

Leonid Petrov. Brief CV

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Research areas

Probability, Mathematical Physics, Algebraic Combinatorics, Representation Theory.

Education

2010: Ph.D., Institute for Information Transmission Problems.

2007: Diploma, Lomonosov Moscow State University, Department of Mathematics and Mechanics (Chair of Probability).

Employment

Since 2019: Associate Professor, Department of Mathematics, University of Virginia.

2014–2019: Assistant Professor, Department of Mathematics, University of Virginia.

2017–2018: Visiting Assistant Professor, Department of Mathematics, MIT.

2011–2014: Research Instructor, Department of Mathematics, Northeastern University.

2009–2011: Research associate, Dobrushin Mathematics Laboratory, Institute for Information Transmission Problems, Moscow, Russia (on leave since 2011).

Scholarships/prizes/funding

2019: The 2020 Bernoulli prize for an outstanding survey article in probability (jointly with Alexei Borodin for the paper *Integrable probability: From representation theory to Macdonald processes*)

2018–2019: PI, NSF DMS conference grant 1839534 “Workshop on Representation Theory, Combinatorics, and Geometry”, amount \$15,000.

- 2017: Simons Foundation Collaboration Grant for Mathematicians. Recommended for funding but not awarded due to the receipt of the NSF DMS grant 1664617 (as per the rules of Collaboration Grants).
- 2017–2020: PI, NSF DMS grant 1664617 “FRG: Collaborative Research: Integrable Probability”. Joint with PIs Jinho Baik (University of Michigan), Alexei Borodin, Vadim Gorin (MIT), and Ivan Corwin (Columbia University). Amount: \$193,453 (UVA part).
- 2016–2017: Co-PI, NSF DMS conference grant 1663552 “2017 Seminar on Stochastic Processes”.
- 2015: Prize of the Moscow Mathematical Society.
- 2014–2015: EDF Fellowship of the University of Virginia.
- 2014: AMS/NSF Travel Grant Award for ICM 2014.
- 2011–2013: RFBR–CNRS grant 11-01-93105 “Representation theory and noncommutative geometry”.
- 2010–2012: RFBR–CNRS grant 10-01-93114 “New models of Markov processes on point configurations. Applications to stochastic queueing networks”.
- 2010: Dynasty foundation fellowship for young scientists.
- 2010: Silver prize of The Fourteenth Möbius Contest.
- 2009: Alexander Kuznetsov/Independent University of Moscow graduate student scholarship.
- 2005, 2006: V. Potatin federal scholarship for academic excellence, leadership and creativity.

Publications (* — preprints)

- [36] (*) (with Matteo Mucciconi) *Spin q -Whittaker polynomials and deformed quantum Toda*, arXiv:2003.14260 [math.PR].
- [35] (*) (with Mikhail Tikhonov) *Parameter symmetry in perturbed GUE corners process and reflected drifted Brownian motions*, arXiv:1912.08671 [math.PR].
- [34] (*) *Parameter permutation symmetry in particle systems and random polymers*, arXiv:1912.06067 [math.PR].
- [33] (*) *PushTASEP in inhomogeneous space*, arXiv:1910.08994 [math.PR]. Submitted.
- [32] (*) (with Axel Saenz) *Mapping TASEP back in time*, arXiv:1907.09155 [math.PR]. Submitted.
- [31] (with Alexey Bufetov and Matteo Mucciconi) *Yang-Baxter random fields and stochastic vertex models*, arXiv:1905.06815 [math.PR]. Advances in Mathematics, to appear.

