

Nivedita

Perimeter Institute for Theoretical Physics, Waterloo, Canada

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Work

Perimeter Institute for Theoretical Physics, Postdoctoral Researcher 2026-27

- Mathematical Physics

Upcoming Appointments

Institute for Advanced Study (IAS), Postdoctoral Scholar 2027-29

- Mathematics

Perimeter Institute for Theoretical Physics, Postdoctoral Researcher 2029-31

- Mathematical Physics

Education

University of Oxford, Doctor of Philosophy in Theoretical Physics 2021-26

Affiliations: Mathematical Institute and Department of Theoretical Physics

- Supervisors: **André Henriques (Department of Mathematics)**
- Thesis: *Towards Fully-Local 2d Chiral CFTs from Conformal Nets: Bicommutant Categories and Fusion of Their Modules* [Oxford Thesis Collection](#)

Indian Institute of Technology (IIT) Kanpur, Bachelor and Master of Technology 2016-21
Materials Science and Engineering

- Grades 9.3/10 in Bachelors; 9.71/10 in Masters.
- Supervisors: Prof. Anurag Gupta
- Thesis title: *Topology and Differential Geometry of Defects in Crystalline Lattices*
- Minors in **Quantum Mechanics, Statistical Mechanics, Cognitive Science**

Papers, Preprints, and Lecture Notes

Mathematics

- [And+25] Diogo Andrade et al. “Higher tensor categories and their extensions: notes from the Scottish Talbot On Algebra and Topology”. [arXiv:2509.10636](#) [math.QA]. Lecture Notes. Sept. 2025.
- [Fer+24] Giovanni Ferrer et al. “Dagger n -categories”. [arXiv:2403.01651](#) [math.CT]. Preprint. Submitted for publication. Mar. 2024.
- [HNP24] André Henriques, **Nivedita**, and David Penneys. “Complete W^* -categories”. [arXiv:2411.01678](#) [math.OA]. Preprint. Submitted for publication. Mar. 2024.

Physics

- [NG21] **Nivedita** and Anurag Gupta. “Revisiting the topological classification of defects in crystals”. [arXiv:2106.06699](#) [math-ph]. Preprint. June 2021.

- [NSS20] **Nivedita**, Henry Shackleton, and Subir Sachdev. “Spectral form factors of clean and random quantum Ising chains”. In: *Physical Review E* 101.4 (Apr. 2020). [arXiv:2001.06732](https://arxiv.org/abs/2001.06732) [cond-mat.str-el] DOI:10.1103/PhysRevE.101.042136, p. 042136.

Cognitive Sciences

- [Sha+24] K. M. Sharika et al. “Interpersonal heart rate synchrony predicts effective information processing in a naturalistic group decision-making task”. In: *Proceedings of the National Academy of Sciences of the United States of America* 121.21 (May 2024). DOI:10.1073/pnas.2313801121, e2313801121.
- [NK19] **Nivedita** and Devpriya Kumar. “Subliminal priming of effect increases Sense of Authorship”. In: *The 6th Annual Conference of Cognitive Science*. Ed. by Veeky Baths. BITS Pilani, K. K. Birla Goa Campus, Dec. 2019, pp. 35–38.

