HARSHIT YADAV

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RESEARCH INTERESTS

Algebraic aspects of 2D conformal field theory: tensor categories, vertex operator algebras, fusion categories, Hopf algebras.

EMPLOYMENT

Max-Wyman Assistant Professor (non tenure-track), University of Alberta, Aug. 2023–June 2026

VISITING POSITIONS

Research member, Quantum Symmetries reunion, Simons Laufer Mathematical Sciences Institute (SLMath/MSRI), June–July 2024

Program Associate, Quantum Symmetries program, SLMath/MSRI, Jan–March 2020

EDUCATION

Ph.D. in Mathematics, Rice University, July 2020–May 2023
Advisor: Chelsea Walton

M.S./Ph.D. in Mathematics (transferred to Rice), University of Illinois at Urbana-Champaign, August 2017–July 2020

Bachelor of Science, Mathematics, Indian Institute of Technology, Kanpur, May 2017

GRANTS AND FELLOWSHIPS

NSERC Discovery Grant RES0065383, National Sciences and Engineering Research Council, Canada, 2024–2029 ($142,500 CAD)

Nettie S. Autrey Fellowship, Rice University, 2022 (awarded once per year college wide)

PREPRINTS

(2) Pivotal Brauer-Picard groupoids and graded extensions (with A. Czenky, D. Jaklitsch, D. Nikshych, J. Plavnik, D. Reutter and S. Sanford), `arXiv:2511.04482`, (2024).

(1) Commutative exact algebras and modular tensor categories (with K. Shimizu), `arXiv:2408.06314`, (2024).

PUBLICATIONS

(9) $\otimes$-Frobenius functors and exact module categories (with D. Jaklitsch), `arXiv:2501.16978`, to appear in *International Mathematics Research Notices*.

(8) Commutative algebras in Grothendieck-Verdier categories, rigidity, and vertex operator algebras (with T. Creutzig, R. McRae and K. Shimizu), *Communications in Contemporary Mathematics*, 2550091 (2025).

(7) Nondegenerate module categories (with C. Walton), *Mathematische Zeitschrift*, 310, no. 2 (2025).

(6) On unimodular module categories, *Advances in Mathematics*, 432, 109264 (2023).

(5) Frobenius monoidal functors from (co)Hopf adjunctions, *Proceedings of the AMS*, 152, no. 2, 471–487 (2024).

(4) On non-counital Frobenius algebras (with A. Hernandez and C. Walton), *Journal of Algebra and its Applications*, 2550018 (2023).

(3) Filtered Frobenius algebras in monoidal categories (with C. Walton), *International Mathematics Research Notices*, rnac314 (2022).

(2) The ABCDs of Schubert calculus (with C. Robichaux and A. Yong), *Séminaire Lotharingien de Combinatoire*, B85a (2020).

(1) Equivariant cohomology, Schubert calculus, and edge labeled tableaux (with C. Robichaux and A. Yong), *Facets of Algebraic Geometry: A Volume in Honour of William Fulton's 80th Birthday*, LMS Lecture Note Series, Vol. 2 (2022), Cambridge University Press, 284–335.

(0) Autoequivariant Network Search via Group Decomposition (with S. Basu, A. Magesh and L. R. Varshney), `arXiv:2104.04848`, presented at SIAM Conference on Mathematics of Data Science (MDS24), Atlanta, GA, 21–25 October 2024.

MENTORING

Ian Parrish (Undergrad, University of Alberta), summer 2025
Topic: Knot and 3-manifold invariants from non-semisimple categories
Obtained an NSERC USRA for the project

Andrii Smutchak, Sofiia Breslavets, 2023–2024
High school students, MIT Yulia's dream program
Topic: Double groupoids and weak Hopf algebras [final report]

Amanda Hernandez (Undergrad, Rice University), 2021–2022
Co-supervised with Chelsea Walton
Topic: (Weak) Hopf algebras and (quasi) Frobenius algebras [arXiv:2204.14182]

TEACHING

- **University of Alberta**, *Instructor*
  - Introduction to Ring Theory: Winter, Spring and Fall 2024
  - Calculus III: Spring and Fall 2025

- **Rice University**
  - *Grader*: Math 357 (Spring 2022), Math 356 (Fall 2020, Fall 2021)
  - *Teaching Assistant (Recitation)*: Math 302 (Spring 2021)

