

SACHIN GAUTAM
CURRICULUM VITAE

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Research Interests

Cluster algebras, Classical and Quantum integrable systems, Representation Theory, Braid groups, Quantum Groups.

Education

- Ph.D. in Mathematics, *Northeastern University*, Boston, USA (2005-2011).
Ph.D. Thesis under the supervision of Prof. V. Toledano Laredo and Prof. A. Zelevinsky.
- M.Sc. in Mathematics, *Institute of Mathematical Sciences* Chennai, India (2003-2005).
M.Sc. Thesis under the supervision of Prof. K.N. Raghavan
- B.Tech. in Computer Science and Engineering, *Indian Institute of Technology*, New Delhi, India (1999-2003).
B.Tech. Thesis under the supervision of Prof. A. Tripathi

Positions

- Assistant Professor at OSU (current).
- Postdoctoral Fellow at Perimeter Institute for Theoretical Physics (2015-2017).
- J.F. Ritt Assistant Professor at Columbia University (2011-2015).
- Visiting researcher at IHP, Paris, France (Summer 2014).
- Visiting researcher at IHES, Bures-sur-Yvette, France (Summer 2013).
- Visiting researcher at FIM, ETH Zürich, Switzerland (June 2012).

Awards

- Collaboration Grant for Mathematicians, Simons Foundation. Starting September 2017. Award Number 526947. Duration 5 years.
- Dissertation Writing Fellowship, Graduate school of arts and sciences, Northeastern University (Fall 2010).

- Ling-Ma Fellowship, Department of Mathematics, Northeastern University (Summer 2010).
- Research Assistantship at Northeastern University, Boston, USA (2008-2010) funded by **Flat connections, Irregular Singularities and Quantum Groups**.
NSF grant DMS-0707212.
Principal investigator: Valerio Toledano Laredo.
Full time support from: June 1, 2008–May 31, 2010.
- Teaching Assistantship at Northeastern University, Boston, USA (2005-2008)
- Junior Research Fellowship sponsored by Department of Atomic Energy at Institute of Mathematical Sciences, Chennai, India (2003-2005)

Publications

I. Published in refereed journals

- (1) *On multicolor non-complete Ramsey graphs of star graphs* (with A. Srivastava and A. Tripathi), *Discrete Applied Mathematics*, **156** (2008), no. 12, 2423 - 2428.
- (2) *Cluster Algebras and grassmannians of type G_2* , *Algebras and Representation Theory* **13** (2010), no. 3, 335 - 357.
- (3) *Yangians and quantum loop algebras* (with V. Toledano Laredo), *Selecta M.* **19** (2013), no. 2, 271-336.
- (4) *Monodromy of the trigonometric Casimir connection of \mathfrak{sl}_2* (with V. Toledano Laredo), *Noncommutative Birational Geometry, Representations and Combinatorics* (A. Berenstein and V. Retakh eds.), *Contemporary Mathematics* **592**, AMS (2013), 137–176.
- (5) *Yangians, quantum loop algebras and abelian difference equations* (with V. Toledano Laredo), *J. Amer. Math. Soc.* **29** (2016), no. 3, 775-824.
- (6) *Meromorphic tensor equivalence for Yangians and quantum loop algebras* (with V. Toledano Laredo), *Publ. Math. IHES.* **125** (2017), 267-337.
- (7) *An explicit isomorphism between quantum and classical $sl(n)$* (with A. Appel), *Transformation groups* **24** (2019), 36pp.

II. Preprints

- (1) *Elliptic quantum groups and their representations* (with V. Toledano Laredo), arxiv:1707.06469 (52 pages).
- (2) *The meromorphic R-matrix of the Yangian* (with V. Toledano Laredo and C. Wendlandt), arxiv:1907.03525 (48 pages). (to appear in *Progress in Mathematics*, volume for N. Reshetikhin's 60th birthday.)

- (3) *Poles of finite-dimensional representations of Yangians in type A* (with C. Wendlandt), arxiv:2009.06427 (27 pages).

