Curriculum Vitae
Igor Makhlin

Personal Data

Name: Igor Makhlin

Email: iymakhlin@gmail.com (preferable), makhlin@math.tu-berlin.de

Languages: Russian, English, German.

Born: 1990

Research interests

Algebraic combinatorics: combinatorial methods in Lie theory, representation theory, algebraic geometry and commutative algebra.

Education

- Undergraduate at the Department of Mechanics and Mathematics at MSU, 2007–2012. Thesis: "Combinatorics of Young tableaux and representations of the algebra $\mathfrak{gl}_n$" (under Prof. Boris Feigin).
- Graduate student at the Faculty of Mathematics at HSE University, 2012–2015. Doctoral advisor: Prof. Boris Feigin.
  PhD thesis: "Quasiclassical formulas for the characters of representations of affine algebras", defended Septempber 2016.

Employment

- Since 2023: Wissenschaftlicher Mitarbeiter at Technische Universität Berlin.
- 2017 - 2022: Research Scientist at the Center for Advanced Studies, Skolkovo Institute of Science and Technology.
- 2016 - 2017: Postdoctoral Fellow at the Max Planck Institute for Mathematics.
- 2014 - 2021: various part-time positions at HSE University.

Visits

- October 2022 - March 2023: Visiting Scientist at the Weizmann Institute of Science.
- Autumn 2014: Visiting Student at the Massachusetts Institute of Technology.

Courses taught

- "Topology", TU Berlin, 2024/25
- "Mathematical Physics II", TU Berlin, 2024
- "Differential Geometry II", TU Berlin, 2023/24
- TA for the courses "Lie Groups and Lie Algebras", "Algebra 1" and "Discrete Mathematics" during graduate studies at HSE

MathOverflow

https://mathoverflow.net/users/19864/igor-makhlin

Seminars organized	- TU Berlin Discrete Mathematics and Discrete Geometry seminar (2024 -): https://www3.math.tu-berlin.de/combi/dmg/seminar/ - HSE and Skoltech seminar on Lie algebras and applications (2019 - 2022): https://sites.google.com/view/lieseminar/
Awards and grants	- Russian Science Foundation grant RSF 19-11-00056, 2019 - 2021. 2018 Young Russian Mathematics award, winner. - Russian Science Foundation/German Research Foundation grant RSF-DFG 16-41-01013, 2016 - 2018. 19th All-Russian Möbius Contest (2015), 3rd prize. 2015 Simons Stipends Contest for Students and Graduate Students of Mathematics, winner.
Publications	

1. S. Cox, I. Makhlin, *Tropicalizing binary geometries*, https://arxiv.org/abs/2410.13652

2. Ie. Makedonskyi, I. Makhlin, *Poset polytopes and pipe dreams: toric degenerations and beyond*, Séminaire Lotharingien de Combinatoire, 91B.42 (2024)

3. Ie. Makedonskyi, I. Makhlin, *Poset polytopes and pipe dreams: types C and B*, https://arxiv.org/abs/2402.16207

4. E. Feigin, I. Makhlin, *Relative poset polytopes and semitoric degenerations*, Selecta Mathematica 30 (2024), 48

5. I. Makhlin, *Chain-order polytopes: toric degenerations, Young tableaux and monomial bases*, https://arxiv.org/abs/2211.03499, to appear in "Algebraic Combinatorics"

6. I. Dumanski, E. Feigin, Ie. Makedonskyi, I. Makhlin, *On reduced arc spaces of toric varieties*, https://arxiv.org/abs/2208.10432, to appear in "Algebra & and Number Theory"

7. E. Feigin, I. Makhlin, A. Popkovich, *Beyond the Sottile–Sturmfels Degeneration of a Semi-Infinite Grassmannian*, International Mathematics Research Notices 2023 (2023), 10037–10066

8. E. Feigin, I. Makhlin, *Semitoric degenerations of Hibi varieties and flag varieties*, https://arxiv.org/abs/2008.13243

9. I. Makhlin, *Gröbner fans of Hibi ideals, generalized Hibi ideals and flag varieties*, Journal of Combinatorial Theory, Series A, 185 (2022), 105541

10. I. Makhlin, *PBW degenerate Schubert varieties: Cartan components and counterexamples*, Algebras and Representation Theory, 23 (2019), 2315–2330

11. I. Makhlin, *Gelfand–Tsetlin degenerations of representations and flag varieties*, Transformation Groups, 27 (2022), 563–596

12. X. Fang, E. Feigin, G. Fourier, I. Makhlin, *Weighted PBW degenerations and tropical flag varieties*, Communications in Contemporary Mathematics, 21:01 (2019), 1850016

13. I. Makhlin, *FFLV-type monomial bases for type B*, Algebraic Combinatorics, 2:2 (2019), 305–322

14. E. Feigin, I. Makhlin, *Vertices of FFLV polytopes*, Journal of Algebraic Combinatorics, 45:4 (2017), 1083–1110

15. B. Feigin, I. Makhlin, *A combinatorial formula for affine Hall–Littlewood functions via a weighted Brion theorem*, Selecta Mathematica, 22:3 (2016), 1703–1747

16. I. Makhlin, *Brion's Theorem for Gelfand–Tsetlin Polytopes*, Functional Analysis and Its Applications, 50:2 (2016), 98–106

17. I. Makhlin, *Characters of Feigin–Stoyanovsky Subspaces and Brion's Theorem*, Functional Analysis and Its Applications, 49:1 (2015), 15–24

Conference talks

- "Governing polytopes in Lie theory", RTISART-2024: Representation Theory, Integrable Systems and Related Topics, Beijing, July 2024.

- "Poset polytopes and pipe dreams", Representation Theory in Cologne (A workshop in honor of Peter Littelmann), Cologne, December 2023.

- "Gröbner fans and semitoric degenerations of flag varieties", Eighth School-Conference on Lie Algebras, Algebraic Groups and Invariant Theory, Moscow, January 2020. *(In Russian.)*

- "Non-abelian PBW degenerations", Degeneration Techniques in Representation Theory, Oberwolfach, October 2019

- "Gelfand-Tsetlin degenerations", ABCD Seminar Workshop, Aachen, February 2019.

- "FFLV degenerations and Gelfand–Tseltin degenerations", The 4th KTGU Mathematics Workshop for Young Researchers, Kyoto, September 2018.

- "Weighted PBW degenerations", Seventh School-Conference on Lie Algebras, Algebraic Groups and Invariant Theory, Samara, August 2018. *(In Russian.)*

- "Degenerate representations and maximal cones in tropical flag varieties", Spring School: Tropical Geometry meets Representation Theory, Cologne, March 2018.

- "Recent results on FFLV bases and FFLV polytopes", Workshop on Quiver Grassmannians and their Applications, Wuppertal, March 2017.

- "FFLV polytopes and their vertices", The Japanese Conference on Combinatorics and its Applications, Kyoto, May 2016.

- "A combinatorial formula for affine Hall-Littlewood functions via a weighted Brion theorem", 25th British Combinatorial Conference, University of Warwick, July 2015.

- "Character formulas and Brion's theorem", Fifth School-Conference on Lie Algebras, Algebraic Groups and Invariant Theory, Samara, June 2015. *(In Russian.)*