Academic achievements

Cecil King Travel Scholarship , <i>The London Mathematical Society</i>	2025
The London Mathematical Society administers two £6,000 travel awards funded by the Cecil King Memorial Foundation for early career mathematicians, to support a period of study or research abroad. One Scholarship is awarded to a mathematician in any area of mathematics and one to an applied mathematician.	
Prize Scholarship , <i>Merton College, University of Oxford</i>	2023
This award is reserved for those of the highest academic distinction and entitles the recipient to dine free of charge with Senior Fellows of the College at the High Table each week. It also comes with a cash award. Article	
James Buckee Scholarship , <i>Merton College, University of Oxford</i>	2021
Full financial support, including all fees (overseas) and a maintenance grant for up to 4 years for the completion of DPhil in Theoretical Physics. This is currently the most generous Graduate Scholarship in Oxford Physics.	
Director’s Gold Medal (5-year program) , <i>Indian Institute of Technology Kanpur</i>	2021
Outstanding all round achievement and leadership among students graduating in all 5-year programs, awarded by the Prime Minister of India	
Bhagwani Devi Maheswari Gold Medal , <i>Indian Institute of Technology Kanpur</i>	2021
Best all round graduating female student in any 4-year/5-year program with academic excellence, social awareness, leadership qualities and extracurricular involvement.	
General Proficiency Medal , <i>Indian Institute of Technology, Kanpur</i>	2021
Best academic performance among all graduating students of the 5-year program.	
Academic Excellence Award (5 consecutive years) , <i>Indian Institute of Kanpur, Department of Materials Science and Engineering</i>	2016 to 2021
Given to top 7% students of the university based on the grade point average of each year across all disciplines.	
S. N. Bose Scholarship , <i>Science and Engineering Research Board Department of Science and Technology, India</i> , Fully Funded research visit to Harvard University for a period of 4 months working in the Condensed Matter Theory Group supervised Prof. Subir Sachdev.	2019

Work Experience

Visiting Researcher, Department of Mathematics, University of Hamburg	2025
• 4 months research visit hosted by Prof. Ingo Runkel and Dr. David Reutter.	
Non-Stipendiary Lecturer in Physics, Merton College, Oxford	2024
• Delivering tutorials to final year physics undergraduate students, setting exam papers for college level exams (collections), preparing performance analysis of students highlighting their strengths and weaknesses to be discussed with senior tutors and the Warden of the College	
Undergraduate Admissions, Keble College, University of Oxford	2024
• Completed the undergraduate admissions training with the University and participated as interviewer in undergraduate admissions for Mathematics and Mathematics and Computer Science.	
Research Intern, Department of Physics, Harvard University	2019
• 4 months research internship working on Condensed Matter Theory on Random Ising Model, also visited the Simons Center in New York, published work in peer-reviewed journal with Prof. Subir Sachdev.	

Organizational Contributions

Elliptic objects, von Neumann algebras, and Functorial Field Theory, Switzerland	2026
• Organised an 2 week program at the Bernoulli Center, Lausanne in July 2026 with the first week in the style of a summer school followed by a conference week. • Secured funding with co-organisers and convened leading researchers in the field to drive progress on the open Segal–Stolz–Teichner conjecture.	
Tensor categories with a Functional Analytic Flavour, Hamburg	2025
• A seminar series at the University of Hamburg in Winter Semester 2025, delivered 90 minute talks on Introduction to Functional Analysis, Functional Analytic tensor Categories and Bicommutant Categories. • co-presented with Adrià Marín Salvador organised by Prof. Ingo Runkel and Prof. Christoph Schweigert.	
Advanced Class in Topology on Differential Cohomology and HoTT, Oxford	2024
• Mathematical Institute, University of Oxford, 8-week program co-organised with Adrià Marín Salvador	
Advanced Class in Topology on the FFRS construction of rational CFT correlators from Topological Field Theories, Oxford	2022
• Mathematical Institute, University of Oxford, 8-week program co-organised with Thomas Wasserman	
Gauge Theory and Knots, IIT Kanpur	2019
• Semester long seminar with weekly talks by Nivedita at IIT Kanpur followed by discussions with Prof. Aparna Dar (Mathematics) and Prof. Arijit Kundu (Condensed Matter Physics) to explore the bridge between Topology and Physics covering basics of Topology and Differential Geometry and Theory of	

