

EDUCATION

Columbia University Ph.D. in Mathematics, Advisor: Andrei Okounkov – Thesis: “Quantum difference equations for Nakajima varieties”	New York 2016
Institute for Theoretical and Experimental Physics Ph.D. Theoretical Physics, Advisor: Mikhail Olshanetsky – Thesis: “Classification of elliptic R -matrices and corresponding Knizhnik-Zamolodchikov equations”	Moscow 2013
Moscow Institute of Physics and Technology M.S. in Applied Mathematics	Moscow 2009
Moscow Institute of Physics and Technology B.S. in Applied Mathematics	Moscow 2007

PROFESSIONAL EXPERIENCE

University of North Carolina Associate Professor	Chapel Hill 2023–Present
University of North Carolina Assistant Professor	Chapel Hill 2018–2023
UC Berkeley Morrey Visiting Assistant Professor	Berkeley 2016–2018

AWARDS AND GRANTS

- Simons Foundation grant: Travel Support for Mathematicians, \$35,000 2024–2029
- NSF grant: DMS-2401380, *Quasimaps to Nakajima varieties*, \$244,777 2024–2027
- NSF grant: DMS - 2054527, *Dualities in enumerative geometry and representation theory*, \$199,989 2021–2025
- Simons Foundation: Travel Support for Mathematicians \$35,000 (withdrawn due to conflict with NSF) 2021–2026
- AMS travel grant \$5,000 2017–2022

JOURNAL PUBLICATIONS

1. A. Smirnov, “Quantum differential and difference equations for $\text{Hilb}^n(\mathbb{C}^2)$ ”, 77 pages, *Comm. Math. Phys.* 405, 178, (2024) [arXiv:2102.10726](https://arxiv.org/abs/2102.10726)
2. A. Smirnov, A. Varchenko, “Polynomial superpotential for Grassmannian $\text{Gr}(k,n)$ from a limit of vertex function”, *Arnold Math J.* (2024), [arXiv:2305.03849](https://arxiv.org/abs/2305.03849)
3. G. Felder, A. Smirnov, V. Tarasov, A. Varchenko, “Hypergeometric integrals, hook formulas and Whittaker vectors”, to appear in *AMS Contemporary Mathematics Series*, (2023). [arXiv:2308.05766](https://arxiv.org/abs/2308.05766)
4. A. Okounkov, A. Smirnov, “Quantum difference equation for Nakajima varieties”, *Inventiones mathematicae*, 131, (2022), [arXiv:1602.09007](https://arxiv.org/abs/1602.09007)

5. H. Dinkins, A. Smirnov, “Euler characteristic of stable envelopes”, *Selecta Mathematica*, (2022) *arXiv:2108.07202*
6. Y. Kononov, A. Smirnov, “Pursuing quantum difference equations II: 3D-mirror symmetry”, *Int. Res. Math. Not.* (2022) *arXiv:2008.06309*
7. Y. Kononov, A. Smirnov, “Pursuing quantum difference equations I: stable envelopes of subvarieties”, *Lett. Math. Phys.*, 112:69, (2022) *arXiv:2004.07862*
8. H. Dinkins, A. Smirnov, “Capped vertex with descendants for zero dimensional A_∞ quiver varieties”, *Adv. in Math.*, 401, (2022), *arXiv:2005.12980*
9. A. Smirnov, Z. Zhou, “3d Mirror Symmetry and Quantum K-theory of Hypertoric Varieties”, *Adv. in Math.*, 395, (2022), *arXiv:2006.00118*
10. R. Rimányi, A. Smirnov, A. Varchenko, Z. Zhou, “3d Mirror Symmetry and Elliptic Stable Envelopes”, *Int. Math. Res. Not.*, 13, 10016–10094, (2022) *arXiv:1902.03677*
11. P. Koroteev, P. Pushkar, A. Smirnov, A. Zeitlin, “Quantum K-theory of Quiver Varieties and Many-Body Systems”, *Selecta Mathematica*, 27: 81, (2021), *arXiv:1705.10419*
12. H. Dinkins, A. Smirnov, “Quasimaps to zero-dimensional A_∞ -quiver varieties”, *Int. Math. Res. Not.*, 2, 1123–1153, (2020), *arXiv:1912.04834*
13. H. Dinkins, A. Smirnov, “Characters of tangent spaces at torus fixed points and 3d-mirror symmetry”, *Lett. Math. Phys.*, 110, 2337–2352, (2020), *arXiv:1908.01199*
14. P. Pushkar, A. Smirnov, A. Zeitlin, “Baxter Q-operator from quantum K-theory”, *Adv. in Math.*, 360, (2020), *arXiv:1612.08723*
15. A. Smirnov, “Elliptic stable envelope for Hilbert scheme of points in the plane”, *Selecta Mathematica*, 26: 3, (2020), *arXiv:1804.08779*
16. R. Rimányi, A. Smirnov, A. Varchenko, Z. Zhou, “Three-Dimensional Mirror Self-Symmetry of the Cotangent Bundle of the Full Flag Variety”, *SIGMA* 15 (2019), 093, 22 pages, *arXiv:1906.00134*
17. A. Smirnov, “On the Instanton R-matrix”, *Commun. in Math. Phys.*, 345, 703-740, (2016) *arXiv: 1302.0799*
18. G. Aminov, S. Arthamonov, A. Smirnov, A. Zotov, “Rational Top and its Classical R-matrix”, *J. of Phys. A: Math. and Theor.*, 47 (2014), 1-19, *arXiv:1402.3189*
19. A. Morozov, A. Smirnov, “Towards the proof of AGT relations with the help of the generalized Jack polynomials”, *Lett. Math. Phys.*, 104, 585-612, (2014), *arXiv:1307.2576*
20. A. Mironov, A. Morozov, A. Sleptsov, A. Smirnov, “On genus expansion of superpolynomials”, *Nucl. Phys. B*, 889, 757-777, (2014), *arXiv:1310.7622*
21. A. Zotov, A. Smirnov, “Modifications of bundles, elliptic integrable systems, and related topics”, *Theor. and Math. Phys.*, 177, 1281 - 1338, (2013)
22. P. Dunin-Barkowski, A. Mironov, A. Morozov, A. Sleptsov, A. Smirnov, “Superpolynomials for toric knots from evolution induced by cut-and-join operators”, *JHEP* 03, 021, 1-85, (2013) *arXiv:1106.4305*
23. A. Levin, M. Olshanetsky, A. Smirnov, A. Zotov, “Characteristic Classes of $SL(N)$ -Bundles and Quantum Dynamical Elliptic R-Matrices”, *J. of Phys. A: Math. and Theor.*, 46, 1-25, (2013) *arXiv:1208.5750*
24. P. Dunin-Barkowski, A. Sleptsov, A. Smirnov, “Kontsevich integral for knots and Vassiliev invariants”, *Int. J. of Mod. Phys. A*, 28, 1-38, (2013), *arXiv:1112.5406*
25. A. Levin, M. Olshanetsky, A. Smirnov, A. Zotov, “Hecke Transformations of Conformal Blocks in WZW Theory. I. KZB Equations for Non-Trivial Bundles”, *SIGMA*, 8 095, 1-37, (2012), *arXiv:1207.4386*

