

CURRICULUM VITAE

Employment:

2020 - present Associate Professor, **MIT**
2015 - 2020 Assistant Professor, **MIT**

Education:

2012 - 2015 PhD in Mathematics, **Columbia University**
Thesis: *Quantum Algebras and Cyclic Quiver Varieties*
2009 - 2012 MA in Mathematics, **Harvard University**
2004 - 2008 BA in Mathematics, **Princeton University** (with Highest Honors)
Thesis: *Laumon Quasiflag Spaces and Many-Body Systems*

Visits and other Appointments:

Jan - May 2018 Research Member at MSRI, Berkeley, USA
May - Jun 2016 Visitor at the Institut Henri Poincaré, Paris, France
Mar - Aug 2014 Visitor at RIMS, Kyoto, Japan
Sep - Dec 2010 Visitor at the Hebrew University in Jerusalem, Israel
Feb - Apr 2009 Visitor at the Max Planck Institute, Bonn, Germany
Oct - Dec 2008 Visitor at the IHÉS, Bures-sur-Yvette, France

Publications:

The cohomology of the Quot scheme on a smooth curve as a Yangian representation
(with A. Marian), arXiv:2307.13671

Quantum loop groups and K-theoretic stable envelopes
arXiv:2303.12041

Reduced quiver quantum toroidal algebras
arXiv:2301.00703

Quantum loop groups for arbitrary quivers
arXiv:2209.09089

An integral form of quantum toroidal \mathfrak{gl}_1
arXiv:2209.04852

Quantum loop groups for symmetric Cartan matrices
arXiv:2207.05504

Shuffle algebras for quivers as quantum groups
(with F. Sala and O. Schiffmann), arXiv:2111.00249

Quantum loop groups and shuffle algebras via Lyndon words
(with A. Tsybaliuk), arXiv:2102.11269

A tale of two shuffle algebras, arXiv:1908.08395

The Trace of the affine Hecke category (with E. Gorsky)
Proceedings of the London Mathematical Society (2023)

Computing the R-matrix of the quantum toroidal algebra
(with A. Garbali), **Journal of Mathematical Physics** (2023)

Shuffle algebras for quivers and wheel conditions
Journal für die Reine und Angewandte Mathematik (2022)

Hecke correspondences for smooth moduli spaces of sheaves
Publications Mathématiques de l'IHÉS (2022)

W-algebras associated to surfaces
Proceedings of the London Mathematical Society (2022)

Affine Laumon spaces and a conjecture of Kuznetsov
Annales Scientifiques de l'École Normale Supérieure (2022)

The PBW basis of $U_{q,\bar{q}}(\mathfrak{gl}_n)$
Transformation Groups (2022)

AGT relations for sheaves on surfaces
Geometry and Topology (2022)

Shuffle algebras for quivers and R-matrices
Journal of the Institute of Mathematics of Jussieu (2022)

Deformed W-algebras in type A for rectangular nilpotent
Communications in Mathematical Physics (2022)

The R-matrix of the quantum toroidal algebra
Kyoto Journal of Mathematics (2022)

The universal sheaf as an operator

Mathematical Research Letters (2021)

Motivic decompositions for the Hilbert scheme of points of a K3 surface

(with G. Oberdieck and Q. Yin)

Journal für die Reine und Angewandte Mathematik (2021)

Flag Hilbert schemes, colored projectors and Khovanov-Rozansky homology

(with E. Gorsky and J. Rasmussen), **Advances in Mathematics** (2021)

Toward AGT for parabolic sheaves

International Mathematics Research Notices (2020)

The Chow of $S^{[n]}$ and the universal subscheme

**Bulletin mathématique de la Société des
Sciences Mathématiques de Roumanie** (2020)

Quantum toroidal and shuffle algebras

Advances in Mathematics (2020)

Lehn's formula in Chow and conjectures of Beauville and Voisin (with D. Maulik),

Journal of the Institute of Mathematics of Jussieu (2020)

Chapter in "Geometric Representation Theory and Gauge Theory"

Lecture Notes in Mathematics 2248 (2019)

Shuffle algebras associated to surfaces

Selecta Mathematica (2019)

The q -AGT- W relations via shuffle algebras

Communications in Mathematical Physics (2018)

