

Curriculum Vitae of Grigori Olshanski

Date: January 2017

Born: January 8, 1949, in Moscow, USSR

Education and degrees

1964–1969: Studies in the Mathematics Department of the Moscow State University.

1969: Diploma in Mathematics from the Moscow State University. Title of the diploma work: On the Frobenius reciprocity theorem.

1969–1972: Graduate student of Prof. Alexandre Kirillov in the Mathematics Department of the Moscow State University.

1973: Ph.D. in Mathematics from the Moscow State University. Thesis title: Representations of reductive p-adic groups.

1990: Doctor of Sci. degree from the St. Petersburg Department of the Steklov Mathematical Institute. Thesis title: Unitary representations of infinite-dimensional classical groups.

Employment

1972–1975: Junior Researcher, Laboratory of psycho-physiology, USSR Academy of Pedagogical Sciences, Moscow.

1975–1987: Senior Researcher, Research Institute of the USSR Ministry of Building Material Industry, Moscow.

1987–1991: Senior Researcher, Institute of Geography, USSR Academy of Sciences, Moscow.

1991–present: Leading Researcher, then Principal Researcher, Institute for Information Transmission Problems of the Russian Academy of Sciences, Moscow.

2013–present: Dobrushin Professor, Department of Mathematics, National Research University Higher School of Economics.

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Professional service

Member of the editorial boards of the journals: Functional Analysis and its Applications, Transformation Groups, Journal of Lie Theory, SIGMA.

Member of the Board of the Moscow Mathematical Society.

Selected talks

4th European Congress of Mathematics (invited speaker), Stockholm, 2004.

Workshop “Random Tilings, Random Partitions and Stochastic Growth Processes” at the Centre de recherches mathématiques, Université de Montréal, 2008.

Conference “Geometry and integrable systems”, Steklov Mathematical Institute, Moscow, 2010.

Conference “The Versatility of Integrability”, Columbia University, 2011.

Workshop “Discrete Random Structures, Representation Theory and Interacting Particle Systems”, Bielefeld, 2012.

The 25th International Conference on Formal Power Series and Algebraic Combinatorics (invited speaker), Paris, 2013.

International Congress of Mathematicians (invited speaker, section Combinatorics), Seoul, August 2014.

Former PhD students

Maxim Nazarov * (currently Professor at University of York, UK),

Andrei Okounkov * (currently Professor at Columbia University, USA),

Alexei Borodin * (currently Professor at MIT, USA),

Vladimir Ivanov (currently teaching at Independent University of Moscow),

Leonid Petrov (currently Assistant Professor at University of Virginia, USA),

Vadim Gorin (currently Assistant Professor at MIT, USA)

Anton Osinenko

Alexey Bufetov (currently postdoc at MIT, USA)

* *shared with my teacher Alexandre Kirillov*

Andrei Okounkov received the Fields Medal “for his contributions to bridging probability, representation theory and algebraic geometry” (2006). Earlier he received the European Mathematical Society prize (2004). He is a member of the National Academy of Sciences of USA and a fellow of the American Academy of Arts and Sciences.

Alexei Borodin was a plenary speaker at the International Congress of Mathematicians (2014); he received the European Mathematical Society prize (2008), the Henri Poincaré prize (2015), the Loève prize (2015).

Current undergraduate students

5 students

Grigori Olshanski. Publications¹

¹Last modified: January 19, 2017

(unitary representations of p -adic and real reductive groups; Lie group and Lie algebra theory; unitary representations of infinite-dimensional groups; algebraic combinatorics; random point processes; infinite-dimensional Markov processes)

