Mikhail Bershtein, Curriculum Vitae
31 March 2023

General Information

Full name: Bershtein Mikhail Aleksandrovich
Date of birth: April 13, 1985 in Kharkiv, Ukraine
Citizenship: Russia, Ukraine
Family status: married, have a daughter
e-mail: mbersht@gmail.com.

Research interests

Representation theory, Conformal field theory, Integrable Systems, Algebraic combinatorics.

Employment

2016–	Associate Professor *Skoltech Center for Advanced Studies*
2014–2022	Researcher *International Laboratory of Representation Theory and Mathematical Physics, National Research University Higher School of Economics.*
2012–2020	Researcher, *Institute for Information Transmission Problems.*
2011–	Researcher *Landau Institute for theoretical physics.*

Education

2007–2010	Graduate student, *Landau Institute for theoretical physics*; *Independent University of Moscow.* Ph.D. received June 2011. Thesis: Cohomology ring and correlation numbers in 2D Liouville gravity. Advisor: B.L. Feigin.
2002–2007	*Independent University of Moscow.* Advisor: B.L. Feigin.
2002–2007	*Lomonosov Moscow State University.* Graduated with honours. Advisor: E.B. Vinberg
2001–2002	*Karazin Kharkiv National University*
1994–2001	*Kharkiv Physics and Mathematics Lyceum No 27*

Publications

2022   M. Bershtein, A. Grigorev, A. Shchechkin *Hamiltonian reductions in Matrix Painlevé systems*, Lett. Math. Phys. **113**, 47 (2023). [`arXiv:2208.04824`].

2022   M. Bershtein, A. Vargulevich *NSR singular vectors from Uglov polynomials*, J. Math. Phys. **63**, 061706 (2022) [`arXiv:2202.11810`].

2021   M. Bershtein, A. Shchechkin *Folding transformations for q-Painleve equations*, [`arXiv:2110.15320`].

2021   M. Bershtein, R. Gonin *Twisted Fock module of toroidal algebra via DAHA and vertex operators*, [`arXiv:2109.12598`].

2021   M. Bershtein, P. Gavrylenko, A. Grassi, *Quantum spectral problems and isomonodromic deformations*, Commun. Math. Phys. **393**, 347–418 (2022) [`arXiv:2105.00985`].

2020   M. Bershtein, R. Gonin *Twisted and Non-Twisted Deformed Virasoro Algebra via Vertex Operators of $U_q(\widehat{\mathfrak{sl}}_2)$*, Lett. Math. Phys. **111**, 22 (2021). [`arXiv:2003.12472`].

2019   M. Bershtein, R. Gonin *Twisted Representations of Algebra of q-Difference Operators, Twisted q-W Algebras and Conformal Blocks*, SIGMA **16**, 077 (2020) [`arXiv:1906.00600`].

2018   M. Bershtein, A. Shchechkin *Painlevé equations from Nakajima-Yoshioka blow-up relations*, Lett Math Phys **109 (11)** 2359–2402 (2019) [`arXiv:1811.04050`].

2018   M. Bershtein, P. Gavrylenko, A. Marshakov *Cluster Toda chains and Nekrasov functions*, Theor Math Phys (2019) **198**: 157 [`arXiv:1804.10145`].

2017   M. Bershtein, P. Gavrylenko, A. Marshakov *Cluster integrable systems, q-Painlevé equations and quantization*, JHEP **1802:077**, (2018); [`arXiv:1711.02063`].

2017   M. Bershtein, P. Gavrylenko, A. Marshakov *Twist-field representations of W-algebras, exact conformal blocks and character identities* JHEP **1808:108**, (2018); [`arXiv:1705.00957`].

2016   M. Bershtein, A. Shchechkin *Backlund transformation of Painlevé III(D_8) tau function*, J. Phys. A **50**, 115205 (2017); [`arXiv:1608.02568`].

2016   M. Bershtein, A. Shchechkin *q-deformed Painlevé τ function and q-deformed conformal blocks*, J. Phys. A **50**, 085202 (2017); [arXiv:1608.02566].