Infinitesimal change of stable basis

(with E. Gorsky) **Selecta Mathematica** (2017)

Exts and the AGT relations

Letters in Mathematical Physics (2016)

Refined knot invariants and Hilbert schemes (with E. Gorsky)

Journal de Mathématiques Pures et Appliquées (2015)

The $\frac{m}{n}$ Pieri Rule

International Mathematics Research Notices (2015)

Moduli of Flags of Sheaves and their K -theory

Algebraic Geometry (2015)

The Shuffle Algebra Revisited

International Mathematics Research Notices (2013)

Holder properties of perturbed skew products and Fubini regained
(with Yu. Ilyashenko), **Nonlinearity** (2012)

Affine Laumon spaces and integrable systems
arXiv:1112.1756

Yangians and Cohomology Rings of Laumon Spaces
(with B. Feigin, M. Finkelberg, L. Rybnikov), **Selecta Mathematica** (2011)

Invisible Parts of Attractors
(with Yu. Ilyashenko), **Nonlinearity** (2010)

Laumon Spaces and the Calogero-Sutherland Integrable System
Inventiones Mathematicae (2009)

Problems for the Mathematical Olympiads
(Book, 158 pages), GIL Publishing House, Romania (2005)

Conferences Co-organized:

Summer School in Geometric Representation Theory
MIT, Cambridge, June 19–23, 2023

Summer School in Geometric Representation Theory
MIT, Cambridge, June 13–17, 2022

Summer School on Enumerative Geometry, Physics and Representation Theory,
IHÉS, Bures-sur-Yvette, July 5–16, 2021

Categorical Braid Group Actions and Categorical Representation Theory,
University of Massachusetts, Amherst, June 14–18, 2021

Quantum Groups, Categorification, Knot Invariants, and Soergel Bimodules,
University of Oregon, August 10–14, 2020

Workshop on Soergel Bimodules and Categorification of the Braid Group,
ICERM, Providence, February 28 - March 1, 2020

Hilbert Schemes, Categorification and Combinatorics,
University of California, Davis, June 19–23, 2019

Categorified Hecke Algebras, Link Homology, and Hilbert Schemes,
American Institute of Mathematics, October 1–5, 2018

Categorification in Mathematical Physics,
Simons Center for Geometry and Physics, April 9–13, 2018

Seminars Co-organized:

Infinite Dimensional Algebra Seminar, MIT, 2021-present
Geometric Representation Theory Seminar, MIT, 2016-2020
Moduli and Representation Theory seminar, MSRI, Spring 2018
MIT-Northeastern joint Graduate Student Seminars, 2016-2017

Grants and Awards:

MIT Charles E. Reed Faculty Initiatives Award, 2020
Class of 1947 Career Development Faculty Chair at MIT, 2019-2022
NSF CAREER Award no. 1845034, 2019-2024
Alfred P. Sloan Research Fellowship 2018-2020
NSF (FRG) Department of Mathematical Sciences Award no. 1760264, 2018-2021
NSF Department of Mathematical Sciences Award no. 1600375, 2016-2019

Graduate Students:

Yu Zhao (MIT, PhD 2021)

Teaching Experience:

Spring 2023	Math 18.702 (algebra II) at MIT
Fall 2022	Math 18.821 (project laboratory in mathematics) at MIT
Spring 2022	Math 18.821 (project laboratory in mathematics) at MIT
Spring 2021	Math 18.06 (linear algebra) at MIT
Fall 2020	Math 18.821 (project laboratory in mathematics) at MIT
Spring 2020	Math 18.727 (topics in algebraic geometry) at MIT
Fall 2019	Math 18.06 (linear algebra) at MIT
Spring 2019	Math 18.S996 (algebraic knot invariants) at MIT
Fall 2017	Math 18.03 (differential equations, course head) at MIT

Spring 2017	Math 18.781 (number theory) at MIT
Fall 2016	Math 18.705 (commutative algebra) at MIT
Spring 2016	Math 18.702 (algebra II) at MIT
Fall 2015	Math 18.02 (multivariable calculus and linear algebra) at MIT
Fall 2013	Math W1003 (introductory college algebra and pre-calculus) at Columbia University - 2 sections
Fall and Spring 2011	Math 1b (calculus, series and differential equations) at Harvard University