Keshav Dahiya

Curriculum Vitae

Department of Mathematics,
Indiana University - Indianapolis,
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Email: kkeshav@iu.edu

Research Interests

Quantum Algebras, Mathematical Physics, Representation Theory, Geometry and Topology, Probability and Stochastic Processes, Quantum computing, Machine Learning

Education

2021 - 2025 **Ph.D. in Mathematics**
Purdue School of Science, Indianapolis
Advisor: Evgeny Mukhin
Thesis: *Intertwiners of representations of quantum affine algebras and superalgebras*

2018 - 2020 **M.S. in Mathematics**
Indian Institute of Technology, Delhi
Advisor: Biplab Basak
Thesis: *Triangulation of manifolds*

2013 - 2015 **M.Tech. in Information and Communication Technology**
Indian Institute of Technology, Delhi
Advisor: Brejesh Lall
Thesis: *Signal reconstruction from its noisy sub-band components* (Link)

2010 - 2015 **B.Tech. in Electrical Engineering**
Indian Institute of Technology, Delhi

Preprints and Publications

2025 K. Dahiya and E. Mukhin, *Intertwiners of representations of quantum affine superalgebras,* in preparation

2025 K. Dahiya and E. Mukhin, *Intertwiners of representations of twisted quantum affine algebras,* J. Math. Phys. **66 (5)**, 2025 (Editor's Pick)
DOI | arXiv

2025 K. Dahiya and E. Mukhin, *Intertwiners of representations of untwisted quantum affine algebras and Yangians revisited,* J. Math. Phys. **66 (5)**, 2025 (Editor's Pick)
DOI | arXiv

Teaching Experience

	Instructor of Record Indiana University, Indianapolis, IN
Fall 2025	MATH-I-110: Fundamentals of Algebra
Summer 2025	MATH-I-165: Analytic Geometry and Calculus II
Spring 2025	MATH-I-165: Analytic Geometry and Calculus I
	Purdue University, Indianapolis, IN
Fall 2024	MA 16010: Applied Calculus I
	Indiana University - Purdue University (IUPUI), Indianapolis, IN
Spring 2024	MATH 166-00: Analytic Geometry and Calculus II
Fall 2023	MATH 166-00: Analytic Geometry and Calculus II
Summer 2023	MATH 110-00: Fundamentals of Algebra
Spring 2023	MATH 171-00: Multidimensional Mathematics
Fall 2022	MATH 165-00: Analytic Geometry and Calculus I
	Recitation Leader Indiana University - Purdue University (IUPUI), Indianapolis, IN
Spring 2022	MATH 166-00: Analytic Geometry and Calculus II
	Teaching Assistant Indian Institute of Technology, Delhi
Fall 2014	EEL 205: Signals and Systems

Invited Talks

Oct 2025	**Mathematical Physics Seminar** Purdue University, West Lafayette, IN
Oct 2024	**Quantum Groups and Representation Theory Conference** North Carolina State University, Raleigh, NC
Mar 2024	**14th Southeastern Lie Theory Conference** University of Virginia, Charlottesville, VA

Seminar Presentations

	Representation Theory Seminar Indiana University, Indianapolis, IN
Mar 2025	*The quantum determinant for Yangian of* $\mathfrak{gl}_n$
Mar 2025	*Transfer matrices for Yangian of* $\mathfrak{gl}_n$
Feb 2025	*Fusion of R matrices*

