Curriculum Vitae of You Qi

CONTACT INFORMATION

Department of Mathematics, University of Virginia
141 Cabell Drive, Kerchof Hall
Charlottesville, VA 22904, USA
Webpage: `https://you-qi2121.github.io/mypage/`

Tel: +1(434)924-4936

Email: yq2dw@virginia.edu

RESEARCH INTERESTS

Categorification, representation theory, algebraic geometry, homological algebra, applications to low dimensional topology.

CURRENT POSITION

Assistant Professor, University of Virginia.
August 2019 – present.

PAST EMPLOYMENT

Sherman Fairchild Research Assistant Professor, California Institute of Technology.
July 2017 – August 2019.

Gibbs Assistant Professor, Yale University.
July 2014 – June 2017.

Morrey Visiting Assistant Professor, University of California, Berkeley.
July 2013 – June 2014.

EDUCATION

Columbia University, New York, USA

PhD in Mathematics, Sept 2008 – May 2013.

- Advisor: Mikhail Khovanov
- Thesis: "Hopfological algebra"

Hong Kong University of Science and Technology, Clear Water Bay, Hong Kong

MPhil. in Mathematics, Sept 2006 - July 2008.

- Advisor: Guowu Meng
- Thesis: "An Algebraic Proof of a Quadratic Relation in MICZ-Kepler Problem"

Tsinghua University, Beijing, P. R. China

BS., Academic Talent Program, Sept 2002 – July 2006.

PUBLICATIONS AND ACCEPTED PAPERS

[1] Hopfological algebra, *Compositio Mathematica* **150**(01): 1–45, 2014. arXiv:1205.1814.
[2] An approach to categorification of some small quantum groups, joint with Mikhail Khovanov, *Quantum Topology* **6**(2): 185–311, 2015. arXiv:1208.0616.
[3] An approach to categorification of some small quantum groups II, joint with Ben Elias, *Advances in Mathematics* **288**: 81–151, 2016. arXiv:1302.5478.
[4] A categorification of the Burau representation at a prime root of unity, joint with Joshua Sussan, *Selecta Mathematica* **22**(3): 1157–1193, 2016. arXiv:1312.7692.
[5] A categorification of quantum sl(2) at prime roots of unity, joint with Ben Elias, *Advances in Mathematics* **299**: 863–930, 2016. arXiv:1503.05114.
[6] The differential graded odd nilHecke algebra, joint with Alexander P. Ellis, *Communications in Mathematical Physics*, **344**(1): 275–331, 2016. arXiv:1504.01712.

[7] Categorification at prime roots of unity and hopfological finiteness, joint with Joshua Sussan, *Categorification and Higher Representation Theory, AMS Contemporary Mathematics*, **683**: 261–286, 2017. arXiv:1509.00438.

[8] The center of small quantum groups I: the principal block in type A, joint with Anna Lachowska, *International Mathematics Research Notices IMRN*, **2018**(20): 6349–6405, 2018. arXiv:1604.07380.

[9] A categorification of a quantum Frobenius map, *Journal of the Institute of Mathematics of Jussieu*, 2017, DOI:10.1017/S1474748017000275. arXiv:1607.02117.

[10] The center of small quantum groups II: singular blocks, joint with Anna Lachowska, the *Proceedings of the London Mathematical Society*, **118**(3):513–544, 2019. arXiv:1703.02457.

[11] Morphism spaces in stable categories of Frobenius algebras, *Communications in Algebra*, **47**(8): 3239–3249, 2019. arXiv:1801.07838.

[12] A faithful braid group action on the stable category of tricomplexes, joint with Mikhail Khovanov, *SIGMA* **16** (2020), 019, 32 pages, arXiv:1911.02503.

[13] Evaluating thin flat surfaces, joint with Mikhail Khovanov and Lev Rozansky, *Communications in Mathematical Physics*, **385**:1835–1870, 2021. arXiv:2009.01384.

[14] Remarks on the derived center of small quantum groups, joint with Anna Lachowska, *Selecta Mathematica*, 27, Article Number 68, 40 pages, 2021. arXiv:1912.08783.