26. D. Galakhov, A. Mironov, A. Morozov, A. Smirnov, “On 3d extensions of AGT relation”, *Theor. and Math. Phys.*, 172, 939-962, (2012) *arXiv:1104.2589*
27. P. Dunin-Barkowski, A. Slepsov, A. Smirnov, “Explicit computation of Drinfeld associator in the case of the fundamental representation of \mathfrak{gl}_N ”, *J. of Phy. A: Math. and Theor.*, 45, 1-15, (2012), *arXiv:1201.0025*
28. A. Levin, M. Olshanetsky, A. Smirnov, A. Zotov, “Characteristic Classes and Integrable Systems. General Construction”, *Commun. in Math. Phys.*, 316, 1–44, (2012), *arXiv:1006.0702*
29. A. Mironov, A. Morozov, Sh. Shakirov, A. Smirnov, “Proving AGT conjecture as HS duality: extension to five dimensions”, *Nucl. Phys. B*, 855, 128-151, (2011), *arXiv:1105.0948*
30. A. Levin, M. Olshanetsky, A. Smirnov, A. Zotov, “Characteristic Classes and Integrable Systems for Simple Lie Groups”, *J. of Geom. and Phys.*, 62, 1810–1850, (2010), *arXiv:1007.4127*
31. A. Morozov, A. Smirnov, “Chern-Simons Theory in the Temporal Gauge and Knot Invariants through the Universal Quantum R-Matrix”, *Nuclear Physics B*, 835, 284-313, (2010), *arXiv:1001.2003*
32. A. Smirnov, “Notes on Chern-Simons Theory in the Temporal Gauge”, *Proceedings of 47th International School of Subnuclear Physics*, Erice, Italy, pages 489-499, (2009), *arXiv:0910.5011*
33. A. Smirnov, “Degenerate Sklyanin Algebras”, *Cent. Eur. J. of Phys.*, 8, 542-554, (2009), *arXiv:0903.1466*
34. A. Smirnov, “Correspondence between Calogero-Moser systems and integrable $SL(N, \mathbb{C})$ Euler-Arnold tops”, *Theor. and Math. Phys.*, 158, 300-312, (2008), *arXiv:0809.2187*
35. A. Smirnov, “Two body systems from $sl(2, \mathbb{C})$ -tops”, *Theor. and Math. Phys.*, 157, 8-21, (2007), *arXiv:0711.2432*