2016   M. Bershtein, G. Bonelli, M.Ronzani, A. Tanzini, *Gauge theories on compact toric surfaces, conformal field theories and equivariant Donaldson invariants*, J. Geom. Phys., **118**, (2017) 40–50; [arXiv:1606.07148].

2015   M. Bershtein, A. Tsymbaliuk, *Homomorphisms between different quantum toroidal and affine Yangian algebras*; J. Pure Appl. Algebra **223 2** (2019), 867-899 [arXiv:1512.09109].

2015   M. Bershtein, B. Feigin, G. Merzon, *Plane partitions with a "pit": generating functions and representation theory*, Sel. Math. New Ser. **24 (1)**, 21–62 (2018); [arXiv:1512.08779].

2015   M. Bershtein, G. Bonelli, M.Ronzani, A. Tanzini, *Exact results for $\mathcal{N} = 2$ supersymmetric gauge theories on compact toric manifolds and equivariant Donaldson invariants*, JHEP (2016) **2016:23**; [arXiv:1509.00267].

2014   M. Bershtein, A. Shchechkin, *Bilinear equations on Painleve tau functions from CFT*, Comm. Math. Phys. **339(3)**, 1021-1061 (2015); [arXiv:1406.3008].

2014   M. Bershtein, O. Foda, *AGT, Burge pairs and minimal models*, JHEP **1406:177**, (2014); [arXiv:1404.7075].

2014   M. Bershtein, G. Merzon, *Young diagrams, lattice paths and reflection method*, Matematicheskoe prosveshenie Ser. 3, **18**, 112-141 (2014).

2013   M. Bershtein, B. Feigin, A. Litvinov, *Coupling of two conformal field theories and Nakajima-Yoshioka blow-up equations*, Lett. Math. Phys. **106(1)** 29-56 (2016) [arXiv:1310.7281].

2012   A. Belavin, M. Bershtein, G. Tarnopolsky *Bases in coset conformal field theory from AGT correspondence and Macdonald polynomials at the roots of unity*, JHEP **1304:019**, (2013), [arXiv:1211.2788].

2011   A. Belavin, M. Bershtein, B. Feigin, A. Litvinov, G. Tarnopolsky *Instanton moduli spaces and bases in coset conformal field theory.* Comm. Math. Phys. **319 1**, 269–301 (2013), [arXiv:1111.2803].

2011	A. Belavin, V. Belavin, M. Bershtein, *Instantons and 2d Superconformal field theory*, JHEP **1109:117**, (2011), [arXiv:1106.4001].
2010	M. Bershtein, V. Fateev, A. Litvinov, *Selberg integrals and three-point correlation function in parafermionic Liouville field theory*, Nuclear Physics **B 84** 413–459, (2011). [arXiv:1011.4090].
2010	A. Belavin, M. Bershtein, G. Tarnopolsky, *A remark on the three approaches to 2D Quantum gravity*, JETP Lett. **93 (2)**, 47-51 (2011) [arXiv:1010.2222].
2009	O. Alekseev M. Bershtein, *The ring of physical states in the M(2, 3) minimal Liouville gravity*, Theor. Math. Phys., **164(1)**, 929-946 (2010), [arXiv:0906.1377].
2006	M. Bershtein, V. Dotsenko, A. Khoroshkin, *Quadratic algebras related to the bihamiltonian operad*, Int. Math. Res. Notices (2007) [arXiv:math/0607289].

Awards/Grants

2023	Abilitazione docenza di seconda fascia per il sett. conc. 01/A4, - FISICA MATEMATICA. 14 February 2023
2019	Moscow government award for young scientists.
2018	RFBR grant *Quantum algebras, vertex algebras and their applications* 18-31-20062 -mol_a_ved.
2016	Young Russian Math Contest award.
2015	Simons Foundation —- IUM fellowship.
2015	Physics Foundation grant (www.physicsfoundation.org).
2012-2013	RFBR grant *Instanton moduli spaces and representation theory* 12-01-31236-mol_a.
2009	Alexander Kuznetsov/Independent University of Moscow graduate student scholarship.
2007	Dobrushin scholarship.
2001/2002	Ukrainian president grant
2001	Gold medal at the International Mathematical Olympiad, Washington, D.C.
1997–2001	Grant of the Kharkov Fund for Young Talents' Support.