Oct/Nov 2024	*MacDonald polynomials*
Sep 2024	*Howe duality and quantum Weyl group*
Dec 2023	*Crystal bases for $U_q\mathfrak{sl}_n$ and Young tableaux*
Jan/Feb 2023	*The $\mathfrak{gl}_m \times \mathfrak{gl}_n$ duality*
Sep 2022	*The Pfaffian using Grassmann variables*
Mar/Apr 2022	*The Gelfand-Tsetlin algebras and representations of symmetric groups*
Dec 2021	*Characters of representations of finite groups*
	_K_-Theory Seminar
	Indiana University, Indianapolis, IN
May/Jun 2024	*Generalized cohomology of complex vector bundles*
	Graduate Student Seminar
	Indiana University, Indianapolis, IN
Apr 2023	*Quantum computing: Shor's algorithm*
Oct 2022	*Tilings by regular vertices*
Mar 2022	*Geometric group theory: Quasi-isometry, the Svarc-Milnor lemma*
Dec 2021	*Spectral bounds in graph theory*
Mar 2021	*Discrete Fourier transform, the convolution theorem and FFT algorithm*

Professional Service

2024	**Journal Reviewer,** *Transformation Groups, Volume 29*
2023	**Journal Reviewer,** *Journal of Mathematical Physics, Volume 64*

Projects

Fall 2025	*Image Caption Generator* (GitHub) The Erdős Institute, Deep Learning Bootcamp
Summer 2025	*Quantum Hamming code* (GitHub) The Erdős Institute, Quantum Computing Bootcamp
Summer 2025	*Quantum state preparation* (GitHub) The Erdős Institute, Quantum Computing Bootcamp
Summer 2025	*Quantum circuit for constrained optimization* (GitHub) The Erdős Institute, Quantum Computing Bootcamp
Spring 2022	*q-characters of quantum affine algebras* (GitHub) Advisor: Evgeny Mukhin, Purdue School of Science, Indianapolis
Fall 2012	*Captcha recognition* Advisor: Sumeet Agarwal, Indian Institute of Technology, Delhi

Fall 2012	*3-D object rendering using ray tracing* Advisor: Subodh Kumar, Indian Institute of Technology, Delhi
Spring 2012	*Guidance system for visually impaired* Advisor: Ranjan Bose, Indian Institute of Technology, Delhi

Professional Experience

2015 - 2018 **Ed-Tech Business Founder**
Delhi, India
- Built a web application using PHP and JavaScript on a private domain to deliver virtual lessons to IIT aspirants.
- Designed and taught interactive online Mathematics and Physics lessons integrating problem-solving exercises.

Summer 2013 **Computer Vision Intern**
Qualcomm, Hyderabad, India
- Developed Android applications for real-time edge detection, corner detection, face detection and contour generation in the mobile camera video using FastCV SDK.
- Designed user interfaces in Java and implemented native Android functionality in C++ on top of FastCV SDK.

Awards and Achievements

2024 **Outstanding Advanced Mathematics Graduate Student Award**
Indiana University, Indianapolis

2021 **Outstanding Beginning Mathematics Graduate Student Award**
Purdue School of Science, Indianapolis

2021 - 2022 **Graduate Student Scholarship**
Purdue School of Science, Indianapolis

2010 **National Rank - 332 among 0.5 million participants (99.93 percentile)**
Joint Entrance Examination for Engineering
Indian Institutes of Technology

2010 **National Rank - 296 among 1 million participants (99.97 percentile)**
All India Engineering Entrance Examination
Central Board of Secondary Education, India

2009 **National Olympiad Rank - 72 among 50k participants (99.86 percentile)**
National Talent Search Examination
National Council of Educational Research and Training, India

2006 **State Rank - 1**
Maths Mind Competition
Mount Abu Public School, Delhi

2006 **State Rank - 5**
Ramanujan Mathematics Competition
New State Academy, Delhi

Referees

Evgeny Mukhin
Professor of Mathematics
Department of Mathematical Sciences,
Indiana University, Indianapolis
Email: emukhin@iu.edu
Phone: (317) 278-1079

Vitaly Tarasov
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Department of Mathematical Sciences,
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Daniel Ramras
Associate Professor of Mathematics
Department of Mathematical Sciences,
Indiana University, Indianapolis
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Roland Roeder
Professor (Director, Graduate Programs)
Department of Mathematical Sciences
Indiana University, Indianapolis
Email: roederr@iu.edu
Phone: (317) 274-6924