

# Rekha Biswal

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## Employment

**NISER, Bhubaneswar, India (Nov 2022 - present)**. Assistant Professor.

**ICJ, University of Jean Monnet, France (May-Aug 2025)**. Foreign Researcher.

**ICJ, University of Jean Monnet, France (May-June 2024)**. Visiting Professor.

**University of Edinburgh, UK(2020-2022)**. Postdoctoral Research Associate.

**Max Planck Institute for Mathematics, Bonn.(2018 - 20)**. Postdoctoral Fellow.

**Université Laval, Québec City, Canada(2016-18)**. Postdoctoral Fellow.

## Education

2011-2016 **Integrated PhD in Mathematics**, The Institute of Mathematical Sciences, Chennai,

Advisor: Sankaran Viswanath

Thesis: Demazure flags, Chebyshev polynomials and mock theta functions.

2010-2011 **Master of Science in Mathematics**, Indian Institute of Technology, Bombay, India

2006-2010 **Bachelor of Science and Bachelor of Education**, Regional Institute of Education, Bhubaneswar, India

## Research Interests

Representation Theory of affine Lie Algebras , Modular forms, Macdonald polynomials.

## Publications

### Published/Accepted

- (1) Rekha Biswal and Stephane Gaussent; *Existence of a new family of irreducible components in the tensor product and its applications*(Algebras and Representation theory (2025) 28:1315–1334)(<https://arxiv.org/pdf/2501.15837.pdf>)
- (2) Rekha Biswal and Susan J. Sierra; *Ideals in enveloping algebras of affine Kac-Moody algebras*(Algebra and Number Theory, Vol. 19(2025), No. 6, 1199-1230)(<https://arxiv.org/pdf/2112.08334.pdf>).
- (3) Georgia Benkart, Rekha Biswal, Ellen Kirkmann, Van C Nguyen and Jieru Zhu; *Tensor representations for the Drinfeld double of the Taft algebras* (Journal of Algebra, (2022) 764-797)(<https://arxiv.org/pdf/2012.15277.pdf>).
- (5) Rekha Biswal and Travis Scrimshaw; *Kirillov-Reshetikhin crystals  $B^{7,s}$  for type  $E_7$*  (Comm. Algebra. (2022) 508-523)(<https://arxiv.org/pdf/1901.00182.pdf>).
- (4) Rekha Biswal, Abdelkarim Chakhar and Xiao He; *Classification of rank two Lie conformal algebras*(Journal of Ramanujan Mathematical Society, (2021), 203-219)(<https://arxiv.org/pdf/1712.05478.pdf>).
- (6) Georgia Benkart, Rekha Biswal, Ellen Kirkmann, Van C Nguyen and Jieru Zhu; *McKay matrices for finite dimensional Hopf algebras* Canad. J. Math. (2021), pp. 1–46 (<https://arxiv.org/pdf/2007.05510.pdf>).
- (7) Rekha Biswal, Vyjayanthi Chari, Peri Shereen and Jeffrey Wand; *Macdonald polynomials and level two Demazure modules for affine  $\mathfrak{sl}_{n+1}$*  Journal of Algebra, Volume 575, (2021), pages 159-191(<https://arxiv.org/pdf/1910.05848.pdf>).

## publications(continued....)

## Published

- (8) Rekha Biswal and Deniz Kus; *A combinatorial formula for graded multiplicities in excellent filtrations*. Transformation Groups, (2021), Vol. 26, pp. 81-114.(<https://arxiv.org/pdf/1712.02667.pdf>).
- (9) Rekha Biswal and Travis Scrimshaw; *Existence of Kirillov-Reshetikhin crystals for multiplicity free nodes* (Publ. Res. Inst. Math. Sci., (2020), Volume 56, 761-778)(<https://arxiv.org/pdf/1902.00769.pdf>).
- (10) Rekha Biswal, Vyjayanthi Chari and Deniz Kus; *Demazure Flags, q-Fibonacci Polynomials and Hypergeometric Series*, Res. Math. Sci. 5(2018), no.1, Paper No.12, 34 pp. (<https://arxiv.org/abs/1607.01069>).
- (11) Rekha Biswal, Vyjayanthi Chari, Lisa Schneider and Sankaran Viswanath; *Demazure Flags, Chebyshev Polynomials, Partial and Mock Theta functions*, Journal of Combinatorial Theory, Series A, **140**, (2016), pages 38-75. (<https://arxiv.org/abs/1502.05322>).
- (12) Rekha Biswal and Ghislain Fourier; *Minuscule Schubert Varieties: Poset Polytopes, PBW-degenerated Demazure Modules, and Kogan Faces*, Algebras and Representation Theory, **18**, (2015), Issue 6, pages 1481-1503. (<https://arxiv.org/abs/1410.1126>).