Talks

Invited Conference Talks and Seminar Talks

1. (Conference) **The Category of Solitonic Representations of Conformal Nets**. July 2026, *Quasicrystals in Fundamental Physics*, ICMS, Edinburgh, United Kingdom.
2. (Conference) **Constructing Fully Extended 2d Chiral CFTs**. June 2026, *Global Categorical Symmetries 2026*, Institut Henri Poincaré, Paris, France. [Slides](#)
3. (Seminar) **Constructing 0- and 1-dimensional Part of Segal Chiral CFTs**. May 2026, *Topology Seminar*, University of Oxford, United Kingdom.
4. (Seminar) **Higher Categorical Analogues of Functional Analytic Structures**. April 2026, *York Mathematical Physics Seminar*, University of York, United Kingdom.
5. (Conference) **Fully Extended Segal Unitary Chiral CFTs from Conformal Nets**. January 2026, *Geometric and Category-Theoretic Approaches to Conformal Field Theory*, CMI–BIRS Workshop (BIRS-CMI), Chennai Mathematical Institute, India.
6. (Conference) **Category Theoretic Methods in QFT**. January 2026, *Women at the Intersection of Mathematics and Theoretical Physics (WIMP)*, ICTS, Bangalore, India. [Video](#)
7. (Seminar) **Functorial Chiral Conformal Field Theory**. December 2025, *Algebra and Topology Seminar*, Department of Mathematical Sciences, University of Copenhagen, Denmark.
8. (Seminar) **Functorial Description of Chiral CFTs**. November 2025, *Research Seminar Algebra, Geometry and Topology*, University of Greifswald, Germany.
9. (Event) **Categorifying von Neumann Algebras and their Modules**. October 2025, *Journées de topologie quantique*, Paris, France.
10. (Conference) **Bicommutant Categories from Conformal Nets**. September 2025, *Operator Algebras and Mathematical Physics*, ICMS, Edinburgh, United Kingdom. [Recording](#)
11. (Seminar) **Categories for the Working Physicist; Chiral Conformal Field Theory**. August 2025, two talks at the *High Energy Physics and String Theory Seminar*, IIT Kanpur, India.
12. (Conference) **(Solitonic) Representation Categories of Conformal Nets**. May 2025, *South West and South Wales Regional Meeting and Workshop by LMS*, Cardiff University, United Kingdom.
13. (Seminar) **Bicommutant Categories from Conformal Nets**. April 2025, *Texas Tech Topology and Geometry Seminar* (online).
14. (Event) **Chiral Conformal Field Theories**. April 2025, *SEMPs, South East Mathematical Physics Seminar*, funded by LMS, University of Hertfordshire, United Kingdom.
15. (Outreach) **Functorial Field Theories**. March 2025, *Oxford Women and Non-Binary People in Mathematics Day, Pathways to Progress*, Oxford, United Kingdom.
16. (Seminar) **Chiral Conformal Field Theories**. March 2025, *Geometry and Mathematical Physics Seminar*, University of Birmingham, United Kingdom. [Notes](#)
17. (Seminar) **Models for 2-Hilb and 3-Hilb, W^* -categories and Bicommutant Categories**. February 2025, *European Quantum Algebra Lectures (EQuAL)* (online).
18. (Seminar) **Bicommutant Categories from Conformal Nets**. January 2025, *Functional Analysis Seminar*, University of Oxford, United Kingdom. [Abstract](#)

19. (Seminar) **Towards Models for 2-Hilb and 3-Hilb as Targets for Functorial Field Theories.** November 2024, *Mathematics and Theoretical Physics Seminar*, University of Hertfordshire, United Kingdom. [Slides](#)
20. (Conference) **Bicommutant Categories from Conformal Nets.** January 2024, *CFT 3 Ways*, SwissMAP Research Station, Les Diablerets, Switzerland. [Outline](#)
21. (Event) **Towards Construction of Fully Extended Chiral Conformal Field Theories from Conformal Nets.** January 2024, *Algebraic Quantum Field Theory in the United Kingdom*, AQFTUK, Biannual Meeting, University of Nottingham, United Kingdom.

Lightning Talks

1. **My Favourite Things.** September 2025, *Higher Structures: Recent Developments and Applications*, Hamburg. [Slides](#)
2. **Bicommutant Categories – Definition.** March 2024, *Workshop on New Directions in Conformal Field Theory*, Hamburg.
3. **An (∞, d) -category of QFTs and Topological Interfaces.** August 2023, *Categorical Symmetries in Quantum Field Theory* (School and Workshop), SwissMAP Research Station in Les Diablerets.
4. **Conformal Nets, Functorial CFTs and Defects.** June 2023, *Hausdorff School on TQFTs and their Connections to Representation Theory and Mathematical Physics*, Hausdorff Centre for Mathematics.