III. In preparation

- (1) *Quantum Kazhdan–Lusztig equivalences in the rational setting* (with V. Toledano Laredo)
- (2) *Quantization of Alekseev–Meinrenken Poisson diffeomorphism* (with A. Appel)
- (3) *The center of the completed Yangian* (with C. Wendlandt)

Organization

- *Three facets of R-matrices* Mini-workshop at MFO Oberwolfach joint with A. Smirnov, C. Wendlandt and M. Yamazaki (Winter 2021).
- *Representation Theory seminar* (Current), The Ohio State University, Columbus, OH.
- *Workshop on Yangians and quantum loop algebras* (May 2014), University of Texas, Austin (USA).
- *Seminar on dynamical Yang–Baxter equations* (Spring 2011), Northeastern University, Boston (USA).
- *Graduate students’ seminar* (Fall 2006, Spring 2007), Northeastern University, Boston (USA).

Mentoring.

- C. Wendlandt (Zassenhaus Assistant Professor at OSU) 2019–Present.

Conference Talks

- (1) *AMS special session on elliptic cohomology and elliptic quantum groups* (January 2020), Denver, CO, USA.
- (2) *Higher symmetries* (March 2019), Aspen center for physics, Aspen, CO, USA.
- (3) *AMS special session on recent advancements in representation theory* (September 2017), State University of New York at Buffalo, NY, USA.
- (4) *KTGU mathematics workshop for young researchers* (February 2017), Kyoto, Japan.
- (5) *Joint India-AMS meeting* (December 2016), Banaras Hindu University, Varanasi, India.
- (6) *Geometric representation theory* (January 2016), Simons Center for Geometry and Physics, Stony Brook, USA.

- (7) *Algebraic Lie theory and representation theory* (September 2014), ICMS, Edinburgh, UK.
- (8) *ARTIN 41* (June 2014), University of Edinburgh, UK.
- (9) *Workshop on combinatorial representation theory* (April 2014), CRM Montreal, Canada.
- (10) *AMS special session on geometric and combinatorial methods in representation theory* (November 2013), University of California Riverside, Riverside, CA, USA.
- (11) *Journées Solstice d'été 2012, Topologie, Groupes et Algèbre* (June 2012) Paris, France.
- (12) *Representation theory and integrable systems* (June 2012) ETH Zürich, Switzerland.
- (13) *Geometry of derived categories and representation theory* (May 2012) Northeastern University, Boston, MA, USA.
- (14) *Joint Mathematics Meeting, AMS special session on noncommutative birational geometry and cluster algebras* (January 2012) Boston, MA, USA.
- (15) *AMS special session on quantum groups and representation theory* (October 2011) University of Nebraska–Lincoln, NE, USA.
- (16) *Equivariant quantum differential equations* (September 2011) Columbia University, New York, NY, USA.
- (17) *Twenty-five years of representation theory of quantum groups* (August 2011), Banff International Research Station, Alberta, Canada.
- (18) ETH (January 2011), Zürich, Switzerland.
- (19) *Graduate students' seminar* during the conference on *Geometric methods in representation theory* (July 2008), Institut Fourier, Grenoble, France.

Seminar Talks

- (1) *Reading classics seminar* (April 2019), The Ohio State University, Columbus, OH, USA.
- (2) *Radical Pi Undergraduate seminar* (April 2019), The Ohio State University, Columbus, OH, USA.
- (3) *Representation theory seminar* (February 2019), U. Mass. Amherst, MA, USA.

- (4) *Geometric representation theory seminar* (February 2019), MIT, Cambridge, MA, USA.
- (5) *Geometry seminar* (October 2018), Boston University, Boston, MA, USA.
- (6) *Representation theory seminar* (August, September 2018), The Ohio State University, Columbus, OH, USA.
- (7) *Algebra seminar* (March 2018), University of Alberta, Edmonton, Canada.
- (8) *Representation theory seminar* (January 2018), The Ohio State University, Columbus, OH, USA.
- (9) *Reading classics seminar* (October 2017), The Ohio State University, Columbus, OH, USA.
- (10) *Welcome seminar* (March 2017), The Ohio State University, Columbus, OH, USA.
- (11) *Geometry, physics and representation theory* (March 2017), Northeastern University, Boston, USA.
- (12) *Physics Journal Club* (December 2016), Institute of Mathematical Sciences, Chennai, India.
- (13) *Geometry and topology seminar* (November 2016), University of Waterloo, Canada.
- (14) *Geometric representation theory seminar* (September 2015), Field institute, University of Toronto, Canada.
- (15) *Representation theory seminar* (October 2014), Yale University, New Haven, CT, USA.
- (16) *Séminaire d'algèbre* (June 2014), Institut Henri Poincaré, Paris, France.
- (17) *Geometric representation theory seminar* (March 2014), Field institute, University of Toronto, Canada.
- (18) *Algebra seminar* (March 2014), University of Alberta, Edmonton, Canada.
- (19) *Algebra seminar* (October 2013), UCLA, Los Angeles, CA, USA.
- (20) *Informal Mathematical Physics seminar* (October 2013), Columbia University, New York, NY, USA.
- (21) *Séminaire algèbre et géométrie* (June 2013), Université de Caen, Caen, France.
- (22) *Séminaire d'algèbre* (June 2013), Institut Henri Poincaré, Paris, France.

