Nilava Metya

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Education

Rutgers, the State University of New Jersey - New Brunswick — **Sep '22 – (expected) '27**
Doctor of Philosophy in Mathematics | ***CGPA:*** 4.0/4.0 — *Piscataway, New Jersey, USA*
(passed written qualifying exams in first attempt just before program started)

Chennai Mathematical Institute — **Aug '19 – May '22**
Bachelor of Science (Honours) in Mathematics and Computer Science | ***CGPA:*** 9.72/10 — *Chennai, Tamil Nadu, India*
Position: ***Third*** *(out of 55 students)*
(completed degree requirements in 2.5 years)

Don Bosco School, Liluah — **Apr '06 – Mar '19**
Indian School Certificate (ISC) *2019* | ***Percentage:*** 97.25% — *Howrah, West Bengal, India*
Position: ***First*** *in science stream (∼ 55 students),* ***second*** *overall (∼ 180 students)*
Indian Certificate of Secondary Education (ICSE) *2017* | ***Percentage:*** 96.6%
Position: ***First*** *in school (∼ 180 students)*

Coursework

- Quantum Computation
- Matrix Computations
- (Measure theoretic) Probability
- Statistics with R
- Data Mining
- Topological Data Analysis
- Differential Equations
- Smooth Manifolds[1]
- Algebraic Topology
- Basic Functional Analysis
- Complex Analysis
- Quiver Representations
- Algebraic Number Theory
- Sheaves and Schemes
- Topics in Algebraic geometry
- Homological Algebra
- Haskell
- Python
- Object Oriented Programming
- Algorithm Design and Analysis
- Discrete Mathematics
- Automata Theory
- Lambda Calculus
- Formal Security Analysis (applied pi calculus, ProVerif, CryptoVerif, F*)
- Newtonian, Lagrangian, Hamiltonian mechanics
- Relativity, Dynamical Systems
- Convex/Conic Optimization^{current}
- Learning Theory^{current}

Relevant Directed Reading

Quantum information (representation theory) | ***Siddhartha Sahi*** | Rutgers University — **Sep – Dec '22**
Read a part of Dr. Christandl's thesis titled 'The Structure of Bipartite Quantum States - Insights from Group Theory and Cryptography'; weekly discussions

Quiver representations and invariants | ***Anne-Marie Aubert*** | Sorbonne University — **Jun '22**
Read a paper on quivers by Daniele Faenzi, and learnt relevant topics in algebraic geometry

Markov Chain and Monte Carlo | ***R V Ramamoorthi*** — **Aug - Sep '21**
A paper on MCMC by KB Athreya, M Delampady, T Krishnan from Resonance, Volume 8, 2003

p-adic analysis | ***Anup Dixit*** | IMSc, Chennai — **May - Jul '21**
Neal Koblitz's book 'p-adic Numbers, p-adic Analysis, and Zeta-Functions' and the paper 'The Derivative of p-adic Dirichlet Series at $s = O$' by H M Stark

Representation theory of Lie algebras | ***Apoorva Khare*** | IISc, Bangalore — **May - Jul '21**
James E Humphreys's book 'Introduction to Lie Algebras and Representation Theory'

[1] Gray color represents courses that are light on analysis and computer science

Publications/Preprints

1. G DePaul, S Hoşten, **N Metya**, I Nometa. Degrees of the Wasserstein distance to small toric models. *Journal of Algebraic Statistics*

Attendance in conferences/workshops

Princeton Machine Learning Theory Summer School | *Summer School* | Princeton **August '24**
Efficient Algorithms for High Dimensional Metrics | *Workshop* | Rutgers, New Brunswick **May '24**
Bayesian Statistics and Statistical Learning | *Workshop* | IMSI, Chicago **Dec '23**
Algebraic Statistics for Ecological and Biological Systems | *Workshop* | IMSI, Chicago **Oct '23**
Apprenticeship Week: Varieties from Statistics | IMSI, Chicago **Oct '23**
Invitation to Algebraic Statistics and Applications | IMSI, Chicago **Sep '23**
Permutation and Causal Inference: Connections and Applications | IMSI, Chicago **Aug '23**
Algebraic Methods in Biochemical Reaction Networks | MPI, Leipzig **Jun '23**
Computations and Data in Algebraic Statistics (online) | BIRS, Oaxaca **May '23**
Joint Mathematics Meetings | Boston **Jan '23**
AlGeCom-XII (Algebra Geometry and Combinatorics day) | UIUC **Oct '22**

Teaching and Grading

Workshop leader for Calculus II | Rutgers **Sep – Dec '23, Jan – Apr '24**

Head Counselor at PROMYS India | IISc Bangalore **May – Jun '23**

Grader | Rutgers University

Algebra II	Jan – Apr '24
Linear Algebra and Applications	Sep – Dec '23
Analysis II	Jan – Apr '23
Topics in Applied Algebra	Jan – Apr '23
Topology	Sep – Dec '22
Theory of Numbers	Sep – Dec '22

