
Vasily Dolgushev

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- **Research interests:** Algebraic operads, homotopy algebras and deformation theory; Galois theory; problems motivated by foundational questions of mathematical physics.
- **Past and Present Employment:**
 - July 2017 – present: Professor at the Department of Mathematics, Temple University.
 - July 2019 – June 2020: Vice Chair of the Department of Mathematics, Temple University.
 - July 2010 – June 2017 (tenured in July 2012): Associate Professor at the Department of Mathematics, Temple University.
 - September 2007 – June 2010: Assistant Professor at the Department of Mathematics, the University of California, Riverside.
 - September 2005 – August 2007: Boas Assistant Professor at Mathematics Department of Northwestern University.
 - August 2005: Liftoff Fellow of Clay Mathematics Institute.
- **Education:**
 - Ph.D. in Mathematics, June 2005, *Massachusetts Institute of Technology*.
Title of the thesis:
“**A proof of Tsygan’s formality conjecture for an arbitrary smooth manifold.**”
Thesis advisors: Pavel Etingof and Dmitry Tamarkin
 - Ph.D. in Theoretical Physics, Dec. 2003, *Bogoliubov Laboratory of Theoretical Physics in Joint Institute for Nuclear Research* (Dubna, Russia).
Title of the thesis:
“**Classical and quantum reduction with applications to integrable systems and quantum algebras.**”
Thesis advisors: Alexei Isaev and Simon Lyakhovich
 - M.S., June 2001, *Physical Department, Tomsk State University*, Tomsk, Russia
 - B.S., June 1999, *Physical Department, Tomsk State University*, Tomsk, Russia
- **Software Skills:** Python, Magma, Matlab.

- **Research Support:**

- 2021 **Summer Research Award**, “Puzzles of the Grothendieck-Teichmueller theory.” Temple University.
- 2018-19 **co-Principal investigator**. An NSF grant for the program “Emphasis Year in Noncommutative Geometry” \$ 30,000.00 (The principal investigator is Dmitry Tamarkin, Northwestern University.)
- 2015-18 **Principal investigator**. “Questions on Algebraic Operads and Related Structures.” **NSF Division of Mathematical Sciences grant**. \$166,241.00
- 2017 **co-Principal investigator**. An NSF grant for the conference “Algebra Extravaganza” \$ 24,949.00 (The principal investigator is Chelsea Walton.)
- 2012-16 **Principal investigator**. “Puzzles of homotopy algebras related to deformation theory.” **NSF Division of Mathematical Sciences continuing grant**. \$257,800
- 2009-12 **Principal investigator**. “Higher algebraic structures, Deligne’s conjectures and formality theorems.” **NSF Division of Mathematical Sciences grant**. \$110,000.
- May 2012 **Max-Planck Institute for Mathematics**, Bonn, Germany. 2900 EUR. A research grant to visit the institute during May 2012.
- 2009-10 **Regent’s Faculty Fellowship**. Deligne’s conjectures, formality theorems and deformation quantization. **The UC Riverside, Academic Senate**. \$9,500.

- **Present and Past Graduate Students:**

- Jingfeng Xia (current).
- Elif Altınay-Ozaslan defended her PhD thesis “Deformation quantization over a \mathbb{Z} -graded base” in May of 2017.
- Geoffrey Schneider defended his PhD thesis “Recursively generating formality quasi-isomorphisms with applications to deformation quantization” in April of 2017.
- Brian Paljug defended his PhD thesis “Deformation complexes for algebraic operads and their applications” in April of 2015.

- **Courses taught:**

- **Graduate courses and seminars**

- * Abstract algebra
- * Algebraic geometry
- * Algebraic number theory
- * Algebraic topology
- * Commutative algebra
- * Complex analysis
- * Deformation theory
- * Galois theory

- * Differential geometry and topology
- * Mini-course on child's drawings (dessins d'enfant).
- * Seminar on simplicial homotopy theory
- * Seminar on deformation quantization of symplectic manifolds /jointly with G. Schneider and B. Paljug/
- * Seminar on rational homotopy theory /jointly with A. Hoffnung, M. Lorenz, B. Paljug, Z. Wei/
- * Seminar on algebraic operads and homotopy algebras /jointly with A. Hoffnung, M. Lorenz, B. Paljug, Z. Wei/
- * Mini-course on Drinfeld associators, the Grothendieck-Teichmueller group and multiple zeta values
- * Mini-course on monoidal categories /jointly with M. Lorenz/
- * Seminar on higher operads /jointly with J. Baez and J. Bergner/
- * Seminar on operads /jointly with M. Lorenz/
- * Seminar on the Kashiwara-Vergne problem
- * Seminar on Noncommutative Geometry /jointly with B. Tsygan/
- * Seminar on Mirror Symmetry /jointly with E. Getzler, C.-C. Liu, D. Tamarkin, and B. Tsygan/
- * Seminar on Vertex Algebras and Algebraic Curves /jointly with R. Anno, R. Heluani, V. Kac, and A. Retakh /