[15] A categorification of cyclotomic integers, joint with Robert Laugwitz, *Quantum Topology*, Volume 15, Number 3, pp. 539–577, 2022. arXiv:1804.01478.

[16] A braid group action on a p-DG homotopy category, joint with Joshua Sussan and Yasuyoshi Yonezawa, *Journal of Algebra*, **598**, 15 May 2022, pp 470–517. arXiv:2012.15181.

[17] On some p-differential graded link homologies, joint with Joshua Sussan, *Forum of Mathematics, Pi*, 10, E26. DOI:10.1017/fmp.2022.19, 2022. arXiv:2009.06498.

[18] On some p-differential graded link homologies II, joint with Joshua Sussan, *Algebraic and Geometric Topology*, Volume 23, Number 7, pp. 3357–3394, 2023. arXiv:2108. 10722.

[19] Actions of sl(2) on algebras appearing in categorification, joint with Ben Elias, *Quantum Topology*, Volume 14, Number 4, pp. 733–806, 2023. arXiv:2103.00048.

[20] A Rickard equivalence for hopfological homotopy categories, *Journal of Pure and Applied Algebra*, Volume 227, Issue 5, May 2023, Article Number 107252. arXiv:2204.14220.

[21] Categorifying Hecke algebras at prime roots of unity, part I, joint with Ben Elias, *Transactions of the AMS* ,Volume 376, pp. 7691–7742 DOI:10.1090/tran/8908, 2023. arXiv:2005.03128.

[22] p-DG cyclotomic nilHecke algebras, joint with Mikhail Khovanov and Joshua Sussan, *Memoirs of the AMS*, Memoirs of the American Mathematical Society, Volume 293, Number 1462, 2024. arXiv:1711.07159.

[23] p-DG cyclotomic nilHecke algebras II, joint with Joshua Sussan, *Memoirs of the AMS*, Memoirs of the American Mathematical Society, Volume 293, Number 1463, 2024. arXiv:1811.04372.

[24] Symmetries of $gl(N)$-foams, joint with Louis-Hadrien Robert, Joshua Sussan and Emmanuel Wagner, *Quantum Topology*, DOI:10.4171/QT/215, 2024. arXiv:2212.10106.

[25] A braid group action on an A-infinity category for zigzag algebras, joint with Benjamin Cooper, Joshua Sussan, accepted by *AMS Contemporary Mathematics*, 2024. arXiv:2305.02824.

Book Chapters

[1] Connections to Link Invariants, joint with Johannes Flake, (2020). In *Introduction to Soergel bimodules*, edited by Ben Elias, Shotaro Makisumi, Ulrich Thiel and Geordie Williamson. RSME Springer Series **5**:421–440, Springer, Cham.

Preprints

[1] A categorification of the colored Jones polynomial at a root of unity, joint with Louis-Hadrien Robert, Joshua Sussan and Emmanuel Wagner, 2021, arXiv:2111.13195.

[2] Symmetries of equivariant Khovanov-Rozansky homology, joint with Louis-Hadrien Robert, Joshua Sussan and Emmanuel Wagner, 2023, arXiv:2306.10729.

Projects in Progress

[1] A categorification of the colored Jones polynomial at a root of unity, part II, joint with Louis-Hadrien Robert, Joshua Sussan and Emmanuel Wagner, in preparation.

[2] A categorification of type-A Hecke algebra at prime roots of unity, part II, joint with Ben Elias and Peter McNamara, in preparation.

[3] Hopfological algebra and algebraic K-theory, in preparation.

Awards and Grants

- Collaboration Grants for Mathematicians, Simons Foundation, PI, 2022–2028.
- NSF Conference Grant "Southeastern Lie Theory Workshop Series", DMS-2303977, 2023-2025.
- Collaboration Grants for Mathematicians, Simons Foundation, 2022–2028.
- NSF Conference Grant "Categorical Methods in Representation Theory and Quantum Topology", DMS–2204700, 2022–2023.
- NSF Research Grant "Categorification at Roots of Unity," DMS-1763328, 2017–2021.
- Carl B. Boyer Memorial Fellowship, Columbia University, 2012–2013.

