Deepak Kamlesh

https://www.maths.ox.ac.uk/people/deepak.kamlesh

Areas of Interest: Number theory and Mathematical Physics - Hopf-Galois structure of Periods, Algebraic structure of multiple zeta values, Hypergeometric functions, Drinfeld associators and the Grothendieck–Teichmüller group, Mathematical structure and computation of Feynman integrals, Integrability structure, Elliptic periods, Calabi-Yau Geometry etc.

Educational Qualifications

- **DPhil in Mathematics** (Oct 2018 -)
  Advisor - **Prof. Francis Brown**
  University of Oxford, UK
- **Master 2 - Analysis, Arithmetic and Geometry**
  Sep 2017 - July 2018
  University of Paris-Sud, Orsay, France
- **Integrated M.Sc. in Mathematics**
  Aug 2012 - July 2017
  University of Mumbai- Department of Atomic Energy, Centre for Excellence in Basic Sciences, India

Teaching Experience (Oxford)

Certification

- Successful completion of the **Preparing for learning and teaching at Oxford** certification issued by the Mathematical Institute, University of Oxford, UK
- Underwent coursework for the **Developing learning and teaching in Higher Education** certification with the MPLS division at the University of Oxford, UK

Mentor, 2020 - 2021

- **Academic Mentor** (2020-21) for a *neurodivergent* undergraduate student in Mathematics

Tutor, 2020 - 2023

- **Part C (4th year UG / Master's)** - *Algebraic Topology (visiting student)*
- **Part B (3rd year UG)** - *Commutative Algebra, Algebraic Number theory*
- **Part A (2nd year UG)** - *Rings and Modules, Number Theory (visiting student)*
- **UNIQ (Summer School)** - *Number theory (prospective Oxford students)*

Teaching Assistant, 2018 - 2020

- **Part C (4th year UG / Master's)** - *Homological Algebra, Algebraic Topology, Differential Manifolds*
- **Part B (3rd year UG)** - *Galois theory, Introduction to Representation theory, Commutative Algebra, Algebraic Number theory*
- **Part A (2nd year UG)** - *Linear Algebra, Rings and Modules*

Publications

- **Motivic coaction of generalized hypergeometric functions** - DPhil thesis (in progress, expected Feb 2024)
- **Motivic coaction and single-valued map of polylogarithms from zeta generators** (w. H. Frost, M. Hidding, C. Rodriguez, O. Schlotterer, B. Verbeek) - preprint
- **Title pending** (w. H. Frost, M. Hidding, C. Rodriguez, O. Schlotterer, B. Verbeek) - in preparation for submission to JHEP (expected 2024)

Scholarships

- **ERC Studentship**, Mathematical Institute, Oxford, Oct 2018 - Sep 2022
  To pursue a *DPhil in Mathematics* at the University of Oxford, UK
- **International Mobility Scholarship**, Paris-Saclay, Sep 2017 - June 2018
  To pursue a *Master 2 in Analysis, Arithmetic and Geometry* at the University of Paris-Sud, Orsay
  Selection pool: All international students who applied to study at institutions affiliated to Paris-Saclay
- **Charpak Masters Scholarship**, Government of France, Sep 2017 - June 2018
  To pursue a *Master 2 in Analysis, Arithmetic and Geometry* at the University of Paris-Sud, Orsay
  15 students were selected out of *all* Indian students who applied to study in France for a Masters course
- **Lebesgue Scholarship** 2017-2018 (Declined)
  Awarded by the Lebesgue center to pursue their Master's program at one of the affiliated Universities
- Funding from **SFB-878 Groups, Geometry and Action**, Sep 2016 - Nov 2016
  To work on my **Master's Thesis** at the *University of Muenster, Germany* under the supervision of *Prof. Christopher Deninger* as a visiting researcher
- *National Board of Higher Mathematics* - **Masters Scholarship**, 2015-2016 (Declined)
  Awarded to 35 students after a National Exam and Interview to pursue a Masters in Mathematics
- *Department of Science and Technology* - **INSPIRE Fellowship**, Aug 2012 - July 2017
  To pursue an *Integrated Masters in Mathematics* at the UM-DAE Centre for Excellence in Basic Sciences, Mumbai
- **Prime Minister Trophy Merit Scholar**, Aug 2012 - July 2017
  To pursue an *Integrated Masters in Mathematics* at the UM-DAE Centre for Excellence in Basic Sciences, Mumbai