– **Undergraduate courses**

- * Basic concepts of mathematics
- * Calculus of several variables
- * Differential calculus of one variable functions
- * Differential equations
- * Integral calculus of one variable functions
- * Introduction to game theory
- * Introduction to rings, fields and Galois theory
- * Introduction to theory of groups
- * Introduction to topology
- * Linear algebra
- * Mathematical aspects of cryptography
- * Senior problem solving

• **Independent studies:**

Summer 2021 Jessica Radford (undergraduate), Advanced group theory II.

Spring 2021 Jessica Radford (undergraduate), Advanced group theory.

Fall 2020 Jingfeng Xia (graduate) Advanced group theory II.

Summer 2020 Jingfeng Xia (graduate) Advanced group theory.

Summer 2020 Jacob Guynee (undergraduate), Advanced group theory II.

Spring 2020 Jacob Guynee (undergraduate), Advanced group theory.

Summer 2019 Aidan Lorenz (undergraduate), GT-shadows and their action on child's drawings.
 Spring 2019 Chelsea Zackey (undergraduate), Graphs on surfaces.
 Spring 2019 Aidan Lorenz (undergraduate), GT-shadows and their action on child's drawings.
 Fall 2018 Aidan Lorenz (undergraduate), GT-shadows and their action on child's drawings.
 Summer 2018 Yeahuay (Joie) Wu and Matthew Wynne (undergraduate), Joan Birman's conjecture on finite type invariants of knots.
 Summer 2018 Aidan Lorenz (undergraduate), GT-shadows and their action on child's drawings.
 Spring 2018 Yeahuay (Joie) Wu (undergraduate), Joan Birman's conjecture on finite type invariants of knots.
 Fall, 2017 Khanh Le (graduate), GT-shadows and their action on child's drawings.
 Fall, 2017 Aidan Lorenz (undergraduate), GT-shadows and their action on child's drawings.
 Summer, 2017 Aidan Lorenz (undergraduate), GT-shadows and their action on child's drawings.
 Spring 2016 Evan Kranzler (undergraduate), Computer experiments related to Kontsevich's graph complex. (*Within the Undergraduate Research Program, College of Science and Technology, Temple University.*)
 Fall 2015 Seth Aaronson, Zachary Cline, Mark Mikida (graduate), A reading course on commutative algebra.
 Summer 2014 Geoffrey Schneider (graduate), Graph complexes, the configuration space integral and the cohomology of spaces of knots.
 Summer 2014 Elif Altinay (graduate), Deformation quantization and algebraic index theorems.
 Spring 2014 Elif Altinay and Geoffrey Schneider (graduate), Deformation quantization and algebraic index theorems.
 Summer 2013 Geoffrey Schneider (graduate), Algebraic operads and homotopy algebras.
 Summer 2013 Brian Paljug (graduate), Topics in differential topology, (following R. Bott and L. Tu *Differential Forms in Algebraic Topology.*)
 Spring 2013 Naeyong Kong and Brian Paljug (graduate), Mathematical methods of classical mechanics.
 Summer 2012 Seth Baldwin (graduate), Algebraic operads and homotopy algebras.
 Summer 2011 Brian Paljug (graduate), Algebraic operads and homotopy algebras.
 Fall 2009 Christopher Rogers (graduate), Formality theorems and the Kashiwara-Vergne conjecture.
 Fall 2009 Jeremy Westfahl (undergraduate), Methods of homological algebra.
 August 2008 Sean Ewing (graduate), Homological algebra of operads (within the Alliance for Graduate Education and the Professoriate).
 Spring 2005 PoNing Chen (undergraduate), Algebraic versus analytic index theorems (within the Undergraduate Research Opportunities Program).
 July 2004 PoNing Chen (undergraduate), Algebraic index theorems (within the Summer Program for Undergraduate Research).
 July 2004 Olga Strojilova (undergraduate), The transfer map for Hochschild homology of the twisted group algebra (within the Summer Program for Undergraduate Research).