- **University of Illinois at Urbana-Champaign**, *Teaching Assistant (Recitation)*
  - Math 241, Calculus 3: Fall 2017, Fall 2018, Spring 2019, Fall 2019
  - Math 231, Calculus 2: Spring 2018

CONFERENCES AND WORKSHOPS CO-ORGANIZED

- **Geometric & Categorical approaches to Conformal Field Theory**, Banff International Research Station, Chennai, India, January 2026
- **RIMS Satellite Seminar**, Research Institute in Mathematical Sciences (RIMS), Kyoto, Japan, December 2025
- **Mini-workshop on VOAs**, University of Alberta, Canada, February–March 2024

SEMINARS CO-ORGANIZED

- Geometry-Algebra-Physics Seminar, University of Alberta, Canada, Fall 2024
- Aspects of Mathematical Physics Seminar, University of Alberta, Canada, Winter 2024
- Algebra-Geometry-Combinatorics Seminar, University of Illinois at Urbana-Champaign, 2018–2019

INVITED AND CONTRIBUTED TALKS

Rigidity and modularity of infinite VOA extensions
- Dalhousie University, Halifax   February 2026
- Tata Institute of Fundamental Research, Mumbai   January 2026
- International Centre for Theoretical Sciences, Bangalore   January 2026
- Institute for Mathematical Sciences, Chennai   December 2025

Tensor functors with isomorphic left and right adjoints
- Hopf algebras and related topics, Bonne Bay station   August 2025

Tensor category results and their applications to VOAs
- University of Hamburg, Hamburg (virtual)   June 2025
- Tata Institute of Fundamental Research, Mumbai   March 2025
- Indian Institute of Technology, Mumbai   March 2025
- Indian Institute of Technology, Kanpur   April 2025

Rigidity of the category of local modules
- Mathematical Physics Seminar, University of Hamburg (virtual)   January 2025
- TQFT Club (virtual)   August 2025

Rigidity of VOAs and Hopf extensions
- AMS sectional meeting, San Antonio   September 2024
- Mini-workshop, Shanghai Jiao Tong University   June 2024

Rigidity of extensions
- Rocky Mountain representation theory Seminar (virtual)   October 2024
- SLMath, Quantum Symmetries Seminar   July 2024
- VOA, tensor categories and related topics, Shanghai   June 2024
- CMS summer meeting, University of Saskatchewan   May 2024
- Fields Institute, Toronto   March 2024

On unimodular module categories
- BIRS, Banff   December 2023
- Rocky Mountain representation theory Seminar   October 2023
- Mathematical Physics Seminar, Perimeter Institute   September 2023
- Mathematical Physics Seminar, University of Hamburg   June 2023

- Shibaura Algebra Seminar, SIT, Japan   May 2023
- AMS sectional meeting, University of Cincinnati   April 2023
- Seattle Noncommutative Algebra Day   March 2023
- Quantum symmetries program, CRM Montreal   October 2022
- AMS fall sectional meeting, University of Utah   October 2022

On non-counital Frobenius algebras
- Categories and Companions Symposium   September 2022
- Hopf algebras, monoidal categories and related topics   July 2022
- Graduate Algebra Symposium, UT Arlington   April 2022
- Seattle Noncommutative Algebra Day (virtual)   March 2022

Filtered Frobenius algebras in monoidal categories
- Quantum Groups Seminar (virtual)   July 2022
- Algebra Seminar, Indiana University   April 2022
- Algebra Seminar, Texas A&M University   March 2022
- Quantum Algebra Seminar, Ohio State University   March 2022
- Seattle Noncommutative Algebra Day (virtual)   May 2021
- AMS Spring sectional meeting (virtual)   March 2021

EXPOSITORY TALKS

Hopf algebras and Quantum Symmetries
- Seminar at Google X   November 2021

Introduction to Topological Quantum Field Theories
- Current Mathematics Seminar, Rice University   October 2021

Various reading group talks at Rice, UIUC, 2019–2022

SERVICE

Referee work
Selecta Mathematica, Communications in Mathematical Physics, Mathematische Zeitschrift, Journal of Pure and Applied Algebra, Canadian Journal of Mathematics, Quantum Topology

Thesis committee member
Zach Goldthorpe, University of Alberta, May 2024

Graduate Student Panelist, Gulf Coast Undergraduate Research Symposium, Rice University, October 2021

Student guide, Counseling service, Indian Institute of Technology, Kanpur, 2014–2015

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