- [30] (with Ivan Corwin and Konstantin Matveev) *The q -Hahn PushTASEP*, arXiv:1811.06475 [math.PR]. Intern. Math. Research Notices (2019), rnz106.
- [29] (with Alisa Knizel and Axel Saenz) *Generalizations of TASEP in discrete and continuous inhomogeneous space*, Commun. Math. Phys. 372 (2019), no. 3, pp 797–864. <https://link.springer.com/article/10.1007%2Fs00220-019-03495-4>. arXiv:1808.09855 [math.PR].
- [28] (with Christian Gromoll, Mark Meckes) *Quenched Central Limit Theorem in a Corner Growth Setting*, Electron. Comm. Probab. 23 (2018) paper no. 101, 12pp, arXiv:1804.04222 [math.PR].
- [27] (with Alexey Bufetov) *Yang-Baxter field for spin Hall-Littlewood symmetric functions*, arXiv:1712.04584 [math.PR]. Forum of Mathematics Sigma, 7 (2019), e39.
- [26] (with Michael Damron and David Sivakoff) *Coarsening model on \mathbb{Z}^d with biased zero-energy flips and an exponential large deviation bound for ASEP*, Comm. Math. Phys. 362 (2018) no. 1, 185–217, arXiv:1708.05806 [math.PR].
- [25] (with Sevak Mkrtchyan) *GUE corners limit of q -distributed lozenge tilings*, Electron. J. Probab. 22 (2017), paper no. 101, 24 pp, arXiv:1703.07503 [math.PR].
- [24] (with Alexei Borodin) *Inhomogeneous exponential jump model*, Probab. Th. Rel. Fields 172 (2018) 323–385, arXiv:1703.03857 [math.PR].
- [23] (with Daniel Orr) *Stochastic higher spin six vertex model and q -TASEPs*, Advances in Mathematics 317 (2017), 473–525, arXiv:1610.10080 [math.PR].
- [22] (with Vadim Gorin) *Universality of local statistics for noncolliding random walks*, Ann. Probab. (2019), Vol. 47, No. 5, 2686–2753. arXiv:1608.03243 [math.PR].
- [21] (with Alexei Borodin) *Lectures on Integrable probability: Stochastic vertex models and symmetric functions* (2016), arXiv:1605.01349 [math.PR]. Lecture Notes of the Les Houches Summer School, Volume 104, July 2015.
- [20] (with Alexei Borodin) *Higher spin six vertex model and symmetric rational functions* (2016), Selecta Math. 24 (2018), no. 2, 751–874, arXiv:1601.05770 [math.PR].
- [19] (with Konstantin Matveev) *q -randomized Robinson–Schensted–Knuth correspondences and random polymers* (2015), Annales de l’Institut Henri Poincaré D: Combinatorics, Physics and their Interactions 4 (2017), no. 1, 1–123, arXiv:1504.00666 [math.PR].
- [18] (with Ivan Corwin) *Stochastic higher spin vertex models on the line*, Comm. Math. Phys. 343 (2016), no. 2, 651–700, DOI: 10.1007/s00220-015-2479-5, arXiv:1502.07374 [math.PR].
- [17] (with Alexei Borodin, Ivan Corwin, and Tomohiro Sasamoto) *Spectral theory for interacting particle systems solvable by coordinate Bethe ansatz*, Comm. Math. Phys. 339 (2015), no. 3, 1167–1245, DOI: 10.1007/s00220-015-2424-7, arXiv:1407.8534 [math-ph].

- [16] (with Alexey Bufetov) *Law of Large Numbers for Infinite Random Matrices over a Finite Field*, *Selecta Math.* 21 (2015), no. 4, 1271–1338, arXiv:1402.1772 [math.PR].
- [15] (with Alexei Borodin) *Integrable probability: From representation theory to Macdonald processes*, *Probability Surveys* 11 (2014), 1–58, arXiv:1310.8007 [math.PR].
- [14] (with Alexei Borodin, Ivan Corwin, and Tomohiro Sasamoto) *Spectral theory for the q -Boson particle system*, *Compositio Mathematica* 151 (2015), no. 1, 1–67, arXiv:1308.3475 [math-ph].
- [13] (with Ivan Corwin) *The q -PushASEP: A New Integrable Model for Traffic in $1+1$ Dimension*, *Journal of Statistical Physics*, 160 (2015), no. 4, 1005–1026, arXiv:1308.3124 [math.PR].
- [12] (with Alexei Borodin) *Nearest neighbor Markov dynamics on Macdonald processes*, *Advances in Mathematics*, 300 (2016), 71–155. Special volume honoring Andrei Zelevinsky. arXiv:1305.5501 [math.PR].
- [11] *The Boundary of the Gelfand-Tsetlin Graph: New Proof of Borodin-Olshanski's Formula, and its q -analogue*, *Moscow Mathematical Journal* 14 (2014) no. 1, 121–160, arXiv:1208.3443 [math.CO].
- [10] *Asymptotics of Uniformly Random Lozenge Tilings of Polygons. Gaussian Free Field*, *Annals of Probability* 43 (2014), no. 1, 1–43, arXiv:1206.5123 [math.PR].
- [9] *Asymptotics of Random Lozenge Tilings via Gelfand-Tsetlin Schemes*, *Probability Theory and Related Fields* 160 (2014), no. 3, 429–487, arXiv:1202.3901 [math.PR].
- [8] $\mathfrak{sl}(2)$ *Operators and Markov Processes on Branching Graphs*, *Journal of Algebraic Combinatorics* 38 (2013), no. 3, 663–720, arXiv:1111.3399 [math.CO].
- [7] *On Measures on Partitions Arising in Harmonic Analysis for Linear and Projective Characters of the Infinite Symmetric Group* (2011), Proceedings of the international conference “50 years of IITP”, arXiv:1107.0676 [math.CO].
- [6] *Pfaffian Stochastic Dynamics of Strict Partitions*, *Electronic Journal of Probability* 16 (2011), 2246–2295, arXiv:1011.3329 [math.PR].
- [5] *Random Strict Partitions and Determinantal Point Processes*, *Electronic Communications in Probability* 15 (2010), 162–175, arXiv:1002.2714 [math.PR].
- [4] *Random Walks on Strict Partitions*, *Journal of Mathematical Sciences* 168 (2010), no. 3, 437–463, arXiv:0904.1823 [math.PR].
- [3] *Limit Behavior of Certain Random Walks on Strict Partitions*, *Russian Mathematical Surveys* 64 (2009), no. 6, 1139–1141.
- [2] *A Two-parameter Family of Infinite-dimensional Diffusions in the Kingman Simplex*, *Functional Analysis and Its Applications* 43 (2009), no. 4, 279–296, arXiv:0708.1930 [math.PR].