July 2003 PoNing Chen (undergraduate), Differential graded Lie algebra of Drinfeld (within the Summer Program for Undergraduate Research).

July 2003 Teal Guidici (undergraduate), Traces of rational Cherednik algebras (within the Summer Program for Undergraduate Research).

- **Service**

- **Editorial work:** Editor for Tbilisi Mathematical Journal (since 2011)
- **Peer-review:** Reviewer for the AMS Mathematical Reviews since 2015. Referee for the following scholarly journals:
 - * Advances in Applied Mathematics
 - * Advances in Mathematics
 - * Algebraic and Geometric Topology
 - * Analysis and Mathematical Physics
 - * Communication in Mathematical Physics
 - * Differential Geometry and its Applications
 - * Duke Mathematical Journal
 - * Homology, Homotopy and Applications
 - * International Mathematics Research Notices
 - * Inventiones Mathematicae
 - * Journal of Algebra
 - * Journal fuer die reine und angewandte Mathematik (Crelle’s Journal)
 - * Journal of the American Mathematical Society
 - * Journal of Elasticity
 - * Journal of Homotopy and Related Structures
 - * Journal of Mathematical Physics
 - * Journal of Noncommutative Geometry
 - * Journal of Pure and Applied Algebra
 - * Letters in Mathematical Physics
 - * Mathematical Research Letters
 - * Proceedings of the American Mathematical Society
 - * Proceedings of the London Mathematical Society
 - * Selecta Mathematica
 - * Symmetry, Integrability and Geometry: Methods and Applications (SIGMA)
 - * Theory and Applications of Categories
 - * Transactions of the AMS
- **Conferences, workshops, and AMS sessions organized:**
 - * Organizing the conference in honor of Boris Tsygan “Modern Trends in Non-commutative Geometry”. (jointly with Ryszard Nest and Dmitry Tamarkin). The conference will take place at Northwestern University, May 27-31, 2019.
 - * Organizing the conference in honor of Ellen Kirkman and Martin Lorenz “Kirkman & Lorenz: Algebra Extravaganza!” (jointly with Ed Letzter, Frank Moore, James Zhang, and Chelsea Walton). The conference will take place at Temple University, July 24-28, 2017.

- * Serving on the scientific committee of the Gone Fishing 2016 (Poisson Conference), University of Colorado at Boulder, March 10-13, 2016.
 - * Organizing the mini-conference “Higher Structures in Philadelphia” (jointly with Christopher L. Rogers and Chenchang Zhu) at Temple, August 2014.
 - * Organizing the special session “Higher Structures in Algebra, Geometry and Physics” (jointly with Jonathan Block and Tony Pantev) within the AMS meeting at Temple, October 2013.
 - * Organizing the third meeting of the annual “Gone Fishing” event on Poisson Geometry (jointly with Rui Loja Fernandes and Eugene Lerman) at Temple, September 2013.
 - * Organizing the special session on noncommutative geometry (jointly with Wee Liang Gan) within the AMS meeting in Riverside, Nov 2009
- Service on NSF panels in 2010, 2014, 2015, 2016.
 - Review service for foreign grant agencies in 2013 and 2015.
 - Review service for NSA and NSF in 2011 and 2013.
 - The Temple liaison for the William Lowell Putnam Mathematical Competition since 2011.
 - Service on the panel of the Yau High School Mathematics Awards, Fall 2009
 - Training undergraduate students of UC Riverside for participation in the William Lowell Putnam Mathematical Competition, Fall 2009, Spring 2009
 - Training undergraduate students of Northwestern University for participation in the William Lowell Putnam Mathematical Competition, Fall 2005
 - Teacher at Summer Physical Mathematical School of Tomsk State University, Tomsk, Russia, August, 2000
 - Training students of Tomsk Polytechnic University for participation in Regional Mathematical Competition, Tomsk, Russia, Spring, 2000 and Spring, 1999
 - Proof-reading the monograph “Methods of Mathematical Physics” by V.G. Bagrov, V.V. Belov, V.N. Zadorozhny and A. Yu. Trifonov, January-March, 2000
 - **Department service:**
 - * Vice chair. 2019-20.
 - * Merit committee. 2019-present.
 - * Hiring committee. 2019-2020.
 - * Hiring committee. 2014-2015.
 - * Hiring committee. 2013-2014.
 - * Chair of the hiring committee. Spring 2013.
 - * Hiring committee on postdoctoral assistant professors. Spring 2012.
 - * Colloquium committee. 2011-2015.
 - * Graduate committee. 2011-2016.
 - * Grosswald lectures committee. 2011-2015.
 - * Library liaison. 2010-2012.
 - * Personnel committee. 2012-14, 2017-2020, 2021-present.
 - * Executive committee. 2013, 2018-2021.