Contributed and Expository Talks

1. (Workshop) **Higher Operator Algebraic Structures: Categorized Analogues of Hilbert Spaces and von Neumann Algebras.** May 2026, *Higher Differential Geometry*, Greifswald, Germany.
2. (Oxford Internal) **Segal and Co-Segal Nature of Bordism Categories with Topological Defects.** May 2026, Diagrammatic Math Club, Oxford (organised by Chris Douglas).
3. (Topology Advanced Class) **Conformal Nets to Unitary VOAs and Back.** Trinity Term 2026, Topology Advanced Class on Conformal Nets and Chiral CFTs, Oxford.
4. (Talbot) **Functoriality of Quantum Dimension.** September 2024, Scottish Talbot on Algebra and Topology on Higher Tensor Categories and Extensions, Glenmore. [Notes](#)
5. (Topology Advanced Class) **Pre-factorisation Algebras from Free Field Theories.** October 2024, Topology Advanced Class on Factorisation Algebras and Factorisation Homology, Oxford. [Notes](#)
6. (Topology Advanced Class) **Naturality of Chern-Weil Forms and Homotopy Theory.** May 2024, Topology Advanced Class on Smooth Differential Cohomology, Oxford. [Notes](#)
7. (Topology Advanced Class) **Poincaré Duality Revisited in Abstract Six-Functor Formalism.** October 2023, Topology Advanced Class on Six-Functor Formalism (Scholze), Oxford. [Notes](#)
8. (OWSM Seminar) **Overview of von Neumann Algebras, Conformal Nets and their Relation to Unitary VOAs.** November 2023, Oxford Symmetry Meeting. [Notes](#)
9. (Topology Advanced Class) **Spans.** May 2023, Topology Advanced Class on the AKSZ construction of TQFTs, Oxford. Showed that each object in (∞, n) -categories of n -fold spans is fully dualisable and sketched the case of Lagrangian correspondences of shifted symplectic derived stacks.

10. (OWSM Seminar) **Introduction to (∞, n) -Categories and Cobordism; Overview of Topological Defects in Field Theories**. March 2023, Oxford Symmetry Meeting. [Notes](#)
11. (Topology Advanced Class) **Hopf Algebra Objects and Related Constructions in Tensor Categories**. November 2022, Topology Advanced Class on Modular Categories and TQFTs beyond Semisimplicity, Oxford.
12. (Topology Advanced Class) **FFRS Construction of RCFT Correlators from TQFT – Construction**. May 2022, Topology Advanced Class on FFRS Construction of RCFT Correlators from TQFT, Oxford. [Slides](#)
13. (Expository Talk Series) **Introduction to Categories for Physicists and Backprop is a Functor**. December 2021, Ard Louis Research Group, Oxford. Three talks introducing categories and symmetric monoidal categories to physicists and discussing applications to Machine Learning.
14. (Expository Talk) **Super-symmetric QFT and Integral Modular Functions**. December 2020, Research Group Jürgen Jost, Max Planck Institute for Mathematics in the Sciences, Leipzig. [Slides](#)
15. (Expository Talk) **CFT and Elliptic Cohomology**. October 2020, Indian Institute of Technology Kanpur, as part of the course on CFTs. [Slides](#)
16. (Expository Talk) **Entanglement in Topological Quantum Field Theories and Complexity**. June 2020, Indian Institute of Technology Kanpur, as part of the course on Quantum Chaos. [Notes](#)
17. (Expository Talk) **Statistical Physics Methods in Cognitive Neuroscience: Critical Brain**. February 2020, Indian Institute of Technology Kanpur, as part of the course Topics in Cognitive Neuroscience. [Slides](#), [Notes](#)
18. (Popular Talk) **Topology and Materials Science**. August 2018, Indian Institute of Technology Kanpur, Department of Materials Science and Engineering. [Slides](#)