Conferences/schools/visits

2022 Sep.–current	visitor Kavli IPMU Japan,
2022 March	Workshop *Advances in Cluster Algebras*, Zoom,
2023 March	*Workshop on Accessory Parameters*, Kumamoto, Japan
2023 Feb.	Conference *Gauge Theory, Moduli Spaces and Representation Theory*, IPMU, Kashiwa, Japan,
2023 Jan.	Colloquium talk University of Tokyo, Japan,
2023 Jan.	Symposium *RIKKYO MathPhys 2023*, RIKKYO university, Tokyo, Japan,
2022 July	Summer school *Contemporary Mathematics*, Dubna,
2022 July	Workshop *Geometric Correspondences of Gauge Theories*, SISSA Trieste,
2022 June	Conference *Workshop on Supermoduli and superstrings,*, Trieste
2022 Feb.	Conference *Vertex Algebras and Poisson Geometry,*, SwissMAP Research Station, Les Diablerets/Zoom.
2021 Sep.	Workshop *Geometric Correspondences of Gauge Theories*, SISSA Trieste, Zoom.
2021 July	*Workshop on Classical and Quantum Integrable Systems,*, Sochi-Sirius, Russia.
2021 Jan	VI School *String theory, Integrable models and representation theory*, Moscow, Russia.
2020 Sep.	Workshop *Geometric Correspondences of Gauge Theories*, SISSA Trieste, Zoom.
2020 June	Conference *Landau Days*, Landau Institute, Chernogolovka, Zoom.
2020 Jan.	VIII School-Conference *Lie algebras, algebraic groups and invariant theory*, Moscow, Russia.
2020 Jan	V School *String theory, Integrable models and representation theory*, Moscow, Russia.
2020 Jan.	Winter School on *Integrable Systems and Representation Theory*, Bologna.
2019 Sep.	Conference *Integrable Systems and Representation Theory*, Hyeres, France.
2019 July	*Workshop on Classical and Quantum Integrable Systems,*, Saint-Peterburg, Russia.

2019 June	Conference *Interaction Between Algebraic Geometry and QFT*, MIPT, Dolgoprudny, Russia.
2019 June	Workshop *Geometric Correspondences of Gauge Theories* ICTP, SISSA Italy.
2019 June.	School on *cluster algebras: theory and applications*, RIMS, Kyoto Japan.
2019 Apr.	Conference *Vertex Algebras and Geometry of Moduli Spaces*, HSE, Moscow, Russia.
2019 Feb.	Workshop *Integrability, combinatorics, and representations,*, IPMU, Tokyo, Japan.
2019 Jan	IV School *String theory, Integrable models and representation theory*, Moscow, Russia.
2018 Nov.	Research meeting *Infinite Dimensional Algebras, Geometry and Integrable Systems*, RIMS, Kyoto, Japan.
2018 Sep.	*Tau Functions of Integrable Systems and Their Applications*, BIRS, Banff, Canada.
2020 Aug.	VII School-Conference *Lie algebras, algebraic groups and invariant theory*, Samara, Russia.
2018 July	*Summer School on Geometric Representation Theory*, IST, Klosterneuburg Austria.
2018 July	*Workshop on Classical and Quantum Integrable Systems,*, Protvino, Russia.
2018 June	*6th Workshop on Combinatorics of Moduli Spaces, Cluster Algebras, and Topological Recursion* Moscow, Russia.
2018 June	Workshop *Geometric Correspondences of Gauge Theories* ICTP, SISSA Italy.
2018 May	Workshop *Supersymmetric Quantum Field Theories in the Nonperturbative Regime*, GGI Florence Italy.
2018 Jan.-Feb.	Winter school *Partition Functions and Automorphic Forms*, Dubna, Russia.
2018 Jan	III School *String theory, Integrable models and representation theory*, Moscow, Russia.
2017 Aug.	Workshop *Quantum Geometry, Duality and Matrix Models*, Moscow, Russia.
2017 Aug.	School *Integrable Models in Statistical Mechanics, Limit Shapes and Combinatorics*, Saint Petersburg, Russia.

