Nikita Kalinin

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Contacts
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Citizenship: Russia.
Birthday: May 6, 1988.

clickable links:

Guangdong Technion profile

mathscinet profile zbmath

ORCID web of science scopus

google scholar arxiv

Interests: analytic/elementary number theory around $SL(2,\mathbb{Z})$, Farey fractions, topographs, and lattice sums; continued fractions, affine geometry.

Positions

Associate professor (tenure track), *Guangdong Technion-Israel Institute of Technology*, Shantou, China (01.2024 – Present).

Visiting Associate professor, *Guangdong Technion-Israel Institute of Technology*, Shantou, China (10.2022 – 11.2023).

Associate professor (доцент), *Department of Mathematics and Computer Science*, Saint Petersburg University, Russia (09.2019 – 11.2022).

Senior Researcher (старший научный сотрудник), *International Laboratory of Game Theory and Decision Making, Saint Petersburg branch of HSE* (National Research University Higher School of Economics), Russia (09.2017 – 10.2022).

A holder of a Swiss grant PostDoc.Mobility with Ernesto Lupercio as a hosting professor, *CINVESTAV (Centro de Investigación y de Estudios Avanzados)*, Mexico City, Mexico (07.2016 – 08.2017).

Education

2015	PhD in Mathematics, *University of Geneva*, Switzerland Thesis topic: "Tropical geometry for Nagata's conjecture and Legendrian curves" Advisor: Grigory Mikhalkin
2010	Specialist (=master) in Mathematics, *Saint Petersburg University*, Russia Thesis topic: "The Alexander polynomial as an intersection of two cycles in a symmetric power" Advisor: Oleg Ya. Viro

Honors, Awards, and Grants

2026	Technion-GTIIT seed grant, Probabilistic methods in geometry (joint with Ilya Gekhtman)
2020	Russian Science Foundation grant №20-71-00007, Scaling in sandpile models, 07.2020–06.2022
2018	Young Russian Mathematics grant holder, A summation over subsets of $SL(2,\mathbb{Z})$, 01.2018–12.2020
2016	PostDoc.Mobility SNSF (Switzerland) grant, P2GEP2_168647, Sandpiles in physics, combinatorics, tropical and algebraic geometry 1.07.2016 – 31.08.2017
2005	Gold medal at the International Mathematical Olympiad

Service

2020-2024	Editor-in-chief of a book about St. Petersburg mathematicians, *Saint Petersburg mathematicians and their discoveries*, 496p., (2024), MCCME. Freely available on `https://sites.google.com/view/spbmath`, Russian version is available on `https://biblio.mccme.ru/node/291128`
2020	Senior Coordinator on International Mathematical Olympiad 2020

Preprints

Topology of a uniform spanning tree on a cylinder, (joint with D. Rakhmankin) `https://arxiv.org/abs/2602.06383`

A p-adic ($p \equiv 3 \pmod 4$) depth-5 supercongruence for Gaussian p-th power sums over a square, (joint with F.S. Zottor) `http://arxiv.org/abs/2602.00206`

Weighted error-sum identities for periodic continued fractions and their generalizations, (joint with K. Calderon) `https://arxiv.org/abs/2601.07862`

Limits of equi-affine equi-distant loci of planar convex domains with two non-parallel asymptotes, (joint with M. Shkolnikov) `https://arxiv.org/abs/2512.21154`

A half-shift reflection identity for the digamma function, `https://arxiv.org/abs/2510.00012`

Evaluation of lattice sums via telescoping over topographs, `https://arxiv.org/abs/2510.02082`

Evaluating lattice sums via telescoping on $SL_+(2,\mathbb{Z})$: a short proof of $\sum \frac{1}{\|x\|^2\|y\|^2\|x+y\|^2} = \frac{\pi}{4}$ and of Zagier's identity, `https://arxiv.org/abs/2410.10884`

Legendre duality for certain summations over the Farey pairs, `https://arxiv.org/abs/2409.10592`

A guide to tropical modifications `https://arxiv.org/abs/1509.03443`

Sandpile group of infinite graphs (joint with V. Khramov), `https://arxiv.org/abs/2305.05346`

Shrinking dynamic on multidimensional tropical series, `https://arxiv.org/abs/2201.07982`

Tropical curves in sandpile models (joint with M. Shkolnikov), `https://arxiv.org/abs/1502.06284`

Published papers

A short telescoping proof of Hata's formula for the Euler–Mascheroni constant, **Integers**, 25, A90 (2025)

Wolstenholme's theorem over Gaussian integers, **Funct. Approx. Comment. Math.** Advance Publication 1-11, (2025)