* Undergraduate committee. 2015-2017.

- **Memberships:** American Mathematical Society. 2010-19, 2021-present.
- **Short term visits:**
 - Northwestern University, Evanston, IL, August, 2019.
 - Korea Institute for Advanced Study (KIAS), Seoul, South Korea, July 29 – August 4, 2019.
 - Northwestern University, Evanston, IL, July 18-August 18, 2018.
 - Northwestern University, Evanston, IL, August 2017.
 - University of Geneva, October 20-23, 2016.
 - Northwestern University, Evanston, IL and Washington University in St. Louis, St. Louis, MO, July-August 2016.
 - Weizmann Institute of Science, Rehovot, Israel, June 13-28, 2016.
 - Max Planck Institute for Mathematics, Bonn, Germany, March 16-22, 2016.
 - University of Pennsylvania, the spring semester of 2016. *University Sabbatical*.
 - Northwestern University, Evanston, IL, June 2015.
 - Northwestern University, Evanston, IL and Washington University in St. Louis, St. Louis, MO, July, 2014.
 - Northwestern University, Evanston, IL, USA, June, 2013.
 - Isaac Newton Institute for Mathematical Sciences, Cambridge, United Kingdom, April 2013.
 - Mathematical Sciences Research Institute (MSRI), Berkeley, CA, January, 2013.
 - Northwestern University, Evanston, IL, USA, June, 2012.
 - Northwestern University and the University of Chicago, Chicago, IL, USA, May, 2011.
 - The University of Chicago, December 2009.
 - Northwestern University and the University of Chicago, Chicago, IL, USA, June-August, 2009.
 - Northwestern University, Evanston, IL, USA, December, 2008.
 - Northwestern University, Evanston, IL, USA, July, 2008.
 - Northwestern University, Evanston, IL, USA, March, 2008.
 - Forschungsinstitut für Mathematik at ETH Zürich, Switzerland, Sept.-Dec., 2006.
 - Northwestern University, Evanston, IL, USA, June, 2005.
 - Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette, France, May 2005.
 - Northwestern University, Evanston, IL, USA, January, 2005.
 - IRMA, Strasbourg, France, May-June, 2004.
 - Northwestern University, Evanston, IL, USA, March, 2003.
 - Bogoliubov Laboratory of Theoretical Physics in Joint Institute for Nuclear Research, Dubna, Moscow region, Russia, January - May 2001.
 - Tamm Theory Division of Lebedev Physical Institute of Russian Academy of Sciences, Moscow, Russia, September - December 2000.

- **Academic achievements:**

- Noted by *Advances in Mathematics* as having one of the top 10 most cited articles in that journal during the period 2005-10.
- The Rogers family award prize to a mentor of the first-place team of the 2004 Summer Program in Undergraduate Research of the Department of Mathematics, M.I.T., July 2004.
- The Rogers family award prize to a mentor of the first-place team of the 2003 Summer Program in Undergraduate Research of the Department of Mathematics, M.I.T., July 2003.
- Charles W. and Jennifer C. Johnson prize for outstanding research paper among graduate students of the Department of Mathematics, M.I.T., May 2003.
- Honors Master diploma in Physics, June 5, 2001.
- Russian President Scholar, Fall 2000 and Spring 2001.
- Russian Government Scholar, Spring 2000.
- Honors Bachelor diploma in Physics, June 29, 1999.
- The third in Russian Student Mathematical Competition, (about 100 students from all over Russia) February 3, 1999.
- Honorary Diploma for substantial contribution to development of Tomsk State University in connection with the 120-th anniversary of Tomsk State University, September 9, 1998.
- Soros Student in 1998.
- The first in Regional Student Mathematical Competition, Spring, 1998.
- The first in Regional Student Competition in Physics, Spring, 1998.
- The first in Regional Student Competition in Physics, April 23, 1997.
- The second in Regional Student Mathematical Competition, April 6, 1997.
- The first in Regional Student Competition in Physics, April 13, 1996.