Invited Presentations

(1) A talk "A categorification of the colored Jones polynomial at a root of unity", 7th Taipei Conference in Representation Theory, Taipei, Taiwan, Dec 2023

(2) A talk "A categorification of the colored Jones polynomial at a root of unity", Conference on Hecke Algebras as a Unifying Theme, University of British Columbia, Canada, May 2023

(3) A talk "Hopfological algebra of dual zigzag algebras" at Informal Categorification Seminar, Columbia University, New York, NY, Mar 2023

(4) A talk on categorification of the colored Jones polynomial, conference on 'Quanntum groups, Categorification, Knot invariants, and Soergel Bimodules II'", University of Oregon, Eugene, OR, Aug., 2022.

(5) A talk on categorification of the colored Jones polynomial, conference on "Braids in Representation Theory and Algebraic Combinatorics", ICERM, Providence, Feb., 2022.

(6) A mini-course on categorification at prime roots of unity, QUACKS conference, lecture videos and notes available online at `https://pages.uoregon.edu/belias/QUACKS/index.html`. Aug., 2020.

(7) A talk on tensor product categorification at prime roots of unity, Columbia Symplectic Geometry, Gauge Theory, and Categorification Seminar, New York, September 2019.

(8) A 4-lecture series on categorification at prime roots of unity, workshop on quiver Hecke algebra and its applications to topology, Nagoya, Japan, July 2019.

(9) An invited 45-minute address on categorification at prime roots of unity, the 8th International Congress of Chinese Mathematicians, Beijing, China, June 2019.

(10) Two lectures on categorification at prime roots of unity, Summer School and Workshop on Categorification of Quantum 3-Manifold Invariants, University of Southern California, Jul., 2018.

(11) A talk on categorification of cyclotomic rings, Categorification and Higher Representation Theory Conference, Mittag-Leffler Institute, Stockholm, Sweden, Jul., 2018.

(12) A talk on the center of small quantum groups, Colloquium, CUNY Medgar Evers College, May, 2018.

(13) A talk on the center of small quantum groups, Lie Theory Seminar, UC Riverside, Apr., 2018.

(14) A talk on the center of small quantum groups, Winter Young Algebraic Geometer Workshop, Southern University of Science and Technology, Shenzhen, Dec., 2017.

(15) A talk on categorification at prime roots of unity at Guanghua Forum, Fudan University, Shanghai, Dec., 2017.

(16) A talk on the center of small quantum groups, Special Session on Recent Advancements in Representation Theory, AMS Sectional Meeting at the State University of New York at Buffalo, Sep. 2017.

(17) A talk on categorification at prime roots of unity, Lie Groups and Quantum Math Seminar, Rutgers University, New Brunswick, Mar., 2017.

(18) A colloquium talk on categorification at prime roots of unity, University of California, Santa Cruz, Feb. 2017.

(19) A colloquium talk on categorification at prime roots of unity, Hong Kong University of Science and Technology, Jan., 2017.

(20) A talk on Categorification at prime roots of unity, Hausdorff Institute, University of Bonn, Dec., 2016

(21) A talk on the center of small quantum groups, Algebra Seminar, University of Virginia, Sep., 2016.

(22) A talk on the center of small quantum groups, Geometric Methods in Representation Theory Seminar, University of North Carolina, Chapel Hill, Sep., 2016.

(23) Three lectures on categorification at prime roots of unity, Workshop: Categorification, Mathematical Institute, University of Bonn, Germany, May, 2016.

(24) A talk on categorification of small quantum sl(2), Informal Mathematical Physics Semniar, Columbia, Apr., 2016.

(25) A talk on the center of small quantum groups, Yau Mathematical Sciences Center, Tsinghua University, Sanya, China, Mar., 2016.

(26) Two talks on categorification at prime roots of unity, Kyoto University and RIMS, Kyoto, Japan, Feb., 2016.

(27) A talk on categorification at prime roots of unity, a conference on "Geometric and Categorical Representation Theory," Mooloolaba, Australia, Dec., 2015.

(28) Five lectures on categorification at prime roots of unity, IMPJ, Paris, France, Nov., 2015.