Tropical Weil's reciprocity law and Weil's pairing (joint with M. Magin, **Journal of Mathematical Sciences**)

(Sandpile patterns on a regular graph of degree eight, in Russian, joint with P. Granin, A. Saakyan) Песочные паттерны на регулярном графе с вершинами степени восемь, **Chebyshevskii Sbornik**, vol. 25 (2024), no. 3, pp.47–69

(Convergence of a sandpile on a triangular lattice under rescaling, in Russian, joint with A. Aliev) Сходимость песочной кучи на треугольной решётке при ремасштабировании, **Matematicheskii Sbornik**, vol. 214 (2023), issue 12, pp.3–25

Some statistics about Tropical Sandpile Model, **Communications in Mathematics**, Volume 31 (2023), Issue 3, 9–19 (joint with Y. Prieto)

Sandpile solitons in higher dimensions, **Arnold Mathematical Journal**, 9 (2023), no. 3, 435–454

Equilateral convex triangulations of $\mathbb{R}P^2$ with three conical points of equal defect, **In the Tradition of Thurston II: Geometry and Groups** (2022, p. 315–329), editors: Ken'ichi Ohshika, Athanase Papadopoulos, Springer (joint with M. Chernaviskikh, A. Erdnigor, and A. Zakharov)

Sandpile Solitons via Smoothing of Superharmonic Functions, **Communications in Mathematical Physics**, 378(3) (2020), 1649–1675 (joint with M. Shkolnikov)

Pattern Formation and Tropical Geometry, **Frontiers in Physics**, 2020 (8), 423

Strategic analysis of the Russian crab quota auction in 2019, **Marine Policy**, Volume 122, December 2020, 104266, (joint with Mark Vershinin)

Tropical formulae for summation over a part of $SL(2,\mathbb{Z})$, **European Journal of Mathematics**, Volume 5 (2019), Issue 3, 909–928 (joint with M. Shkolnikov)

Self-Organized Criticality and Pattern Emergence through the Lens of Tropical Geometry, **PNAS** August 28, 2018. 115 (35) E8135–E8142 (joint with A. Guzmán-Sáenz, Y. Prieto, M. Shkolnikov, V. Kalinina, E. Lupercio)

Legendrian curves in $\mathbb{C}P^3$: cubics and curves on a quadratic surface, **Zapiski Nauchnyh Seminarov PDMI**, vol. 476 (2018), Geometry and Topology Series 13, 92-110 (Journal of Mathematical Sciences, 251(4), 489-502)

Introduction to tropical series and wave dynamic on them, **Discrete and continuous dynamical systems, A**, 38(6) (2018): 2843–2865 (joint with M. Shkolnikov)

The number π and summation by $SL(2,\mathbb{Z})$, **Arnold Mathematical Journal**, Volume 3 (2017), Issue 4, 511–517 (joint with M. Shkolnikov)

Tropical approach to Nagata's conjecture in positive characteristic, **Discrete and Computational Geometry**, 58(1) (2017), 158-179

Tropical curves in sandpiles, **Comptes Rendus Mathematique**, Volume 354, Issue 2, 1 February 2016, 125–130 (joint with M. Shkolnikov)

Sandpiles on the heptagonal tiling, **Knot Theory and Its Ramifications**, Vol. 26 (2016), Issue 12, 1642005 (joint with M. Shkolnikov)

The Newton polygon of a planar singular curve and its subdivision, **Journal of Combinatorial Theory, Series A**, 137 (2016), 226–256

The Alexander polynomial as an intersection of two cycles in a symmetric power, **Journal of Knot Theory and Its Ramifications**, Vol. 24 (2015), No. 12, 1550061

Articles in Russian

(What could be a dynamical centralized admission system in Russia, in Russian, **Journal of the New Economic Association**) Каким могло бы быть централизованное распределение абитуриентов по образовательным программам, **Журнал Новой Экономической Ассоциации**, № 1 (62), 2024, 101–115 (joint with A. Kuzmina)

(A cipher broken by Ch. Goldbach, in Russian) Шифр, который разгадал Христиан Гольдбах, **Математика в высшем образовании**, 19, с. 85–94, 2021

(Crab auction in 2019: history, estimates and alternative scenarios, in Russian) Крабовый аукцион 2019: история, оценка и альтернативные сценарии, **Экономический журнал ВШЭ**, 2021. Т. 25. № 4. С. 574–594 (joint with D. Ivanov, A. Nesterov, I. Susin)