- (23) *Informal Mathematical Physics seminar* (May 2013), Columbia University, New York, NY, USA.
- (24) *Representation theory seminar* (April 2012) City University of New York, NY, USA.
- (25) *Research training group in representation theory, geometry and combinatorics* (September 2011) University of California Berkeley, CA, USA.
- (26) *Infinite dimensional algebras seminar* (November 2010), MIT, Cambridge, MA, USA.
- (27) *Geometry seminar* (October 2010), Boston University, Boston, MA, USA.
- (28) *Tapas seminar* (June 2006, 2008 and 2010), Northeastern University, Boston, MA, USA.

Colloquium Talks

- (1) Cleveland State University (February 2020), Cleveland, OH, USA.
- (2) *Invitations to mathematics series* The Ohio State University (October 2019), Columbus, Ohio, USA.
- (3) *Invitations to mathematics series* The Ohio State University (October 2017), Columbus, Ohio, USA.
- (4) Institute of Mathematical Sciences (December 2016), Chennai, India.
- (5) Institute of Mathematical Sciences (December 2015), Chennai, India.
- (6) Colorado State University (February 2015), Fort Collins, Colorado, USA.
- (7) Ohio State University (January 2015), Columbus, Ohio, USA.
- (8) University of North Carolina Chapel Hill (January 2015), North Carolina, USA.
- (9) Perimeter Institute for Theoretical Physics (December 2014), Waterloo, Ontario, Canada.
- (10) University of Illinois (December 2014), Chicago, Illinois, USA.
- (11) University of Illinois at Urbana-Champaign (December 2014), Champaign, Illinois, USA.
- (12) Institute of Mathematical Sciences (August 2012), Chennai, India.

Teaching

- (1) Complex analysis (Spring 2020).

- (2) Topics in representation theory (Fall 2019).
- (3) Reading course on symmetric functions (Spring 2019).
- (4) Honors Abstract Algebra (Fall 2018).
- (5) Abstract Algebra II (Spring 2018).
- (6) Abstract Algebra I (Fall 2017).
- (7) Lie Groups and representation theory (Spring 2017).
- (8) Complex analysis (Spring 2015).
- (9) Lie groups and representations II (Spring 2015).
- (10) Topics in Representation Theory (Spring 2014).
- (11) MATH V1102 Calculus II (Spring 2013).
- (12) MATH V1101 Calculus I (Spring 2012).
- (13) MATH V1201 Calculus III (Fall 2011, Fall 2012, Fall 2013, Fall 2014).
- (14) MTH U341 Calculus III for Science and Engineering (Spring 2008).
- (15) MTH U241 Calculus I for Science and Engineering (Fall 2007).
- (16) MTH U115 Applications of Algebra (Fall 2006 and Spring 2007).
- (17) Recitation Instructor for Calculus III (Fall 2005 and Spring 2006).
- (18) Part time instructor of Mathematics at Government Senior Secondary School, Shahdara, New Delhi (April 2000 - March 2002).

Conferences and Workshops

- (1) Quantum structures in algebra and geometry, Northeastern University and MIT, Boston, MA, USA (August 2019).
- (2) Higher symmetries in physics and mathematics, Aspen center for physics, Aspen, CO, USA (March 2019).
- (3) Enveloping algebras and representation theory, Oberwolfach, Germany (November 2018).
- (4) Higher algebras and QFT, Perimeter Institute for Theoretical Physics, Waterloo, ON, Canada (August 2018).