## Awards and Fellowships/recognition

### Awards

- Odisha young scientist award for the year 2022 in the category of "odia scientists working outside the state of Odisha".

### Fellowships

- Awarded ANRF-MARTICS grant in 2025 for 5 years.
- Scientific High level visiting Fellowship(SSHN) 2025 by the French Institute in India.
- Oberwolfach Foundation Fellowship, April 2024.
- 2022 - Summer Collaborators Grant, at Institute for Advanced Study(IAS), Princeton, USA.
- UGC-CSIR Junior Research Fellowship, July 2013.
- National Board of Higher Mathematics (NBHM) Ph.D Fellowship, 2011.
- National Board of Higher Mathematics (NBHM) M.Sc Fellowship, 2010.
- Qualified IIT-JAM, M.Sc Mathematics(2010), All India Rank :- 2.

### Recognition

- Invited to visit Institut des Hautes Études Scientifiques(IHES), France for one month in the summer 2025.
- Invited as visiting professor at ICJ, University of Jean Monnet, France for one month during the period May-June 2024.
- Hired by CNRS, at the Institute Camile Jordan as a foreign researcher(Poste Rouge) for 3 months on fixed-term contract(May -Aug , 2025).

## Teaching Experience

Jan-April 2025	Taught a course on Algebraic Topology to Int.PhD students at National Institute of Science Education and Research, Bhubaneswar, India.
Aug-Nov 2024	Taught a course on Lie Algebras (M476) to masters and PhD students at National Institute of Science Education and Research, Bhubaneswar, India.
Jan-April 2024	Taught a course on Algebra II(MA602) to PhD students at National Institute of Science Education and Research, Bhubaneswar, India.
Aug-Nov 2023	Taught a course on Commutative Algebra(M403) to masters and PhD students at National Institute of Science Education and Research, Bhubaneswar, India.
Jan-April 2023	Taught a course on Field theory(M307) to third year masters students at National Institute of Science Education and Research, Bhubaneswar, India.
Jan-Feb,	Taught a course on representation theory of finite groups to first year PhD students

2021	at SMSTC(Scottish Mathematical Sciences Training Center) in Edinburgh.
May 25-29, 2016	Taught a short course on Topology to masters students and college teachers in the summer school at the Institute of Mathematical Sciences, Chennai, India
Winter 2013	Teaching assistant for Lie Algebra course at the Institute of Mathematical Sciences, Chennai, India
Summer 2013	Teaching assistant for Algebra course at the Institute of Mathematical Sciences, Chennai, India
Winter 2012	Tutor for Representation Theory course in Annual Foundation School at Chennai Mathematical Institute, Chennai, India
Apr-May, 2009	Worked as a teaching intern at DM School, Bhubaneswar where I taught Physics and Mathematics to students of Std. IX.

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## Conferences

- *BIRS-CMI workshop on Geometric and Category-Theoretic approaches to Conformal Field Theory*(Jan 5-9, 2026), Chennai Mathematical Institute, Chennai, India.
- *Geometry and Representation Theory around the Langlands programs*(July 7-11, 2025), University of Clermont Auvergne, France.
- *Representations with Interconnections: Lie Theory and Non-associative Algebras*(July 2-4, 2025), Université Claude Bernard, Lyon 1, Institut Camille Jordan, France.
- *Representation Theory and Related Geometry: Progress and Prospects* (May 27-31,2024), University of Georgia, Athens, GA, USA.
- *Oberwolfach Arbeitsgemeinschaft: Geometry and Representation Theory around the P=W Conjecture.* (March 31 - April 5, 2024), Oberwolfach, Germany.
- *Conference: Taipei conference on representation theory VII*(Dec 18-22, 2023), Institute of Mathematics, Academia Sinica, Taipei, Taiwan.
- *Conference: Harish Chandra representation theory and Harmonic Analysis*(Oct 8-15, 2023), Harish Chandra Research Institute, Allahabad, India.
- *Workshop: Kac-Moody Geometry*(July 24-28, 2023), Kiel University, Germany.
- *Conference: Representation Theory in Lyon*(June 25- July 1, 2023), University of Lyon, France.
- *Workshop: Winter STAR workshop*(Jan 29-Feb 3, 2023), Weizmann Institute of Science, Israel.
- *Conference: A day and half with Dixmier and Moeglin*(June 30-July 1, 2022), University of Manchester, UK.
- *Workshop: Future directions in algebraic groups and Lie algebras in the UK*(April 11-13 2022), University of Birmingham , UK.
- *Introductory Workshop: Higher Categories and Categorification*(February 10-14, 2020), MSRI, Berkeley, USA.
- *Connections for Women: Higher Categories and Categorification*(February 6-7, 2020), MSRI, Berkeley, USA.
- *Introductory Workshop: Quantum Symmetries*(January 27-31, 2020), MSRI, Berkeley, USA.
- *Connections for Women: Quantum Symmetries*(January 23-24, 2020), MSRI, Berkeley, USA.

