

Curriculum Vitae of You Qi

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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 $\mathfrak{sl}(2)$ 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 $\mathrm{sl}(2)$ 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 ‘Quantum 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 $\mathfrak{sl}(2)$, 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 $\mathfrak{sl}(2)$ 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, Introduction 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, Reflection 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 Oregon, 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 on the inaugural Quantum Topology Biennial Workshop, “Focus on Representation Theory”. January 14–19, 2024, SwissMap in Les Diablerets, Switzerland.
- 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.