Leonid Monin   CV

Affiliation	MPI MIS	**Email**	leonid.monin@mis.mpg.de;
	Nonlinear Algebra group,	**Website**	http://www.math.toronto.edu/lmonin/
	Inselstrasse 22,	**Date of Birth**	8th December 1992
	04103 Leipzig	**Citizenship**	Russia

Employment

Jan 2023 -	Bernoulli instructor at EPFL, Lausanne
May 2021 - Dec 2022	Postdoc in the Nonlinear algebra group at Max Planck Institute for Mathematics in the Sciences, Leipzig
Jun 2019 - Apr 2021	Research Associate at the University of Bristol (funded by EPSRC grant EP/R023379/1)

Education

May 2019	PhD in Mathematics advised by Askold Khovanskii, University of Toronto
June 2013	BSc in Mathematics, Higher School of Economics, Moscow

Research

In preparation

22. *Algebraic degree of polynomial optimisation and mixed volume,*
    with K. Rose and J. Lindberg

21. *Polyhedral models for K-theory of toric and flag varieties,*
    with E. Smirnov

20. *Toric bundles over toric varieties,*
    with A. Khovanskii

19. *Mirror symmetry for homogeneous spaces,*
    with L. Bossinger and A. Nájera Chávez

Preprints

18. *Faces of cosmological polytope*, submitted
    with L. Kühne

17. *The Algebraic Degree of Coupled Oscillators*, submitted
    with P. Breiding, M. Michałek and S. Telen

16. *Algebras with Gorenstein duality and cohomology rings of toric bundles*, submitted
    with A. Khovanskii

15. *Billiards and hyperelliptic curves with many automorphisms*, submitted
    with E. Duryev

14. *Multigraded algebras and multigraded linear series*, submitted
    with Y. Cid-Ruiz and F. Mohammadi

13. *Cohomology of toric bundles and rings of conditions of horospherical varieties*, submitted
    with J. Hofscheier and A. Khovanskii

Publications

12. *Cohomology rings of quasitoric bundles*, accepted to FILOMAT
    with A. Khovanskii and I. Limonchenko

11. *Generalized virtual polytopes and quasitoric manifolds*, accepted to Proceedings of the Steklov Institute of Mathematics
    with A. Khovanskii and I. Limonchenko

10. *Complete quadrics: Schubert calculus for Gaussian models and semidefinite programming*, accepted to Journal of European Mathematical Society
    with L. Manivel, M. Michałek, T. Seynnaeve and M. Vodicka

9. *Triangulations and Canonical Forms of Amplituhedra: a fiber-based approach beyond polytopes*, Communications in Mathematical Physics, 2021
   with F. Mohammadi and M. Parisi

8. *Projective Embeddings of $\overline{M}_{0,n}$ and Parking Functions* - Journal of Combinatorial Theory, Series A, 2021
   with R. Cavalieri and M. Gillespie

7. *Maximum likelihood degree and space of orbits of a $\mathbb{C}^*$-action* - SIAM Journal on Applied Algebra and Geometry, 2021
   with M. Michałek and J. Wiśniewski

6. *Overdetermined Linear Systems on Toric, Spherical and Other Algebraic Varieties* - Advances in Mathematics, 2020

5. *On Normalizations of Thurston Measure on the Space of Measured Laminations* - Topology and its Applications, 2019
   with V. Telpukhovskiy

4. *Discrete Invariants of Generically Inconstant Systems* - C. R. Math. Rep. Acad. Sci. Canada, 2017

3. *Equations for $\overline{M}_{0,n}$* - Combinatorial Algebraic Geometry Edited by Gregory G. Smith and Bernd Sturmfels, 2017
   with J. Rana

2. *Resultants of Developed Systems of Laurent Polynomials* - Moscow Mathematical Journal, 2017
   with A. Khovanskii

1. *Lattice Geometry and Reduction of Finitely Generated Abelian Groups to a Normal Form* - C. R. Math. Rep. Acad. Sci. Canada, 2014