- *Conference on representation theory and integrable systems*, ETH, Zurich, Switzerland, August 12-16, 2019.
- *Summer School and workshop on Geometric representation theory and low-dimensional topology*, University of Edinburgh, UK, 3 - 14 June 2019.
- *Women in Noncommutative Algebra and Representation Theory*, University of Leeds, UK, May 20 – 24, 2019.
- *Taipei Conference on representation theory VI 2019*, National Taiwan University, Taiwan, January 7-11, 2019.
- *Nikolaus Conference 2018*, RWTH Aachen University, Germany, December 7-8, 2018.
- *Conference on Algebraic Groups, Lie Algebras and their Representations* , Max Planck Institute for Mathematics, Bonn, Germany, November 22-24, 2018
- *Workshop on representation theory, combinatorics and geometry*, University of Virginia, USA, Oct 19-21, 2018
- *Sage Days* , ICERM, Brown University , USA. July 23–28, 2018
- *Southeastern Lie Theory Workshop X* , University of Georgia, Athens, GA , USA. June 10–12, 2018
- *Conference on Interactions of quantum affine algebras with cluster algebras, current algebras and categorification*, The Catholic University of America , Washington, D.C. , USA June 2-8, 2018
- *School and workshop on Equivariant Combinatorics* , Centre de recherches mathématiques (CRM), Montreal, Canada, June 12-23, 2017
- *The 2017 Midwest Combinatorics Conference*, University of Minnesota, Minneapolis, USA, May 23-25, 2017.
- *Workshop on Mid-Atlantic Algebra, Geometry, and Combinatorics (MAAGC)*, Drexel University, Philadelphia, USA. May 5-6, 2017.
- *Conference on Texas-Oklahoma Representations and Automorphic forms VIII*, Oklahoma State University, Stillwater, Oklahoma, USA. March 31-April 2, 2017.
- *Conference on Combinatorial Algebra meets Algebraic Combinatorics*, Université du Québec à Montréal, Montréal, Québec , Canada, January 27-29, 2017.
- *Conference on Texas-Oklahoma Representations and Automorphic forms VII*, University of North Texas, Denton, TX, USA. April 8-10, 2016.
- *International Conference on Number Theory*, SASTRA University, Thanjavur, TN, India. Dec 21-22, 2015.
- *Workshop on Lie Groups, Lie Algebras and their Representations*, University of California, Riverside, USA. Feb 14-15, 2015.
- *Workshop on Combinatorial Representation Theory*, The Centre de recherches mathématiques (CRM) in Montréal, Canada. April 21-25, 2014.
- *Workshop on Hall and Cluster Algebras*, The Centre de recherches mathématiques (CRM) in Montréal, Canada. May 8-12, 2014.
- *Lecture series on Modular representations of algebraic groups* by Professor Peter Fiebig at The Institute of Mathematical Sciences, Chennai, India. October 6-19, 2013.
- *Advanced Instructional School on Chevalley Groups*, Indian Institute of Science Education and Research (IISER), Pune, India. July 2013.
- *Lecture series on Cohomological finite generation* by Professor Wilberd van der Kallen at The Institute of Mathematical Sciences, Chennai, India. June-Aug, 2013.

- Advanced Instructional School on *Commutative algebra*, Indian Institute of Technology (IIT) Madras, India. May 2013.
- Annual Foundation School III, Harish-Chandra Research Institute (HRI), Allahabad, India. July 2012.
- Lecture series on *Infinite dimensional Lie algebras* by Professor Vyjayanthi Chari at The Institute of Mathematical Sciences, Chennai, India. August 16-30, 2011.
- Annual Foundation School II, Panjab University, Chandigarh, India. July 2011.

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## Talks

### Conference/Workshop Talks

- *Geometric and Category-Theoretic approaches to Conformal Field Theory.* (Jan 5 - 9, 2026), BIRS-CMI, Chennai, India.
- *Oberwolfach Arbeitsgemeinschaft: Geometry and Representation Theory around the P=W Conjecture.* (March 31 - April 5, 2024), Oberwolfach, Germany.
- *Inter IISER-NISER Meet* (Sept 29-Oct 1, 2023), National Institute of Science Education and Research, Bhubaneswar, India.
- *Workshop on Kac-Moody geometry* (July 24-28, 2023), Kiel University, Germany.
- *WInter STAR Workshop* (Jan 29- Feb 3, 2023), Weizmann Institute of Science, Israel.
- *Conference on representation theory and integrable systems* (Aug 12-16, 2019), ETH, Zurich, Switzerland.
- *Nikolaus Conference 2018* (December 7-8), RWTH Aachen University, Germany.
- *Texas-Oklahoma Representations and Automorphic forms VII* (April 2016), University of North Texas, Denton, TX, USA.
- *International Conference on Number Theory* (December 2015), SASTRA University, Thanjavur, TN, India.