1. Topology of the space of unitary representations of a nilpotent Lie group. *Funct. Anal. Appl.* 3, no. 4 (1969), 340-342.
2. On the Frobenius reciprocity theorem. *Funct. Anal. Appl.* 3, no. 4 (1969), 295-302.
3. On intertwining operators for induced representations of reductive p -adic groups. *Russian Math. Surveys* 27, no. 6 (1972), 243-244.
4. On unitary representations of the groups $GL(2)$ and $GU(2)$ over a totally disconnected locally compact quaternion field. *Funct. Anal. Appl.* 7, no. 1 (1973), 73-75.
5. Intertwining operators and complementary series in the class of representations of the general linear group over a locally compact division algebra induced from parabolic subgroups. *Math. USSR-Sbornik* 22 (1974), 217-255.
6. On representations of the group of automorphisms of a tree. *Uspehi Mat. Nauk.* 30, no. 3 (1975), 169-170 (Russian).
7. Classification of irreducible representations of groups of automorphisms of Bruhat-Tits trees. *Funct. Anal. Appl.* 11, no. 1 (1977), 26-34.
8. Unitary representations of the infinite-dimensional classical groups $U(p, \infty)$, $SO(p, \infty)$, $Sp(p, \infty)$ and the corresponding motion groups. *Soviet Math. Doklady* 19 (1978), 220-224.
9. Unitary representations of the infinite-dimensional classical groups $U(p, \infty)$, $SO(p, \infty)$, $Sp(p, \infty)$ and the corresponding motion groups. *Funct. Anal. Appl.* 12 (1979), 185-195.
10. Construction of unitary representations of infinite-dimensional classical groups. *Soviet Math. Doklady* 21 (1980), 66-70.
11. Description of unitary representations with highest weight for the groups $U(p, q)^\sim$. *Funct. Anal. Appl.* 14 (1981), 190-200.
12. Invariant cones in Lie algebras, Lie semigroups, and the holomorphic discrete series. *Funct. Anal. Appl.* 15 (1982), 275-285.
13. Invariant orderings in simple Lie groups: the solution to E.B. Vinberg's problem. *Funct. Anal. Appl.* 16 (1983), 80-81.
14. New "large" groups of type one. *J. Soviet Math.* 18 (1982), 22-39.
15. Convex cones in symmetric Lie algebras, Lie semigroups, and invariant causal (order) structures on pseudo-Riemannian symmetric spaces. *Soviet Math. Dokl.* 26 (1982), 97-101.
16. Complex Lie semigroups, Hardy spaces, and the Gelfand-Gindikin program. In: *Topics in group theory and homological algebra*. Yaroslavl University Press,

1982, 85-98 (Russian). English translation: *Differential Geometry and its Applications*, 1 (1991), 297-308.

17. Spherical functions and characters on the group $U(\infty)^X$. *Russian Math. Surveys* 37, no. 2 (1982), 233-234.

18. Unitary representations of infinite-dimensional pairs (G, K) and the formalism of R. Howe. *Soviet Math. Dokl.* 27, no. 2 (1983), 290-294.

19. Infinite-dimensional classical groups of finite \mathbf{R} -rank: description of representations and asymptotic theory. *Funct. Anal. Appl.* 18, no. 1 (1984), 22-34.

20. (with M. C. Prati) Extremal weights of finite-dimensional representations of the Lie superalgebra $gl_{n/m}$. *Il Nuovo Cimento* 85A, no. 1 (1985), 1-18.

21. Unitary representations of the infinite symmetric group: a semigroup approach. In: *Representations of Lie groups and Lie algebras* (A.A. Kirillov, ed.). Budapest, Akad. Kiado, 1985, 181-198.

22. Unitary representations of the group $SO(\infty, \infty)$ as limits of unitary representations of the groups $SO(n, \infty)$ as $n \rightarrow \infty$. *Funct. Anal. Appl.* 20, no. 4 (1987), 292-301.

23. Yangians and universal enveloping algebras. *Zapiski Nauchn. Semin. LOMI*, vol. 164 (1987), 142-150 (Russian); English translation: *J. Soviet Math.* 47, no. 2 (1989), 2466-2473.

24. Extension of the algebra $U(g)$ for infinite-dimensional classical Lie algebras g , and the Yangians $Y(gl(m))$. *Soviet Math. Dokl.* 36, no. 3 (1988), 569-573.

25. Determinism of Lévy random fields and unitary representations of infinite-dimensional groups. *Russian Math. Surveys* 43, no. 2 (1988), 183-184.