(29) A talk on categorification of small quantum groups, Colloquium, CUNY Medgar Evers College, Oct., 2015.

(30) A talk on "A New Year's Resolution", Joint Meeting of AMS-EMS-SPM, Porto, Portugal, Jun., 2015.

(31) A talk on categorification of small quantum groups given at the algebra seminar at University of Oregon, Mar., 2015.

(32) A talk on "A New Year's Resolution," Spring Eastern AMS Sectional Meeting at Georgetown University, Mar., 2015.

(33) A talk on categorification of small quantum groups given at the representation theory seminar at CUNY graduate center, Sep., 2014.

(34) A talk on categorification of small quantum groups given at the CBMS conference at North Carolina State University, Jul., 2014.

(35) A talk on categorification of small quantum sl(2) given at CRM (Canada), a workshop on "Categorification and geometric representation theory," Jun., 2014.

(36) A talk on categorification of small quantum groups given at HKUST (Hong Kong), Mar., 2014.

(37) A talk on categorification of small quantum groups given at UC Davis, Mar., 2014.

(38) A talk on categorification of small quantum groups in the workshop "Lie Theory Workshop on Quantum Groups," Stanford, Feb, 2014.

(39) A talk on categorification of small quantum groups in the conference "Hecke algebras in number theory and categorification," Columbia, May, 2013.

(40) A talk on categorification of small quantum groups, MIT, Oct., 2012.

(41) A talk on categorification of small quantum groups, Yale, Sep., 2012.

(42) Two talks on categorification of small quantum groups, USC, Sep., 2012.

(43) Three lectures on Khovanov homology, Chern Institute, Nankai, China, Jun., 2012.

Teaching Experience

University of Virginia

- Math 4993 Independent Study (Directed Reading Program), Spring 2024
- Math 3354 Survey of Algebra, Spring 2024
- Math 4651, Advanced Linear Algebra, Spring 2024
- Math 4993 Independent Study (Directed Reading Program), Fall 2023
- Math 7751, (Graduate) Algebra I, Fall 2023
- Math 2310, Calculus III, Fall 2022 (course coordinator)
- Math 3354, Survey of Algebra, Fall 2022
- Math 8710, Lie Algebras, Spring 2022
- Math 2310, Calculus III, Spring 2022
- Math 8559, Introdcution to Categorification, Spring 2021
- Math 8710, Lie Algebras, Fall 2020
- Math 2310, Calculus III, Spring (course coordinator)
- Math 4651, Advanced Linear Algebra, Fall 2019

California Institute of Technology

- Math 151b Algebraic and Differential Topology, Winter 2019
- Math 128 Homological Algebra, Winter 2019
- Math 151b Algebraic and Differential Topology, Winter 2018
- Math 191a Introduction to Categorification, Fall 2017

Yale University

- Math 560, Geometric Representation Theory, Spring 2017.
- Math 235, Relfection Groups, Spring 2017.
- Advisor of Andrew Salmon on his undergraduate senior thesis *Topics in Lie Theory*. Summer 2017.
- Math 225 Linear Algebra and Matrix Theory, Fall, 2016.
- Advisor of Alexandros Mousatov on his undergraduate senior thesis *An Introduction to Quantum Invariants*. Fall 2015–Spring 2016.
- Math 225 Linear Algebra and Matrix Theory, Spring, 2016.
- Math 381/501, Modern Algebra II, Spring, 2016.
- Math 225, Linear Algebra and Matrix Theory, Spring, 2016.
- Math 650, Introduction to Categorification, Fall, 2015.
- Math 120, Multivariable Calculus, Spring, 2015.
- Math 225, Linear Algebra and Matrix Theory, Fall, 2014.

University of California, Berkeley

- Math 185, Introduction to Complex Analysis, Spring, 2014.
- Math H1b, Honors Calculus, Fall, 2013.
- Math 113, Introduction to Abstract Algebra, Fall 2013.

Conferences Attended

(1) Summer School and Workshop on Categorification of Quantum 3-Manifold Invariants, University of Southern California, Jul., 2018.

(2) Categorification and Higher Representation Theory Conference, Mittag-Leffler Institute, Stockholm, Sweden, Jul., 2018.