### Seminar Talks

- *seminar talk* (Sept 26, 2025) Indian Statistical Institute, Bangalore.
- *seminar talk* (Jan 9, 2025) The Institute of Mathematical Sciences, Chennai, India.
- *seminar talk* (June 18, 2024) University of Clermont Auvergne, France.
- *seminar talk* (June 13, 2024) University of Lyon, France.
- *seminar talk* (May 13, 2024) University of Vienna, Austria.
- *seminar talk* (Nov 17, 2023) Indian Institute of Science, Bangalore.
- *seminar talk* (June 13, 2023) Uppsala University, Sweden.
- *seminar talk* (March 28, 2022) Chennai Mathematical Institute, Chennai, India.
- *seminar talk* (March 3, 2022) ICTS, Bangalore, India.
- *seminar talk* (Jan 28, 2022) Harish Chandra Research Institute, Allahabad, India.
- *seminar talk* (Sep 27, 2021) Indian Statistical Institute, India.
- *seminar talk* (Dec 17, 2020) The Institute of Mathematical Sciences, Chennai, India.
- *seminar talk* (Nov 19, 2020) Northeastern University, USA.
- *seminar talk* (Oct 14, 2020) University of Edinburgh, UK.
- *seminar talk* (May 8, 2020) National Institute of Science Education and Research, Bhubaneswar, India.
- *seminar talk* (Feb 28, 2020) Central Michigan University, USA.

- *Representation theory seminar talk*(Feb 21,2020) Indiana University Purdue University Indianapolis, USA.
- *Integrable systems and Mathematical Physics seminar talk*(Feb 20,2020) Indiana University Purdue University Indianapolis, USA.
- *seminar talk*(Feb 14,2020) University of North Carolina, Chapel Hill, USA.
- *seminar talk*(Feb 13,2020) University of Pittsburgh, USA.
- *Combinatorics seminar talk*(Feb 5,2020) University of Southern California, Los Angeles, USA.
- *Combinatorics seminar talk*(Feb 4,2020) University of California, San Diego, USA.
- *Combinatorics seminar talk*(Feb 3,2020) University of California, Berkeley, USA.
- *Combinatorics seminar talk*(Jan 31,2020) San Francisco State University, USA.
- *Oberseminar talk*(Nov 15, 2019), University of Bonn, Germany.
- *seminar talk*(Oct 31,2019) University college Dublin, Ireland.
- *Seminar talk*(Sep 19, 2019), Indian Institute of Technology, Bombay, India.
- *Seminar talk*(Sep 18, 2019), Indian Institute of Science Education and Research, Pune, India.
- *Algebra and combinatorics seminar*(Sep 16, 2019), Indian Institute of Science, Bangalore, India.
- *Colloquium talk*(Sep 12, 2019), Indian Statistical Institute, Bangalore, India.
- *Seminar talk*(Feb 14, 2019), Max Planck Institute for Mathematics, Bonn, Germany.
- *Algebra seminar*(Nov 13, 2018), RWTH Aachen University, Germany
- *Algebra and combinatorics seminar*(Oct 22, 2018), North Carolina State University, USA
- *Algebra seminar*(Oct 12, 2018), Laval University, Canada.
- *Lie Group/Quantum Mathematics Seminar*(Feb 23, 2018), Rutgers University, USA.
- *Algebra seminar*(Nov 29, 2017), University of Ottawa, Canada.
- *CAGE seminar*(Nov 16, 2017), University of Pennsylvania, Philadelphia, USA.
- *Algebra seminar*(Nov 10, 2017), Rutgers University, USA.
- *Combinatorics/Partitions Seminar*(Nov 14, 2017), Pennsylvania State University, State College, PA, USA.
- *Combinatorics seminar*(Nov 3, 2017),Université du Québec à Montréal, Canada.
- *Algebra seminar*(Oct 11, 2017), University of Waterloo, Canada.
- *Algebra and Combinatorics seminar*(June 5, 2017), North Carolina State University, Raleigh, USA.
- *Algebra seminar* (October 2016), Temple University, Philadelphia, PA, USA.

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## Professional activities

- Journal refereed:
  1. Communications in Algebra,
  2. Journal of Algebra,
  3. Transformation Groups,
  4. Journal of Algebra and Applications
  5. Journal of combinatorial Theory Series A