(Various equilibria in a game-theoretical model of the behavior of a teacher and a student (possibly) cheating on a written exam, in Russian) Различные равновесия в теоретико-игровой модели поведения преподавателя и (возможно) списывающего студента на письменном экзамене, **Социология: методология, методы, математическое моделирование (Социология: 4М)**, вып. 50-51, стр. 97–140

Recent conference talks

25.09.2025	"Statistics of Tropical Sandpiles: Degree Growth, Coefficient Laws, and Tree Structure of Curves", Recent Developments on Tropical Sandpiles and Related Subjects, Sofia (ICMS-Sofia), Bulgaria
7.07.2025	"The residue of a zeta-function for convex domains", The 9th National Conference on Theory of Spaces of Holomorphic Functions, Hulunbuir, China
21.01.2025	"Zeta-functions for convex domains", MIST: Mathematics Inspired by String Theory 2025, Hong Kong, 21-24 January 2025
06.01.2025	"Tropical differential forms on tropical curves", Chinese conference on complex analysis, Shenzhen
29.06.2022	"Shrinking dynamics on tropical series", Combinatorial Algebraic geometry: tropical and real, Tata Institue, India.
13.10.2021	"Tropical hypersurfaces with mild singularities in sandpile models", Real algebraic geometry in Saint Petersburg.
18.06.2021	"Tropical singular points", Multidimensional Residues and Tropical Geometry, Sochi, Russia.
11-13.09.2020	"Sandpile patterns", Applications of topology and geometry, HSE, Russia.
13-16.04.2020	"Summation by $SL(2,\mathbb{Z})$", Combinatorics and geometry days-2, MIPT, Russia.
16-17.12.2019	"Tropical forms", Analysis, geometry, and mathematical physics, Saint-Petersburg, Russia.
9.10.2019	"Summation by $SL(2,\mathbb{Z})$ and tropical curves", Gokova Eudoksos conference
2.07.2019	"New mechanism for infinite repeated posted price auction without discounting", Turku, Finland,
27.06.2018	"Scaling limits in sandpile models and summation by a part of SL(2,$\mathbb{Z}$)", Ascona, Switzerland
22.06.2018	"Tropical sandpile: patchworking geometry and arithmetic", Belalp, Switzerland

Talks on seminars

15.01.2026	"Sandpile and tropical sandpile models", YMSC Probability seminar, Tsinghua University, Beijing, China
28.11.2025	"Telescoping over topograph", Colloquium Saint-Peterburg University, Russia
5.11.2025	"Tropical Weil Reciprocity", Moscow-Beijing Topology Seminar (online)
3.07.2025	"Zeta function for convex domains", Harbin Polytechnical University, Harbin, China
16.06.2025	"Sandpile States on a Cylinder and Random Spanning Trees", Jimei University, Xiamen, China
30.04.2025	"Three Lectures on Binary Quadratic Forms and Conway's Topographs", Sofia, Bulgaria
28.01.2025	"Elementary SL(2,Z) number theory formulas which stem from the sandpile model", Stavanger, Norway
17.11.2024	"Number theory in olympiads and scientific life", Harbin Polytechnical University, Harbin, China
20.09.2024	"Tropical formulae for the number π", University of Geneva
6.08.2024	"Several formulae for summation over $SL(2,\mathbb{Z})$", SYSU, Sun Yat-sen University, Guangzhou
21.03.2024	"Sandpiles on infinite domains", Westlake Math Colloquium, Westlake University, Hangzhou
6.12.2023	"Introduction to tropical modifications 2", ICMS Geometry Seminar, ICMS-Sofia
29.11.2023	"Introduction to tropical modifications", ICMS Geometry Seminar, ICMS-Sofia
02.03.2023	"Tropical objects in sandpiles", Beijing-Saint Petersburg Mathematics Colloquium
14.07.2020	"Linear patterns in sandpile model on a plane", Leipzig, zoom conference
18.11.2019	"Sandpile models", Miami online seminar.
15.11.2018	"The origin of the formulae for pi from sandpile problems", HSE Moscow
28.09.2018	"Tropical geometry and summation over SL(2,Z)", MIPT, Moscow
31.05.2017	"Power law in the (tropical) linearized sandpile model", Tropical working group seminar, Geneva
13.02.2015	"Tropical geometry in Nagata's conjecture and sandpile models", colloquium talk, CUSO, Lausanne
11.04.2014	"Tropical geometry in questions around Nagata's conjecture", Séminaires de l'équipe Géométrie, Université de Savoie
13.12.2013	"Tropical approach to Nagata's conjecture", Seminari de Geometria Algebraica Universitat de Barcelona/Universitat Politécnica de Catalunya