26. Method of holomorphic extensions in the representation theory of infinite-dimensional classical groups. *Funct. Anal. Appl.* 22, no. 4 (1989), 273-285.

27. Irreducible unitary representations of the groups $U(p, q)$ sustaining passage to the limit as $q \rightarrow \infty$. *Zapiski Nauchn. Semin. LOMI*, vol. 172 (1989), 114-120 (Russian); English translation: *J. Soviet Math.* 59, no. 5 (1992), 1102-1107.

28. Unitary representations of (G, K) -pairs connected with the infinite symmetric group $S(\infty)$. *Leningrad Math. J.* 1, no. 4 (1990), 983-1014.

29. (with M. L. Nazarov and Yu. A. Neretin) Semi-groupes engendrés par la représentation de Weil du groupe symplectique de dimension infinie. *Comptes Rendus Acad. Sci. Paris. Sér. 1*, 309, no. 7 (1989), 443-446.

30. Unitary representations of infinite-dimensional pairs (G, K) and the formalism of R. Howe. In: *Representations of Lie groups and related topics*. Advances in Contemp. Math., vol. 7 (A. M. Vershik and D. P. Zhelobenko, editors). Gordon and Breach, N.Y., London etc. 1990, 269-463.

31. Twisted Yangians and infinite-dimensional classical Lie algebras. *CWI Report*, Amsterdam, 1991; *Lecture Notes in Math.* 1510 (1992), 103-120.

32. Representations of infinite-dimensional classical groups, limits of enveloping algebras, and Yangians. In: *Topics in Representation Theory* (A. A. Kirillov, ed.). Advances in Soviet Math., vol. 2. Amer. Math. Soc., Providence, R.I., 1991, 1-66.

33. On semigroups related to infinite-dimensional groups. In: *Topics in representation theory* (A. A. Kirillov, ed.). Advances in Soviet Math., vol. 2. Amer. Math. Soc., Providence, R.I., 1991, 67-101.
34. Caractères généralisés du groupe $U(\infty)$ et fonctions intérieures. *Comptes Rendus Acad. Sci. Paris. Sér. 1*, 313 (1991), 9–12.
35. Quantized universal enveloping superalgebra of type Q and a super-extension of the Hecke algebra. *Letters in Mathematical Physics* 24 (1992), 93-102.
36. (with S. Kerov and A. Vershik) Harmonic analysis on the infinite symmetric group. A deformation of the regular representation. *Comptes Rendus Acad. Sci. Paris. Sér. 1*, 316 (1993), 773-778.
37. Weil representation and norms of Gaussian operators. *Functional Analysis and its Applications* 28 (1994), 42–54.
38. (with Serguei Kerov) Polynomial functions on the set of Young diagrams, *Comptes Rendus Acad. Sci. Paris, Ser. I*, 319 (1994), 121–126.
39. Cauchy–Szegő kernels for Hardy spaces on simple Lie groups, *Journal of Lie Theory*, 5 (1995), 241–273.
40. (with Alexander Molev and Maxim Nazarov) Yangians and classical Lie algebras. *Russian Mathematical Surveys* 51, no. 2 (1996), 205-282.
41. (with Anatoli Vershik) Ergodic unitarily invariant measures on the space of infinite Hermitian matrices, in *Contemporary Mathematical Physics. F. A. Berezin's memorial volume*, American Mathematical Society Translations, Series 2, Vol. 175 (Advances in the Mathematical Sciences — 31), R. L. Dobrushin, R. A. Minlos, M. A. Shubin, A. M. Vershik, eds., Amer. Math. Soc., Providence, RI, 1996, pp. 137–175
42. (with Maxim Nazarov) Bethe subalgebras in twisted Yangians, *Communications in Mathematical Physics* 178 (1996), 483-506.
43. (with Yu. A. Neretin) Boundary values of holomorphic functions, special unitary representations of the groups $O(p, q)$, and their limits as $q \rightarrow \infty$. *J. Math. Sciences* 87 (1997), no. 6, 3983-4035.
44. (with Andrei Okounkov) Shifted Schur functions, *Algebra i Analiz* 9 (1997), no. 2, 73–146 (Russian); English version: *St. Petersburg Mathematical J.*, 9 (1998), 239–300.
45. Generalized symmetrization in enveloping algebras, *Transformation Groups* 2 (1997), 197–213.
46. (with Andrei Okounkov) Shifted Jack polynomials, binomial formula, and applications, *Mathematical Research Letters* 4 (1997), 69–78.
47. (with Andrei Okounkov) Shifted Schur functions II. The binomial formula for characters of classical groups and its applications, in: *Kirillov's Seminar on Representation Theory*, Amer. Math. Soc. Translations, 1998, 245–271.
48. (with Sergei Kerov and Andrei Okounkov) The boundary of Young graph with Jack edge multiplicities, *Intern. Mathematics Research Notices*, 1998, no. 4, 173–199.