Thesis

Overdetermined systems of equations, Newton Polyhedra, and Resultants, The University of Toronto 2019

Grants and Recognitions

2023	Oberwolfach Research Fellows with Nick Early and Lukas Kühne
2020	London Mathematical Society Scheme 5 'Collaborations with Developing Countries' grant
2019	Oberwolfach Leibniz Graduate Student
2019	IASH Postdoctoral Fellowship at Weizmann University (went to Bristol instead)
2019	Doctoral Completion Award, Department of Mathematics, University of Toronto

2017	Vivekananda Graduate Scholarship for academic excellence in graduate studies for international students, University of Toronto
2017	Program level Fellowship, Department of Mathematics, University of Toronto
2012	Moscow Government Scholarship

Teaching and mentoring

Teaching statement available on request.

2022	Mentor of at REU program at the University of Leipzig: - Lennart Buchwald "Real forms of Hirzebruch surfaces" - Jakob Nute "Classification of nilpotent Lie algebras"
2019	Lecturer at the University of Bristol - Reading course on Combinatorial algebraic geometry, Fall 2019,
2018 - 2019	Lecturer and course coordinator at the University of Toronto - Calculus 1 (B) MAT136 Summer 2018, - Polynomial equations and Fields MAT401 Spring 2019
2013 - 2019	Teaching assistant at the University of Toronto - Assisted courses: MAT135 Calculus I (A), MAT136 Calculus I (B), MAT186 Calculus I, MAT332 Graph Theory (2015, 2017), MAT402 Classical Geometries (2015-2019), MAT257 Analisys II, MAT335 Topology.
2012 - 2013	Teaching assistant at Independent University of Moscow - Assisted courses: Geometry I, Topology I.
2010 - 2013	Teaching assistant at Higher School of Economics, Moscow - Assisted courses: Mathematical Model of Political Economics, Discrete Mathematics, Game Theory, Mathematical Introduction into Economics.

Organising

- Co-organiser of the workshop "Toric bundles and Cox rings" at the University of Oldenburg, 2021
- Co-organiser of the Geometry and Topology seminar at the University of Bristol, 2020-2021
- Co-organiser of the Algebra and Geometry seminar at the University of Bristol, 2019-2020
- Co-organiser of the Spherical Varieties learning seminar at the University of Toronto 2017-2019
- Co-organiser of the Homemade seminar at AdIMOM, Toronto 2015-2019
- Co-organiser of the Algebra and Geometry seminar at the University of Toronto, 2013-2014

Service

- Member of Mathematics Graduate Student Association at the University of Toronto, 2014-2016
- Reviewer for Compositio Mathematica, IMRN, Arnold Mathematical Journal, Collectanea Mathematica, Fields Institute Communications, SEMI, and MEGA conference.
- External member of the graduate committee at Higher School of Economics, 2022

Outreach

2014, 2016	University of Toronto Math Mentorship Program - four month long research program for high school students, volunteer - Students supervised: Andrey Khesin (2014), Brittania Fusca (2016)
2010 - 2013	Grading and administrating mathematical olympiads for high school students, Moscow
2008 - 2013, 2021	Teaching at evening mathematical school 57, Moscow, volunteer

Langueges

- Russian – mother tongue;
- English – fluent;
- German – basic.

