learning Seminar on Cluster Algebras (with Sara Maloni). Brown University, Spring 2014.
- ◇ Junior Arithmetic and Algebraic Geometry Seminar (JAAGS). Brown University, 2013–14.

Referee.....

Bollettino dell'Unione Matematica Italiana, Bulletin of the LMS, Crelle (4x), Fields Institute Communications, Geometry and Topology, International Mathematical Research Notices, manuscripta mathematica, Proceedings of the LMS, Research in Mathematical Sciences (2x).

Reviewer.....

Mathematical Reviews of the AMS, zbMATH.

Languages, Further Education, and Special Skills

Languages: German (native), English (fluent), French (reading).

Teaching: Sheridan Teaching Certificate I, The Harriet W. Sheridan Center for Teaching and Learning, Brown University, 2012–2013.

Computer: Matlab, C/C++, \LaTeX .