49. (with Andrei Okounkov) Asymptotics of Jack polynomials as the number of variables goes to infinity, Intern. Mathematics Research Notices 1998, no. 13, 641–682.
50. (with A. Borodin) Point processes and the infinite symmetric group, Mathematical Research Letters 5 (1998), 799–816.
51. (with A. Borodin) Distributions on partitions, point processes, and the hypergeometric kernel, Communications in Mathematical Physics 211 (2000), no. 2, 335–358.
52. (with A. Borodin and A. Okounkov) Asymptotics of Plancherel measures for symmetric groups, J. American Mathematical Society 13 (2000), no. 3, 481–515.
53. (with Alexander Molev) Centralizer construction for twisted Yangians, Selecta Mathematica 6 (2000), no. 3, 269–317.
54. (with A. Borodin) Harmonic functions on multiplicative graphs and interpolation polynomials. Electronic J. Combinatorics 7 (2000), paper #R28.
55. (with A. Molev) Degenerate affine Hecke algebras and centralizer construction for the symmetric groups. J. Algebra 237 (2001), 302–341.
56. (with A. Borodin) Z-Measures on partitions, Robinson–Schensted–Knuth correspondence, and $\beta = 2$ ensembles. In: *Random matrix models and their applications* (P. M. Bleher and A. R. Its, eds). MSRI Publications, vol. 40, Cambridge Univ. Press, 2001, 71–94.
57. (with A. Regev) Random Young tableaux and combinatorial identities. Seminaire Lotharingien de Combinatoire, Issue 46 (2001), paper B46e (30 pp).
58. (with A. Borodin) Infinite random matrices and ergodic measures. Communications in Mathematical Physics 223 (2001), no. 1, 87–123.
59. (with V. Ivanov), Kerov’s central limit theorem for the Plancherel measure on Young diagrams. In: *Symmetric functions 2001. Surveys of developments and perspectives*. Proc. NATO Advanced Study Institute (S. Fomin, editor), Kluwer, 2002, pp. 93–151.
60. (with A. Regev and A. Vershik) Frobenius–Schur functions. In: *Studies in Memory of Issai Schur* (A. Joseph, A. Melnikov, R. Rentschler, eds), Progress in Mathematics 210, Birkhäuser, 2003, pp. 251–300.
61. Point processes related to the infinite symmetric group. In: *The orbit method in geometry and physics: in honor of A. A. Kirillov* (Ch. Duval, L. Guieu, V. Ovsienko, eds.), Progress in Mathematics 213, Birkhäuser, 2003, pp. 349–393.
62. An introduction to harmonic analysis on the infinite symmetric group. In: *Asymptotic Combinatorics with Applications to Mathematical Physics* (A. Vershik, ed.). Springer Lecture Notes in Math. 1815, 2003, 127–160.
63. The problem of harmonic analysis on the infinite-dimensional unitary group. Journal of Functional Analysis 205 (2003), no. 2, pp. 464–524.
64. Probability measures on dual objects to compact symmetric spaces, and hypergeometric identities. Funkts. Analiz i Prilozh. 37 (2003), no. 4 (Russian); English translation in Functional Analysis and its Applications 37 (2003), 281–301.