Research Presentations and Talks

- Algebraic geometry seminar, Jena (invited)
  K-theory and polytopes, 2022
- Copenhagen-Jerusalem Combinatorics Seminar (invited)
  K-theory and polytopes, 2022
- DM/G Seminar, TU Berlin (invited)
  K-theory and polytopes, 2022
- Algebraic geometry seminar, Hanover (invited)
  Toric bundles, 2022
- Complexity Theory, Model Theory, Set Theory seminar, Konstanz (invited)
  Number of roots of systems of polynomial equations, 2022
- Algebraic geometry seminar, Jena (invited)
  Toric bundles, 2022
- Groups and Geometry Seminar, Bielefeld (invited)
  Counting of mapping class group orbits and related questions, 2022
- Toric Geometry, Oberwolfach (invited)
  Toric bundles, 2022
- Constructive Approaches to Varieties with Group Actions, Oldenburg (invited)
  Toric bundles, 2022
- Algebraic Geometry Seminar, Warwick (invited)
  Inversion of matrices, ML-degrees and the space of complete quadrics, 2022
- Algebraic Geometry and Moduli Seminar, ETH (invited)
  Macaulay inverse systems and computation of cohomology rings, 2022
- Algebraic Topology and Applications, Steklov Mathematical Institute, Moscow (invited)
  Multi-polytopes and the BKK theorem for quasitoric bundles, 2021
- Seminar on Lie groups and invariant theory, Moscow State University (invited)
  The ring of conditions of horospherical homogeneous spaces, 2021
- Algebraic Geometry seminar, Freie Universität (invited)
  Gorenstein algebras and computations of cohomology rings, 2021
- Topology of torus actions and related topics, Sirius, Sochi (invited)
  Gorenstein algebras and quasitoric bundles, 2021

- Newton-Okounkov bodies and Fanosearch, Levico Terme (invited)
  Gorenstein algebras and computations of cohomology rings, 2021

- Nonlinear algebra seminar, MPI MiS, Leipzig (invited)
  Macaulay inverse systems and computation of cohomology rings, 2021

- Hamiltonian systems seminar, the University of Toronto (invited)
  Hyperelliptic curves with many automorphisms and triangular billiards, 2021

- Polytopes and polynomials seminar, HSE, Moscow (invited)
  Two talks on the ring of conditions of horospherical varieties, 2020

- Discrete Geometry seminar, TU Berlin (invited)
  Inversion of matrices, ML-degrees and the space of complete quadrics, 2020

- Online Nottingham algebraic geometry seminar (invited)
  Inversion of matrices, a $\mathbb{C}^*$-action on Grassmannians and the space of complete quadrics, 2020

- AdIMOM Conference (invited)
  Inversion of matrices, a $\mathbb{C}^*$-action on Grassmanian and the space of complete quadrics, 2020

- Topology seminar, UNAM Oaxaca (invited)
  Inversion of matrices, ML-degrees, and $\mathbb{C}^*$-action on Grassmanians, 2020

- Algebraic geometry seminar, Imperial college (invited)
  Cohomology of toric bundles and rings of conditions of horospherical varieties, 2019

- Algebra seminar, the University of Leeds (invited)
  Newton polyhedra theory for overdetermined systems of Laurent polynomials, 2019

- Geometry, topology and mathematical physics seminar, the University of Manchester (invited)
  Cohomology ring of toric bundles, 2019

- Workshop on Toric Arrangements, the University of Bristol (invited)
  Cohomology ring of toric bundles, 2019

- Combinatorial algebraic geometry day, the University of Bristol (invited)
  Newton polyhedra theory for overdetermined systems of Laurent polynomials, 2019

- Mutations: Mirror Symmetry, Deformations, and Combinatorics, Banff (invited)
  Cohomology ring of toric bundles, 2019

- Algebra and Geometry conference, Yaroslavl (invited)
  Bernstein-Kushnirenko theorem and cohomology of toric bundles, 2019

- ASGARD, the University of Oslo (contributed)
  Cohomology ring of toric bundles and rings of conditions of horospherical varieties, 2019

- RepTile conference, University of Georgia (invited)
  Counting geodesics on hyperbolic surfaces, 2019

- RepTile conference, University of Georgia (invited)
  Eigengons, 2019

- Algebraic geometry seminar, University of Georgia (invited)
  Cohomology of toric bundles and rings of conditions of horospherical varieties, 2019

- MGSA Seminar, University of Toronto (invited)
  Polygons and hyperelliptic curves with many automorphism, 2018