- (5) KTGU mathematics workshop for young researchers, Kyoto University, Japan (February 2017).
- (6) Geometric representation theory program, Simons Center for Geometry and Physics, Stony Brook, USA (January 2016).
- (7) Mathematical aspects of six-dimensional quantum field theories, UC Berkeley, USA (December 2014).
- (8) Workshop on categorical methods in harmonic analysis and number theory, MSRI, Berkeley, USA (November 2014).
- (9) Algebraic Lie theory and representation theory, ICMS, Edinburgh, UK (September 2014).
- (10) ARTIN 41, University of Edinburgh, UK (June 2014).
- (11) Workshop on Yangians and quantum loop algebras, Austin, TX, USA (May 2014).
- (12) Combinatorial Lie theory, CRM, Montreal, Canada (April 2014).
- (13) Workshop on quiver varieties, Simons center of geometry and physics, Stony Brook, NY, USA (October 2013).
- (14) DT invariants in Paris, Paris 7, France (June 2013).
- (15) Algebra, Combinatorics and Representation Theory: in memory of Andrei Zelevinsky, Northeastern University, Boston, MA, USA (April 2013).
- (16) Interactions between non-commutative birational geometry and representation theory, MSRI Berkeley, CA, USA (April 2013).
- (17) Journées Solstice d'été 2012. Topologie, Groupes et Algèbre. CIRM Paris, France (June 2012).
- (18) Representation theory and integrable systems, ETH Zürich, Switzerland (June 2012).
- (19) Geometry of derived categories and representation theory, Northeastern University, Boston, MA, USA (May 2012).
- (20) Joint Mathematics Meeting, AMS special session on noncommutative birational geometry and cluster algebras, Boston, MA, USA (January 2012).
- (21) AMS special session on quantum groups and representation theory, University of Nebraska–Lincoln, NE, USA (October 2011).
- (22) Equivariant quantum differential equations, Columbia University, New York, NY, USA (September 2011).

- (23) Research training group in representation theory, geometry and combinatorics, University of California Berkeley, CA, USA (September 2011)
- (24) Twenty-five years of representation theory of quantum groups, Banff International Research Station, Alberta, Canada (August 2011)
- (25) Nonperturbative effects and dualities in QFT and integrable systems, University of California Santa Barbara, CA, USA (August 2011)
- (26) The versatility of integrability (conference in honor of 60th birthday of Igor Krichever), Columbia University, NY, USA (May 2011)
- (27) Derived categories of algebro-geometric origin and integrable systems, Institute of Advanced Studies, Hebrew University of Jerusalem, Israel (December 19-24, 2010)
- (28) Langlands type dualities in Quantum Field Theory, Kavli Institute of Theoretical Physics, University of California, Santa Barbara, CA, USA (August 9-27, 2010).
- (29) NSF/CBMS conference on Quiver varieties and crystal bases of quantum affine algebras, North Carolina State University, Raleigh, NC, USA (May 25-29, 2010).
- (30) Double affine Hecke algebras and Algebraic Geometry, MIT, Cambridge, MA, USA (May 17-21, 2010).
- (31) Geometric Representation Theory and extended affine Lie algebras, University of Ottawa, Ontario, Canada (June 15-27, 2009).
- (32) International conference on cluster algebras and related topics, UNAM, Mexico (December 8-20, 2008).
- (33) Gauge theory and Langlands duality, Kavli Institute for Theoretical Physics, University of California Santa Barbara, CA, USA (July 21 - August 8, 2008).
- (34) Geometric methods in Representation Theory, Summer school at Institut Fourier, Grenoble, France (June 16 - July 4, 2008).
- (35) Conference on Algebro-Geometric derived categories and applications, School of Mathematics, Institute of Advanced Study, Princeton, NJ, USA (March 10-14, 2008).
- (36) XII International Conference on Representations of Algebras, Torun, Poland (August 14-24, 2007).
- (37) NSF/CBMS conference on Cluster Algebras and Applications, North Carolina State University, Raleigh, NC, USA (June 13-17, 2006).
- (38) Geometry and Representation Theory (conference in honor of 60th birthday of G. Lusztig), MIT, Cambridge, MA, USA (May 30 - June 3, 2006).

- (39) Joint India-AMS Mathematical meeting, Indian Institute of Science, Bangalore, India (December, 2003).
- (40) Workshop on computational Algebraic Geometry, Harish-Chandra Research Institute, Allahabad, India (December 2002)