

# 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.

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## 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

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## Research Interests

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

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## 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>)
- (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  $E_7^1$**  (Comm. Algebra. (2022) 508-523)(<https://arxiv.org/pdf/1901.00182.pdf>).
- (4) Rekha Biswal, Abdelkarim Chakhar and Xiao He; **lassification 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>).

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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>).

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## 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 Camille Jordan as a foreign researcher(Poste Rouge) for 3 months on fixed-term contract(May -Aug , 2025).

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## Teaching Experience

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| 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  |

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|--------------------|---|
| 2021               | at SMSTC(Scottish Mathematical Sciences Training Center) in Edinburgh.  |
| May 25-29,<br>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,<br>2009   | Worked as a teaching intern at DM School, Bhubaneswar where I taught Physics and Mathematics to students of Std. IX.                                      |

## 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.

## 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 Institute of Science, 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.

## 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