- Graduate Summer School in Algebraic Group Actions, McMaster University (invited)
  Newton polyhedra theory for overdetermined systems, 2018

- AMS Sectional Meeting at the Ohio State University (invited)
  Discrete Invariants of Generically Inconsistent Collections of Linear Series, 2018

- Galois Meets Newton: Algebraic and Geometric aspects of Singularity Theory, Weizmann Institute of Science (contributed)
  Discrete invariants of generically inconstant systems, 2017

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- Poster session of the conference "Teichmüller Space, Polygonal Billiard, Interval Exchanges", CIRM (contributed)
  Moduli Space of Dilation Surfaces, 2017
- CMS Meeting, Section of Combinatorial Algebraic Geometry, Niagra Falls (invited)
  Discrete Invariants of Generically Inconstant Systems, 2016
- Apprenticeship Weeks, Fields Institute (contributed)
  Equations for $\overline{M}_{0,n}$, 2016
- GAeL XXIV, Nesin Mathematics Village, Turkey (contributed)
  Product of roots of systems of Laurent polynomials, 2016
- Open problem in Mathematics, HSE, Moscow (invited)
  Volumes of Moduli spaces of abelian differentials, 2014
- Poster session of "Workshop Geometric Structures in Low-Dimensional Dynamics", ICERM (contributed)
  Lattice geometry and finitely generated abelian groups, 2013
- Algebra and Geometry Seminar, University of Toronto (invited)
  On subgroups of the lattice $\mathbb{Z}^n$, 2013

Expository Talks

- Symplectic geometry learning seminar, UNAM Oaxaca
  Torus actions on algebraic varieties, 2021
- Birational Geometry, Nottingham University
  Mori's bend and break, 2020
- Algebra Reading Seminar, Ghent University
  3 talks on various topics, 2020
- Tropical Combinatorics and Geometry, Nottingham University
  Tropical and algebraic geometries, 2020
- Geometry of Numbers, Nottingham University
  3 talks on various topics, 2020
- Zoomerfest, University of Georgia
  Combinatorial Riemann-Roch theorem, 2020
- Junior Algebra Colloquium, University of Bristol
  Vershik-Okounkov approach to the representation theory of the symmetric groups, 2020
- Spherical varieties learning seminar, University of Toronto
  Talks on various topics, 2017-2019
- Homological Methods Seminar, University of Toronto
  Białynicki-Birula decomposition, 2018
- MGSA Seminar, University of Toronto
  Mnëv universality theorem and Murphy's law in algebraic geometry, 2017
- Geometric Structures on Manifolds seminar, HSE, Moscow
  Tropical curves and their moduli spaces, 2017
- Geometric Structures on Manifolds seminar, HSE, Moscow
  Newton Okounkov Bodies, 2017
- Geometric Structures on Manifolds seminar, HSE, Moscow
  Nielson Realization Problem, 2016
- MGSA Seminar, University of Toronto
  Markov Triples, 2016
- Homological Methods Seminar, University of Toronto
  The Bernstein-Kushnirenko theorem, 2016

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- Geometric Structure Laboratory, Fields Institute, Toronto
  Hodge theory for elliptic curves, 2016
- Learning Seminar on Teichmüller Theory, University of Toronto
  Invariant measures on Moduli spaces of abelian differentials, 2015
- MGSA Seminar, University of Toronto
  Plane curves: around the Tait-Kneser Theorem and the 4-vertex Theorem, 2015
- Learning Seminar on Teichmüller Theory, University of Toronto
  Interval exchange transformations, 2015
- Graduate Students Representation Theory Seminar, Columbia University
  Converse Weil theorem, 2015
- Working Group in Hamiltonian systems, University of Toronto
  Cohomology of the moduli spaces of algebraic curves, 2014
- Homological Methods, University of Toronto
  Moduli space of stable curves and DM compactification II, 2014
- Seminar on Geometry and Dynamics, Steklov Mathematical Institute, Moscow
  Sharkovsky ordering, 2013

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