Academic Projects (pre-DPhil)

- Master's Thesis - **Multiple Zeta Values** (March - June 2018)
  Supervisor - *Prof. Stephane Fischler*, University of Paris-Sud, Orsay
  Explored the theory of multiple zeta values and the associated conjectures following the text *From numbers to motives* by Javier Fresán and José Gil.
- 10th Semester project - **Homotopy Groups of Spheres** (Jan - April 2017)
  Supervisor - *Prof. A. R. Shastri*, Indian Institute of Technology, Bombay
  Following Prof. Shastri's Basic Algebraic Topology, I learned singular cohomology and computed the homotopy groups of spheres in small dimensions.
- 9th Semester project (Master's Thesis - 2016) - **p-adic analogue of Narasimhan-Seshadri theorem**
  Supervisor - *Prof. Christopher Deninger*, University of Muenster, Germany
  Addressed some fundamental open problems in Faltings p-adic Simpson theory, specifically the unitarity condition (vanishing of Higgs field) for higher dimensional representations.

- 8th Semester project - **Lines on Cubic surfaces** (Jan - April 2016)
  Supervisor - *Dr. Shameek Paul*, UM-DAE Centre for Excellence in Basic Sciences, Mumbai
  Following Shafarevich's text I learned basic Algebraic Geometry and proof of the result on 27 lines on a cubic surface.

- 7th Semester project - **Ramsey Theory** (Aug - Dec 2015)
  Supervisor - *Prof. Niranjan Balachandran*, Indian Institute of Technology, Bombay
  Learned Ramsey theory from the textbook of the same name by Graham, Rothschild and Spencer and solved exercises from Bollobas' text on Modern Graph Theory

- Visiting Student Research Program (June 2015) - **Dimension Theorem**
  (atmost 20 undergraduate and graduate students get selected nationally)
  Supervisor - *Prof. Ravi Rao*, Tata Institute of Fundamental Research, Mumbai
  Learned the Dimension Theorem in Commutative Algebra

- Winter Reading Project (Dec 2014) - **Algebraic Number Theory**
  Supervisor - *Prof. Narasimhan Chari*, University of Mumbai, Mumbai
  Learned Algebraic Number Theory from Samuel's Algebraic Theory of Numbers

- Visiting Student Research Program - **Integration by Parts in Higher Dimensions**
  (atmost 20 undergraduate and graduate students get selected nationally)
  Supervisor - *Prof. Mythily Ramaswamy*, June - July 2014, Tata Institute of Fundamental Research - Centre for Applicable Mathematics, Bangalore
  Followed Apostol's textbooks to learn multi-variable calculus and extend the Integration by Parts formula to higher dimensions

- Summer Reading Project - **Linear Algebra and its applications to computer graphics**
  Supervisor - *Prof. I. K. Rana*, May - July 2013, Indian Institute of Technology, Bombay
  Read Robinson's A course in linear algebra and explored basic applications to computer graphics using Singular Value Decomposition

Awards and Achievements

- **2nd prize, Jigyasa-2016**, UM-DAE Centre for Excellence in Basic Sciences, Mumbai
  Regional level team based science competition for University students

- **4th, Mimamsa-2015**, *Indian Institute of Scientific Education and Research, Pune*
  National level science competition, qualified from over 250 undergraduate teams of 4 who participated in the event

- **1st prize** (out of 7672 students) in *Madhava Mathematics Competition 2014* and qualified in 2013
  A national level math Olympiad competition for undergraduates in India, organized annually by the *TIFR, Homi Bhabha Center for Science Education, Mumbai*

- **Winner** *Samasya* (Math Olympiad), **2nd Prize** *Publish or Perish* (problem solving in teams) at **Pravega-2014** - An Annual Science/Cultural/Technical Fest of the *Indian Institute of Science, Bangalore* attended by science and engineering students from all over India