Teaching Assistant | Chennai Mathematical Institute

Algebra II (Group theory)	*BSc 1st year*	***Prof Manoj Kummini***	Jan – May '22
Algebra I (Linear algebra)	*BSc 1st year - head tutor*	***Prof T R Ramadas***	Sep – Dec '21
Functional Programming in Haskell	*BSc and MSc Comp. Sci. 1st year*	***Prof S P Suresh***	Sep – Dec '21
Probability Theory	*BSc 1st year*	***Prof P Sankaran***	Apr – Jul '21
Discrete Mathematics	*BSc 1st year*	***Prof K V Subrahmanyam***	Apr – Jul '21
Design and Analysis of Algorithms	*MSc Data Science 1st year*	***Prof G Philip***	Apr – Jul '21
Algebra I (Linear algebra)	*BSc 1st year*	***Prof T R Ramadas***	Dec '20 – Mar '21
Functional Programming in Haskell	*BSc and MSc Comp. Sci. 1st year*	***Prof S P Suresh***	Dec '20 – Mar '21

Counselor at PROMYS | Boston University **Jul – Aug '20, '21**

Talks Delivered

Principal Components along Quiver representations | 1 *talk* | Rutgers course: *Computational Topology* **Dec '23**
Inference on growth process of a network | 1 *talk* | Rutgers course: *Data Mining* **Dec '23**
Representations as sections of Line Bundles | 1 *talk* | Princeton course: *Topics in Algebraic Geometry* **Dec '23**
Complexity of Optimization | 1 *talk* | Rutgers *Pizza Seminar* **Oct '23**
Complexity of Computing Wasserstein Distance | 1 *talk* | *Apprenticeship Week* at IMSI, Chicago **Oct '23**
Quiver Reps - geometry & invariants | 1 *talk* | Rutgers *Algebra 'N' Geometry Learning Seminar* **Apr '23**
Quiver Reps - Intro | 1 *talk* | Rutgers *Graduate Algebra and Representation Theory Seminar* **Dec '22**
Burnside p^aq^b theorem | 1 *talk* | Rutgers *Graduate Number Theory Learning Seminar* **Nov '22**
Very basic Lie Theory | 1 *talk* | Rutgers *Graduate Geometry and Topology Learning Seminar* **Oct '22**
Kneser graph coloring | 1 *talk* | Rutgers *Graduate Combinatorics Seminar* **Oct '22**
Well definedness of Brauer group | 1 *talk* | Rutgers *Algebra 'N' Geometry Learning Seminar* **Sep '22**
Fiedler vector method | 1 *talk* | CMI course: *Matrix Computations* **May '22**
Derivative of p-adic Dirichlet series at $s = 0$ (Stark) | 1 *talk* | Internship with *Prof Dixit* **Nov '21**
Dehn's proof of Hilbert's 3^{rd} problem | 1 *talk* | CMI *Student Seminar* **Nov '21**
Markov Chain Monte Carlo | 1 *talk* | Internship with *Prof Ramamoorthi* **Sep '21**
Lie Algebras and Representation Theory | 3 *talks* | Counselor Seminar at *PROMYS* **Jul – Aug '21**
Introduction to Hyperbolic Geometry | 1 *talk* | Counselor Seminar at *PROMYS* **Jul '21**
Introduction to Quantum Computing | 4 *talks* | Counselor Seminar at *PROMYS* **Jul – Aug '20**

Honours and Awards

Nominated by Rutgers Math department for SLMath summer school **Jun '23**
Summer school at Leipzig - awarded full travel funding. Only two students from Rutgers Math were fully funded by SLMath.

Academic Excellence Award at Rutgers **Sep '22**
Received a certificate and $100 based on performance in Written Qualifying Exams.

Shriram Scholarship at CMI **'19 – '22**
Received institutional fee waiver and monthly stipend (based on entrance exam).

Ranked 4^{th} nationally at the *Bachelor of Statistics* (B.Stat.) entrance examination **'19**
Indian Statistical Institute (ISI)

Informatics Olympiad **'17, '18, '19**
*Selected among (approx) top 100-130 school students in India in **Zonal Informatics Olympiad** (ZIO).*

Mathematical Olympiad **Jan '18**
*Selected for **Indian National Mathematical Olympiad** (INMO) **Training Camp** | top 30 school students in West Bengal.*

Program in Mathematics for Young Scientists (PROMYS) **'18, '19, '20, '21**
*Awarded the **Tara and Jasubhai Mehta Fellowship** to PROMYS (among 5 Indian school students in 2018) based on a competitive process. Participated twice as a student ('18, '19) and twice as a counselor ('20, '21).*

Others

- Qualified for **International Collegiate Programming Contest** (ICPC) Kharagpur regionals and Amritapuri regionals in 2019 and secured rank 35 among (approx) 90 university teams at Kharagpur.
- Selected among top 30 students in India to participate in **Scholastic Test of Excellence in Mathematical Sciences** (STEMS) camp at CMI in 2018, based on a competitive exam (across grades $9 - 12$ and across Math, Physics, Computer Science).
- Secured the **third position** in **Mathematics Talent Reward Programme** (MTRP) 2016, organized by ISI Kolkata, based on a competitive exam and quizzes at a camp.

Service

Algebra 'N' Geometry Learning Seminar (ANGeLS) | *Organizer* | Rutgers Math Department **Jan - Apr '23**

Student Seminar | *Organizer* | Chennai Mathematical Institute **Oct - Dec '22**

ICO Camp (online) | *Combinatorics teacher* | CodeChef **Nov '20**

Skills

Languages	Bengali (mother tongue), English (fluent), Hindi (fluent)
Programming	JAVA, C++, Python, Haskell, R, HTML, SageMath, Maple, Macaulay2
Documentation	LaTeX, Microsoft Word