PREPRINTS

1. A. Smirnov, “Enumerative geometry via elliptic stable envelope”, 16 pages, arXiv
2. H. Konno, A. Smirnov, “Elliptic Quantum Toroidal Algebra $U_{t_1, t_2, p}(\mathfrak{gl}_{1, tor})$, Vertex Operators and L -operators”, 42 pages, arXiv:2406.00964
3. A. Smirnov, “Frobenius intertwiners for q -difference equations”, 17 pages, arXiv:2406.00206
4. J. Ayers, A. Smirnov, “Capped Vertex Functions for $Hilb^n(\mathbb{C}^2)$ ”, 29 pages, arXiv:2406.00498
5. A. Smirnov, A. Varchenko, “The p -adic approximations of vertex functions via 3D-mirror symmetry”, 22 pages, *arXiv:2302.03092*
6. A. Smirnov, “Rationality of capped descendent vertex in K-theory”, 31 pages, *arXiv:1612.01048*
7. A. Smirnov, “Polynomials associated with fixed points on the instanton moduli space”, 22 pages, *arXiv:1404.5304*

GRADUATE STUDENTS AND POSTDOCS

- **Hunter Dinkins**, University of North Carolina Graduated: May 2022
Thesis: “Exotic quantum difference equations and integral solutions”
 Currently is an NSF postdoc at MIT.
- **Jeffrey Ayers**, University of North Carolina Expected graduation: Spring 2025
Thesis: “Descendent invariants for $Hilb^n(\mathbb{C}^2)$ ”
- **Nikhil Nagabandi**, University of North Carolina Expected graduation: Spring 2026
Thesis: “Stable envelopes and local systems”
- **Slava Naprienko**, University of North Carolina 2022-2024
UNC postdoc

TEACHING EXPERIENCE

- **Math. 551, Euclidean and Non-Euclidean Geometries**, University of North Carolina Fall 2024
- **Math. 676, Abstract algebra 1**, University of North Carolina Fall 2024
- **Math. 548, Combinatorics**, University of North Carolina Spring 2024
- **Math. 775, Algebraic Geometry**, University of North Carolina Spring 2024
- **Math. 676, Abstract algebra 1**, University of North Carolina Fall 2023
- **Math. 233, Calculus (Honors section)**, University of North Carolina Spring 2023
- **Math. 548, Combinatorics**, University of North Carolina Fall 2022
- **Math. 676, Abstract algebra 1**, University of North Carolina Fall 2022
- **Math. 677, Abstract algebra 2**, University of North Carolina Spring 2022
- **Math. 521, Advanced Analysis**, University of North Carolina Spring 2022
- **Math. 548, Combinatorics**, University of North Carolina Fall 2021
- **Math. 383 Differential equations**, University of North Carolina Summer 2021
- **Math. 521 Advanced Analysis**, University of North Carolina Spring 2021
- **Math. 548, Combinatorics**, University of North Carolina Spring 2021
- **Math 231, Calculus I**, University of North Carolina Fall 2019
- **Math. 233 Multivariable calculus**, University of North Carolina Spring 2019
- **Math. 774 Lie algebras**, University of North Carolina Fall 2018
- **Math. 185 Complex analysis**, UC Berkeley Spring 2018
- **Math 113 Abstract algebra**, UC Berkeley Fall 2017
- **Math 113 Abstract algebra**, UC Berkeley Spring 2017
- **Math. 141 Differential Topology**, UC Berkeley Fall 2016
- **Math. 185 Complex analysis**, UC Berkeley Fall 2016

SUMMER AND MINI SCHOOLS I TAUGHT

- **Contemporary Trends in Integrable Systems**, University of Lisbon, Portugal 1-5 July 2024
Topic: Geometric methods in theory of integrable spin chains
- **Elliptic Integrable Systems, Representation Theory and Hypergeometric Functions**, University of Tokyo, Japan July 26-28, 2023
Topic: Enumerative geometry of quiver varieties
- **Representation theory and flag or quiver varieties**, University of Paris, France June 13-17, 2022
Topic: Vertex functions, stable envelopes and 3D mirror symmetry
- **Mini-course on quantum-difference equations (in zoom)**, ETH, Switzerland April, 2020
Topic: Difference equations and 3D mirror symmetry
- **Mini-course on quiver varieties (in zoom)**, HSE, Moscow March, 2019
Topic: Quiver varieties in mathematical physics

EXTRACURRICULAR ACTIVITIES

- Referee for Math. Journals:
JAMS, Duke, Adv. in Math., Selecta Math., Letter in Math. Phys., PRISM, Annales de l'Institut Fourier, Comm. Math. Phys., Math. Res. Lett.
- Conferences and workshops co-organized:
Mini-Workshop: Three Facets of R-Matrices, Oberwolfach, Germany, 17 October - 23 October 2021, (coorganized with Sachin Gautam (Columbus) Curtis Wendlandt, (Columbus) Masahito Yamazaki, (Kashiwa)

PROFESSIONAL SERVICE WITHIN UNC-CHAPEL HILL

- Member of Algebra Committee 2022 - present
- Coorganizer of mathematics Colloquium and at UNC (2021-2023)
- Coorganizer of "Physically Inspired Mathematics" seminar (2020-Present)
- Member of UNC mathematics graduate committee (2021-2023)
- Chair of algebra postdoc search committee (2022-2023)
- Member of applied search committee (2021-2022)
- Member of more than 10 doctoral committees