- [1] *Asymptotic Behavior of a Certain Collection of Particles on a Line Under Synchronization*, Proceedings of the XXVIII Conference of Young Scientists of Department of Mechanics and Mathematics of the Lomonosov Moscow State University (2006), 152–156, in Russian.

Contributing works

- [1] Sihan Li, Andrew Mecca, Jeewoo Kim, Giusy Caprara, Elizabeth Wagner, Ting-Ting Du, Leonid Petrov, Wenhao Xu, Runjia Cui, Ivan Rebustini, Bechara Kachar, Anthony Peng, and Jung-Bum Shin, *Myosin-VIIa is expressed in multiple isoforms and essential for tensioning the hair cell mechanotransduction complex*. To appear in Nature Communications.

Organization and service

- 2020: (**postponed due to COVID-19**) Program "Integrability and combinatorics at finite temperature" at MATRIX Institute, University of Melbourne, June 1-19, 2020, <https://www.matrix-inst.org.au/events/integrability-and-combinatorics-at-finite-temperature/>
- 2020: (**cancelled due to COVID-19**) Special Session on Integrable Probability at the 2020 AMS Spring Southeastern Sectional Meeting at University of Virginia, March 13-15, 2020, http://www.ams.org/meetings/sectional/2273_program.html
- 2019: Virginia Integrable Probability Summer School, May 27 - June 8, 2019, <http://vipss.int-prob.org/>
- 2018-19: Reading seminar on Integrable Probability, <https://lpetrov.cc/reading-2019/>
- 2018: Workshop on Representation Theory, Combinatorics, and Geometry at UVA, October 19-21, 2018, <http://math.virginia.edu/ims/workshop-fall-2018/>
- 2018: Conference "Integrable Probability Boston 2018 (IntProb Boston)" at MIT, May 14-18, 2018, <http://frg.int-prob.org/conference2018/>
- 2017+: Developer of the website and forum for the FRG "Integrable Probability", <http://frg.int-prob.org/>
- 2017+: Developer of the University of Virginia Math Department website, <http://math.virginia.edu/>
- 2017: Conference "Seminar on Stochastic Processes 2017" at UVA, March 8-11, 2017, <http://faculty.virginia.edu/ssp17/>
- 2016-17: Reading seminar on Integrable Probability, <https://lpetrov.cc/2016/12/reading-seminar/>
- 2014-17: University of Virginia Probability Seminar, <http://math.virginia.edu/seminars/probability/>
- 2014-17: Undergraduate Math Club at the University of Virginia, <http://math.virginia.edu/seminars/mathclub/>

Teaching

University of Virginia (since 2014)

Complex Variables; Introduction to Probability; Introduction to Stochastic Processes; Calculus III; Random matrices (graduate topics course); Real Analysis and Linear Spaces (graduate).

Northeastern University (2011–2014)

Calculus II for Sci&Eng; Probability and Statistics; Statistics and Stochastic Processes; Probability 1 (graduate course); Topics in Probability (graduate topics course).

Informatic skills

L^AT_EX, Mathematica, git, Python, html/jekyll and web design, UNIX, Computer experimentation, Probabilistic visualization, Cloud computing.

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