2017 July	Workshop *Geometric Correspondences of Gauge Theories* ICTP, Trieste Italy.
2017 July	Workshop on *Classical and Quantum Integrable Systems*, Dubna, Russia.
2017 July	School *The first summer mathematics school on Fontanka*, Saint Petersburg, Russia.
2017 June	Visit of the SISSA (International School for Advanced Studies), Trieste, Italy.
2017 June	International Conference on *Integrable Systems and Quantum symmetries*, Prague, Czech Republic.
2017 May	Workshop *Representation Theory and Integrable Systems*, Amsterdam, Netherlands.
2017 Feb	VI School-Conference *Lie algebras, algebraic groups and invariant theory*, Moscow, Russia.
2017 Jan	II School *String theory, Integrable models and representation theory*, Moscow, Russia.
2017 Jan	Conference *Christmas mathematical meeting*, Moscow, Russia.
2016 Nov.	Program *New trends in integrable models*, Natal Brasil.
2016 Oct.	Workshop Conference *Random Geometry and Physics*, Paris France.
2016 Oct.	Visit of the *Laboratory of Mathematics and Theoretical Physics, Tours University*, Tours, France.
2016 Sep.	Workshop *Geometric Correspondences of Gauge Theories* ICTP, Trieste Italy.
2016 Aug.	Workshop *Quantum Geometry, Duality and Matrix Models*, Moscow Russia.
2016 July	Workshop on *Classical and Quantum Integrable Systems*, Saint Petersburg, Russia.
2016 June	String-Math 2016 conference, Paris, France.
2016 June	Visit of the SISSA (International School for Advanced Studies), Trieste, Italy.
2016 Jan	I School *String theory, Integrable models and representation theory*, Moscow, Russia.
2015 Aug.	Workshop *Quantum Geometry, Duality and Matrix Models*, Moscow Russia.

2015 July	Graduate Summer School *Geometry of moduli spaces and representation theory*, PCMI, Midway, USA.
2015 July	Workshop on *Classical and Quantum Integrable Systems*, IHEP, Protvino, Russia.
2015 June-July	Visit of the SISSA (International School for Advanced Studies), Trieste, Italy.
2015 June	V School-Conference *Lie algebras, algebraic groups and invariant theory*, Samara, Russia.
2015 March	Worksop *Representation Theory, Special Functions and Painlevé Equations* RIMS, Kyoto, Japan. Workshop *Integrable Systems and Representation Theory* TUMSAT Tokyo, Japan.
2014 Oct.	Program *Gauge Theory, Integrability, and Novel Symmetries of Quantum Field Theory* Simons Center for Geometry and Physics, Stony Brook, NY, USA.
2014 Sep.	Visit of the SISSA (International School for Advanced Studies), Trieste, Italy.
2014 July	Program *RIMS Project 2014 Geometric Representation Theory*, Kyoto, Japan.
2014 June-July	WE-Heraeus Seminar *Integrable Lattice Models and Quantum Field Theories*, Bad Honnef, Germany.
2014 June	Workshop *Instanton Counting: Moduli Spaces, Representation Theory and Integrable Systems*, Leiden, Netherlands.
2014 Jan.	IV School-Conference *Lie algebras, algebraic groups and invariant theory*, MSU, Moscow, Russia.
2013 Oct.	Visit of the New High Energy Theory Center, Rutgers University, New Brunswick, USA
2013 Oct.	Program *Quiver varieties* Simons Center for Geometry and Physics, Stony Brook, NY, USA.
2013 Sep.	Workshop *Geometric Correspondences of Gauge Theories* ICTP Trieste, Italy .
2013 Aug.	Visit of the SISSA (International School for Advanced Studies), Trieste, Italy.
2012 Oct.-Nov.	Program *Integrability in Modern Theoretical and Mathematical Physics* Simons Center for Geometry and Physics, Stony Brook, NY, USA.