Teaching Experience

University of Oxford

- **Category Theory** (Part C course for Mathematics) Tutor, Mathematics Institute *Michaelmas Term 2024*
- **Algebraic Topology** (Part C course for Mathematics) TA *Michaelmas Term 2022*
- **Symbolic, Numerical and Graphical Scientific Programming** (Part C course for Mathematical and Theoretical Physics) TA *Trinity Term 2023, Hilary Term 2022*
- **Projective Geometry, Number Theory, Group Theory** (Part A undergraduate short options for Mathematics) TA for Exeter College *Trinity Term 2025*
- **Rings and Modules** (Part A undergraduate course for Mathematics) TA for Exeter College *Hilary Term 2025*
- **Groups and Group Actions** (Preliminary undergraduate course for Mathematics) TA for Exeter College *Trinity Term 2025, Hilary Term 2025*
- **Topology** (Part A undergraduate course for Mathematics) Tutor for Merton College *Hilary Term 2024*
- **Symmetry and Relativity** (Third year undergraduate course for Physics) Tutor for Merton College (Non-Stipendiary Lecturer) *Michaelmas Term 2023*

- **Mathematical Methods** (Second year undergraduate course for Physics) Tutor for Merton College *Michaelmas Term 2022*
- **Linear Algebra II** (Preliminary undergraduate course for Mathematics) TA for Exeter College *Hilary Term 2025, Hilary Term 2024*
- **Introduction to University Mathematics and Linear Algebra I** (Preliminary undergraduate course for Mathematics and Computer Science) TA for Exeter College *Michaelmas Term 2024*
- **Physical Basis of Chemistry: Kinetic Theory of Gases and Magnetism** (1st year undergraduate course for Chemistry) Tutor for St Hilda's College and University College *Hilary Term 2023, Hilary Term 2022*
- **Physical Basis of Chemistry: Classical Mechanics and Role of Charges** (1st year undergraduate course for Chemistry) Tutor for St Hilda's College and University College *Michaelmas Term 2022, Michaelmas Term 2021*

Indian Institute of Technology Kanpur

- **PSO201A: Quantum Physics** (2nd year undergraduate course for Physics and Materials Science and Engineering students) TA *Semester II, 2021–22*

Outreach

- **From research to outreach**, participating in events and workshops enabling researchers to create outreach content from their own research, and explore what outreach can give back to research.
- **Invited Public Lecture** for the Physics Society of the University of Oxford, [YouTube Link](#)
- Featured by Oxford Mathematics on official social media channels through multiple engaging short-form video content about mathematics and life as a graduate student, **with >2M views across platforms**.
- Volunteered for the **Mfano Africa mentorship scheme 2023** to support pre-PhD students in sub-Saharan Africa by mentoring a research project and further supporting their successful graduate school application.
- Assisted local organisers during 'A Panorama of Homotopy Theory-A Conference in Honour of Mike Hopkins', conference with attendees from around the world.
- Elected as the Welfare Officer at Merton College, Oxford as a part of the Executive Committee for the academic year of 2022-23, *Peer Support Trained* by the Oxford University Counselling Service to provide welfare support to fellow students at the college; Trained as a Mental Health First-Aider by MHFA England.
- Frequently involved in mentoring international students with the graduate school applications and outreach activities including podcast style interviews about life as a graduate student in mathematics on YouTube.
- Member of the Youth Advisory Board for IAPMD (International Association for Premenstrual Disorders)

Other Skills

- **Computer Skills:** C/C++, Java, MATLAB, Python, Mathematica, $\text{\LaTeX}$, Microsoft Office;
Languages: English (IELTS Academic 8.5/9.0, Native), Hindi (Native), Punjabi (Native), French (Level A1)
- Other interests: Psychology, Women's Mental Health and neuro-divergence, Creative writing, Urdu Poetry, Hiking and Exploring the Outdoors.