- Qualified **Regional Mathematics Olympiad-2011**
  Invited for **Indian National Mathematics Olympiad-2012**
  Note : Selection for the National Team which represents India at IMO is made via INMO

Conferences / Workshops / Summer Schools

- Conference on **Special values of L-functions, Periods and Fundamental Groups**, July 22-23, 2022, *All Souls College, Oxford*

- Invited talk (link) on *'Motivic coaction on generalized Hypergeometric functions'* at the **Elliptics** Conference, October 2021, *Uppsala University, Sweden*
- Talk on *Introduction to periods*, March 2020, **Junior Number Theory Seminar**, Mathematical Institute, Oxford
- Workshop on **K-theory, algebraic cycles and motivic homotopy theory**, Jan-June 2020, *Isaac Newton Institute for Mathematical Sciences, Cambridge*
- **Clay Research Conference** 2019, *Mathematical Institute, Oxford*
- Conference on **Arithmetic and Geometric aspects of Modular Forms**, July 22-23, 2019, *All Souls College, Oxford*
- **Masterclass on Elliptic Motives**, May 20-24, 2019, *Stockholm Mathematics Centre*
- Organized a **learning seminar on Algebraic Geometry** following Ravi Vakil's notes, Hilary term, Oxford, 2019
- Talk on *The Reimann zeta function*, Nov 2018, **GALOP Seminar**, Mathematical Institute, Oxford
- **Riemann Conference**, October 4-7, 2016, *University of Munster, Germany*
- Winter School on **Higgs Bundles and Fundamental Groups of Algebraic Varieties** Sep 27-30, 2016, *University of Duisburg-Essen*
- TIFR **Advanced Instructional School on Differential Geometry** May 9-28, 2016, Indian Institute of Technology, Bombay
- **Complex Systems Winter School**, Dec 6-21, 2015
  Organized by *Santa Fe Institute USA and IISER Mohali*
  Application of mathematics and physics to biology, economics, finance, CS and social sciences
- **Physics of Life-2015** monsoon school, June 21-27, 2015
  TIFR National Centre for Biological Sciences, Bangalore
  On application of mathematics to biology. During the school I was part of a small group which collected and analyzed the sound made by crickets to try to differentiate between danger signals, mating calls, signaling food sources etc using Fourier analytic methods
- **Modern Mathematics International Summer School**, Aug 20-30, 2014
  Ecole Normale Superieure de Lyon, France
  I was one of the only two Indian students selected for the summer school, which was participated by over 80 students from 40 different countries
- **Madhava Nurture Camp 2013** (by invitation), *Bhaskaracharya Pratisthana, Pune*
  Mathematics camp for undergraduates focused on Geometry and Number Theory
- **Young Talent Nurture Camp 2013**, *Indian Institute of Space Science and Technology, Trivandrum*
  Mathematics camp for undergraduates focused on Algebra, Analysis and Topology
- **Pre-Indian National Mathematics Olympiad Camp - 2012**
  Pre-Regional Mathematics Olympiad Camp - 2010 , 2011

Programming skills

- *Proof assistant* - **Lean**
- *Computer Algebra Systems* - **SAGE, Mathematica**
- *Programming Languages* - **Python, FORTRAN, C++**

Extra-Curricular Activities

- Elected co-chair of the Oxford SU's **International Students Campaign** 2019-20
- Volunteered to be a **Junior advisor** at St Cross College, **DPhil buddy** at Mathematical Institute, **Mentor** for OxFEST - Oxford females in Science, Engineering and Technology, **Parent** for Oxford SU's Class Act College Family Scheme
- Volunteered to be a **Health and Safety officer** at St Cross college's bops
- Volunteer for the **Oxford Maths Festival** in 2019, 2020
- Marked papers for the **Mathematics Admissions Test** 2018-2019, 2019-2020 at Oxford
- Prepared the *Math Question Paper* for **Jigyasa-2015**
  A team based science quiz competition for University students in Mumbai and Pune, organized annually by UM-DAE CEBS, Mumbai
- **College Ambassador** for Pravega-2014, 2015, 2016
  The Annual Science/Cultural/Technical Fest, *Indian Institute of Science, Bangalore*
- Elected Member (Secretary) of the **Student Council** of *UM-DAE CEBS, Mumbai*