2012 March	Workshop *on the AGT Conjecture*, Bethe Forum, Bonn, Germany.
2012 Jan.	Workshop *Classical and Quantum Integrable Systems*, JINR, Dubna, Russia.
2011 Sep.	Conference *Low dimensional physics and gauge principles*, Nor Amberd, Armenia and Tbilisi, Georgia.
2011 Jan.	II School-Conference *Lie algebras, algebraic groups and invariant theory*, MSU, Moscow, Russia.
2010 Jan.	Conference *Representation Theory and Quantization,* FIM, ETH Zurich, Switzerland.
2009 Aug.	Summer School *Structures in Lie Representation Theory,* Jacobs University, Bremen, Germany.
2009 June—July	Conference *Conformal Field Theory, Integrable Models and Liouville Gravity,* Landau Institute, Chernogolovka, Russia.
2009 April	*Second International Conference on String Field Theory and Related Aspects,* Steklov Mathematical Institute, Moscow, Russia.
2009 Jan.	Russian–Japanese School of Young Mathematicians, Kyoto University, Japan.
2007 June—July	*NATO Advanced Study Institute on Higher-Dimensional Geometry over Finite Fields,* Mathematisches Institut, Gottingen, Germany.
2007, Jan.—Feb.	Exchange program between IUM (Independent University of Moscow) and ENS Paris.
2002, 2003	Summer school *Contemporary mathematics*, Dubna Russia.

Organizing experience

2022	Conference *Isomonodromic Deformations Painlevé Equations and Integrable Systems* Member of the **Organizing Committee**.
2016–2022	I-VII School-conference of *String theory, Representation theory and Integrable models.* Member of the **Organizing Committee**.
2015	Workshop on *Classical and Quantum Integrable Systems* . Member of the **Organizing Committee**.

Teaching experience

2018–2022	*Higher School of Economics, Mathematical Department.* Working seminar on representation theory (one of the **organizers**) "Gaudin model and related topics" (2021–2022), "W algebras and related topics" (2020–2021), "Macdonald polynomials and DAHA" (2019–2020), "Category $\mathcal{O}$ and Soergel bimodules" (2018–2019).
2017–2022	*Skoltech.* **Lecturer** "Introduction to cluster algebras and varieties" (2022). "Affine quantum groups" (2021). "Introduction to quantum groups" (2020), "Virasoro algebra and CFT" (2019) "Affine Lie algebras and CFT" (2018), "String theory and conformal theory", (2017),
2016	*Higher School of Economics, Mathematical Department.* **Lecturer** Introduction to string theory and conformal field theory (1/3 of the course).
2013–2022	*Moscow Institute of Physics and Technology.* **Lecturer** "Introduction to the group theory"
2007–2015	*Independent University of Moscow.* **Lecturer** "Instanon moduli spaces" (2011), "Representation theory and Knizhnik–Zamolodchikov equations" (2015). **Assistant** "Topology" (2007, 2011), "Algebra" (2008, 2009), "Introduction to the AGT correspondence" (2010, 2011). **Tutor** in Math in Moscow programm (2007-2010).
2002–2013	*Summer Mathematical school for gifted school students*, Kirov Russia, teacher.
2008–2013	*Moscow school 1543*, teacher for gifted school students.
2004, 2005, 2008, 2009, 2014	*Moscow Mathematical olympiad*, Head of one grade jury.
2003–2012	*Kharkov Mathematical olympiad*, member of jury.

Supervision

2014–2021	Roman Gonin (Bachelor student, Master student, Ph. D.)
2014–2020	Anton Shchechkin (Master student, Ph. D.)
2018–	Alexander Trufanov (Bachelor student, Master student, Ph. D.)

2018–2022   Angelina Vargulevich (Bachelor student, Master student, Ph. D.)

2019–   Andrei Grigorev (Bachelor student, currently Master student)

2018–2021   Dmitrii Rachenkov (Bachelor student, Master student)

2016–2018   Yuri Zhuravlev (Master student)

2019–2021   Daria Zamiraylo (Bachelor student)