65. (with S. Kerov and A. Vershik) Harmonic analysis on the infinite symmetric group. *Inventiones Mathematicae* **158** (2004), no. 3, 551–642.
66. (with A. Borodin) Harmonic analysis on the infinite-dimensional unitary group and determinantal point processes. *Annals of Mathematics* vol. 161 (2005), no.3, 1319–1422.
67. (with A. Borodin) Z-measures on partitions and their scaling limits. *European Journal of Combinatorics*, Vol. 26 (2005), no. 6, 795–834.
68. (with A. Borodin) Random partitions and the Gamma kernel. *Advances in Mathematics*, **194** (2005), no. 1, 141–202.
69. (with A. Borodin) Representation theory and random point processes, In: A. Laptev (ed.), *European congress of mathematics* (ECM), Stockholm, Sweden, June 27–July 2, 2004. Zürich: European Mathematical Society, 2005, pp. 73–94.
70. (with A. Borodin) Markov processes on partitions, *Probability Theory and Related Fields*, 135 (2006), no. 1, 84–152.
71. (with A. Okounkov) Limits of BC -type orthogonal polynomials as the number of variables goes to infinity, In: *Jack, Hall–Littlewood and Macdonald polynomials* (V. Kuznetsov and S. Sahi, eds.), Amer. Math. Soc., Contemporary Mathematics Series **417** (2006), 281–318.
72. (with A. Borodin) Stochastic dynamics related to Plancherel measure on partitions, In: *Representation Theory, Dynamical Systems, and Asymptotic Combinatorics* (V. Kaimanovich and A. Lodkin, eds). Amer. Math. Soc. Translations–Series 2: Advances in the Mathematical Sciences, vol. **217**, 2006, 9–21.
73. (with A. Borodin and E. Strahov) Giambelli compatible point processes, *Advances in Appl. Math.* **37** (2006), 209–248.
74. (with A. Gnedin) Coherent permutations with descent statistic and the boundary problem for the graph of zigzag diagrams, *Internat. Math. Research Notices*, **2006** (2006), Article ID 51968.
75. (with A. Gnedin) The boundary of the Eulerian number triangle. *Moscow Math. J.* **6** (2006), no. 3, 461–475.
76. (with A. Borodin) Meixner polynomials and random partitions. *Moscow Math. J.* **6** (2006), no. 4, 629–655.
77. (with A. Borodin) Asymptotics of Plancherel-type random partitions. *Journal of Algebra*, **313** (2007), no. 1, 40–60.
78. Difference operators and determinantal point processes, *Functional Analysis and its Applications* **42** (2008), no. 4, 317–329.
79. (with A. Borodin) Infinite-dimensional diffusions as limits of random walks on partitions. *Probability Theory and Related Fields* **144** (2009), no. 1, 281–318.
80. Anisotropic Young diagrams and infinite-dimensional diffusion processes with the Jack parameter, *International Mathematics Research Notices* **2010** (2010), no. 6, 1102–1166.
81. (with A. Gnedin) A q -analogue of de Finetti’s theorem, *Electronic Journal of Combinatorics* **16** (2009), no. 1, paper #R78.