- **Seminar/Colloquium Talks (Last 6 years)**

- *GT-shadows and their action on Grothendieck's child's drawings*, Seminar on Deformation Quantization, Institute of Mathematics, Julius Maximilian University Wuerzburg, April 2021.
- *GT-shadows and their action on child's drawings*, Topology Seminar, KIAS, South Korea, July 31, 2019.
- Two lectures on *Operads, graph complexes and grt*, Geometry and Physics Seminar, Penn State, April 2019.
- *Grothendieck-Teichmueller shadows and their action on child's drawings*, Geometry and Topology Seminar, Temple University, November 2018.
- *GT-shadows and their action on child's drawings*, Geometry/Physics Seminar, Northwestern University, August 2018.
- *Towards deformation quantization over a \mathbb{Z} -graded base*, Deformation Theory Seminar, University of Pennsylvania, June 2017.

- *Kontsevich’s formality quasi-isomorphism is “demystified”*, Geometry and Physics Seminar, Penn State, April 2017.
- *The Intricate Maze of Graph Complexes*, Rutgers Algebra Seminar, November 2016.
- *Kontsevich’s formality quasi-isomorphism is “demystified”*, Seminar “Groupes de Lie et espaces des modules”, University of Geneva, October 2016.
- *The Intricate Maze of Graph Complexes*, Valley Geometry Seminar, (the five-college seminar in Amherst, MA), September 2016.
- *Kontsevich’s formality quasi-isomorphism is “demystified”*, Deformation Theory Seminar, University of Pennsylvania, June 2016.
- *The Intricate Maze of Graph Complexes*, Infinite Dimensional Algebra Seminar, MIT, April 2016.
- *A manifestation of the Grothendieck-Teichmüller group in geometry*, Number Theory and Algebraic Geometry Seminar, Boston College, April 2016.
- *Kontsevich’s formality quasi-isomorphism is “demystified”*, Geometry and Physics Seminar, Boston University, April 2016.
- *The Intricate Maze of Graph Complexes*, Algebra-Geometry Seminar, Tufts University, April 2016.
- *The Intricate Maze of Graph Complexes*, Special Seminar, Northwestern University, April 2016.
- *The Intricate Maze of Graph Complexes*, Topology Seminar, Purdue University, March 2016.
- *The Intricate Maze of Graph Complexes*, Topology Seminar, University of Notre Dame, March 2016.
- *The Intricate Maze of Graph Complexes*, Symplectic and Poisson Geometry Seminar, University of Illinois at Urbana-Champaign, March 2016.
- *A manifestation of the Grothendieck-Teichmüller group in geometry*, Algebra and Combinatorics Seminar, Loyola University, Chicago, March 2016.
- *The Intricate Maze of Graph Complexes*, Deformation Theory Seminar, University of Pennsylvania, March 2016.
- *The operadic definition of the Grothendieck-Teichmüller group GT*, Galois Seminar, University of Pennsylvania, March 2016.
- *What do homotopy algebras form?*, Deformation Theory Seminar, University of Pennsylvania, March 2015.
- *The Goldman-Millson Theorem revisited*, Deformation Theory Seminar, University of Pennsylvania, March 2015.

- **Conference Talks (Last 6 years)**

- *GT-shadows and their action on Grothendieck’s child’s drawings*, Virtual Conference “Koszul duality and Operads”, CIRM, Luminy, France and MPI MiS Leipzig, Germany, October, 19-23, 2020 (plenary address)

- *What Drinfeld could have replied to Deligne*, Higher Structures 2, A conference honoring Murray Gerstenhaber and Jim Stasheff, University of Pennsylvania, Philadelphia, PA, March 5-8, 2018 (plenary address)
- *A Recursive construction of formality quasi-isomorphisms for algebraic operads*, Geometry and Physics, Penn State University, State College, PA, July 31 – August 4, 2017 (plenary address)
- *Kontsevich’s formality quasi-isomorphism is “demystified”*, Cyclic Homology, Banach Center Conferences, Warsaw, Poland, October 17-21, 2016 (plenary address)
- *The Intricate Maze of Graph Complexes*, Closing Conference for the Program on Higher Structures in Geometry and Physics, MPIM, Bonn, Germany, March 18-22, 2016 (plenary address)
- *The Goldman-Millson theorem revisited*, AMS Sectional Meeting, Loyola University Chicago, October, 2015