(3) Winter Young Algebraic Geometer Workshop, Southern University of Science and Technology, Shenzhen, Dec., 2017.

(4) Workshop: Categorification, Mathematical Institute, University of Bonn, Germany, May, 2016.

(5) Joint AMS-EMS-SPM meeting, Porto, Portugal, Jun. 10–13, 2015.

(6) A conference on "Representation Theory and Geometry of Symplectic Resolutions," Boston, USA, May 18–21, 2015.

(7) Spring Eastern AMS Sectional Meeting at Georgetown University, Washington, DC, USA, Mar. 7–8, 2015.

(8) CBMS conference on Categorification at North Carolina State University, Raleigh, USA, Jul. 5–10, 2014.

(9) A workshop on "Categorification and geometric representation theory," CRM, Montreal, Canada, Jun. 9–13, 2014.

(10) A workshop on "Yangians and Quantum Loop Algebras," Austin, USA, May 5–9, 2014.

(11) A workshop on "Quantum and Affine Schubert Calculus," University of Oregon, Eugene, USA, Aug. 5–9, 2013.

(12) A summer school on "Cluster Algebras and Commutative Algebras," MSRI, Berkeley, USA, Aug. 27–Sep. 7, 2012.

(13) A workshop on "Categorical Representation Theory", University of Oregon, Eugene, USA, Aug. 13–17, 2012.

(14) A workshop on "Super-Symmetry and Invariants", Chern Institute, Nankai, P. R. China, Jun. 18–24, 2012.

(15) A workshop on "Cluster Algebras and Lusztig's Semicanonical Basis", University of Oregan, Eugene, USA, Jun. 13–17 2011.

(16) A conference on "Derived categories", Newton Institute, Cambridge, United Kindom, Apr. 11–15, 2011.

(17) An international conference on representation theory, Tokyo, Japan, Aug. 5th–15, 2010.

(18) A winter school on "Homology Theory of Knots and Links", MSRI, Berkeley, USA, Jan. 25–29, 2010.

Professional Sevices

- Co-organizer on the conferecne, the 14th Southeastern Lie Theory Workshop Series "Quantum Structures in Lie Theory". March 1–3, 2024, Charlottesville, VA.
- Co-organizer with Slava Krushal and Weiqiang Wang on the conferecne, "Categorical Methods in Representation Theory and Quantum Topology". Apr 15–17, 2022, Charlottesville, VA.
- Referee for the journals and book series *Compositio Mathematica*, *Selecta Mathematica*, *Quantum Topology*, *Finite Fields and their Applications*, *Algebraic and Geometric Topology*, *Proceedings of the London Mathematical Society*, *Algebra and Representation Theory*, *Journal of Combinatorial Theory, Series A*, *Fundamenta Mathematicae*, *Journal of Combinatorial Algebra*, *Contemporary Mathematics*, *Journal of Knot Theory and Ramifications*, *Advances in Mathematics*, *Journal für die reine und angewandte Mathematik*, *Journal of the London Mathematical Society*.
- Coorganizer with Lei Chen of the "Geometry and Topology Seminar" at Caltech, Fall 2018-Spring 2019.
- Coorganizer with Tom Graber, Daxin Xu and Sasha Yom Din of the "Algebra and Geometry Siminar" at Caltech, Fall 2017-present.
- Coorganizer with Igor Frenkel, Gregg Zuckerman of the "Geometry, Symmetry and Physics Seminar" at Yale, Fall 2014-Spring 2017.
- Coorganizer with Atoshi Chowdhury of the UC Berkeley "Representation Theory, Geometry and Combinatorics Seminar", Fall 2013-Spring 2014.
- Coorganizer with Mikhail Khovanov and Alexander Ellis of the informal categorification and representation theory seminar, 2011-present.
- Discussion session leader, homology theory of knots and links, MSRI, Berkeley, 2010.

- Coorganizer with A. Johan de Jong of the summer graduate student seminar on intersection theory and Grothendieck-Riemann-Roch theorem.

LANGUAGES

- Native Language: (Chinese) Mandarin.
- Foreign Languages: English, French.