82. Plancherel averages: Remarks on a paper by Stanley, *Electronic Journal of Combinatorics* **17** (2010), paper #R43.
83. (with A. Gnedin) q -Exchangeability via quasi-invariance, *Annals of Probability* **38** (2010), Number 6, 2103-2135.
84. The quasi-invariance property for the Gamma kernel determinantal measure. *Advances in Mathematics* **226** (2011), 2305-2350.
85. Laguerre and Meixner symmetric functions, and infinite-dimensional diffusion processes. *Zapiski Nauchnyh Seminarov POMI* **378** (2010), 81-110; reproduced in *Journal of Mathematical Sciences (New York)* **174** (2011), no. 1, 41-57; arXiv:1009.2037.
86. Random permutations and related topics. Chapter 25 in *The Oxford Handbook on Random Matrix Theory*, Gernot Akemann, Jinho Baik, and Philippe Di Francesco, eds. Oxford University Press, 2011.
87. (with A. Borodin) Markov processes on the path space of the Gelfand-Tsetlin graph and on its boundary. *Journal of Functional Analysis* **263** (2012), 248-303.
88. (with A. Gnedin) The two-sided infinite extension of the Mallows model for random permutations. *Advances in Applied Math.* **48** (2012), Issue 5, 615-639.
89. Laguerre and Meixner orthogonal bases in the algebra of symmetric functions. *International Mathematics Research Notices* **2012** (2012), 3615-3679.
90. (with A. Borodin) The boundary of the Gelfand-Tsetlin graph: A new approach. *Advances in Mathematics* **230** (2012), 1738-1779.
91. (with A. Borodin) The Young bouquet and its boundary. *Moscow Mathematical Journal* **13** (2013), no. 2, 191-230.
93. (with A. Osinenko) Multivariate Jacobi polynomials and the Selberg integral. *Functional Analysis and its Applications* **46** (2012), No. 4, pp. 31-50 (Russian), pp. 262-278 (English translation).
94. (with E. Lytvynov) Equilibrium Kawasaki dynamics and determinantal point processes. *Journal of Mathematical Sciences (N.Y)* **190**, Issue 3, 451-458.
95. Projections of orbital measures, Gelfand-Tsetlin polytopes, and splines. *Journal of Lie Theory* **23** (2013), no 4, 1011-1022.
96. (with A. Borodin) Markov dynamics on the Thoma cone: a model of time-dependent determinantal processes with infinitely many particles. *Electronic Journal of Probability* **18** (2013), no. 75, 1-43.
97. (with A. Borodin) An interacting particle process related to Young tableaux. *Zapiski Nauchnyh Seminarov POMI* [Proceedings of the Scientific Seminars of the Steklov Mathematical Institute, St.-Petersburg Branch], vol. 421 (2014), 47-57 [to be reproduced in *Journal of Mathematical Sciences (New York)*].
98. The Gelfand-Tsetlin graph and Markov processes. In: *Proceedings of the International Congress of Mathematicians, Seoul 2014* (invited talk, section: Combinatorics). arXiv:1404.3646

99. (with Alexei Borodin and Alexey Bufetov) Limit shapes for growing extreme characters of $U(\infty)$. *The Annals of Applied Probability* 25 (2015), Number 4, 2339–2381; arXiv:1311.5697.

100. (with Vadim Gorin) Determinantal measures related to big q -Jacobi polynomials. *Functional Analysis and its Applications* 49 (2015), 214–217 [In Russian version: no. 3, pp. 70–74].

101. Approximation of Markov dynamics on the dual object to the infinite-dimensional unitary group. *Functional Analysis and its Applications* 49 (2015), 289–300 [in Russian version: no. 4, pp. 61–75].

102. (with Anton Osinenko) Multivariate Jacobi polynomials and the Selberg integral II. *Zapiski Nauchnyh Seminarov POMI* 436 (2015), 199–218; to be reproduced in *Journal of Mathematical Sciences (New York)*.

103. The representation ring of the unitary groups and Markov processes of algebraic origin. *Advances in Mathematics* 300 (2016), 544–615.

104. (with Vadim Gorin) A quantization of the harmonic analysis on the infinite-dimensional unitary group. *Journal of Functional Analysis* 270 (2016), 375–418.

105. Markov dynamics on the dual object to the infinite-dimensional unitary group. In: *Probability and Statistical Physics in St. Petersburg. Proceedings of Symposia in Pure Mathematics* vol. 91, pp. 373–394. Amer. Math. Soc., 2016.

106. Extended Gelfand–Tsetlin graph, its q -boundary, and q -B-splines. *Functional Analysis and its Applications* 50 (2016), no. 2, 107–130.

107. Diffusion processes on the Thoma cone. *Functional Analysis and its Applications* 50 (2016), no. 3, 237–240.

108. (with Alexei Borodin) The ASEP and determinantal point processes. Preprint, 47 pp., arXiv:1608.01564.

Book:

Alexei Borodin and Grigori Olshanski, *Representations of the infinite symmetric groups*. Cambridge University Press, 2017.