

# NILAVA METYA

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DOB: December 30, 2001 (Age: 21)

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## EDUCATION

### Rutgers, the State University of New Jersey - New Brunswick

*Doctor of Philosophy in Mathematics* | CGPA: 4.0/4.0

(passed written qualifying exams in first attempt just before program started)

Sep '22 – (expected) '27

Piscataway, New Jersey, USA

### Chennai Mathematical Institute

*Bachelor of Science (Honours) in Mathematics and Computer Science* | CGPA: 9.72/10

Position: *Third* (out of 55 students)

Aug '19 – May '22

Chennai, Tamil Nadu, India

### Don Bosco School, Liluah

*Indian School Certificate (ISC) 2019* | *Percentage*: 97.25%

Position: *First* in science stream (~ 55 students), *second* overall (~ 180 students)

Apr '06 – Mar '19

*Indian Certificate of Secondary Education (ICSE) 2017* | *Percentage*: 96.6%

Position: *First* in school (~ 180 students)

Howrah, West Bengal, India

## COURSEWORK

- Quantum Computation
- Matrix Computations
- (Measure theoretic) Probability
- Statistics with R
- Data Mining
- Topological Data Analysis
- Differential Equations
- Smooth Manifolds
- 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
- Mechanics, Relativity, Dynamical Systems
- Convex/Conic Optimization<sup>soon</sup>
- Learning Theory<sup>soon</sup>

## RELEVANT DIRECTED READING

### Quantum information (representation theory) | *Siddhartha Sahi* | Rutgers University

Read a part of Dr. Christandl's thesis titled 'The Structure of Bipartite Quantum States - Insights from Group Theory and Cryptography'; weekly discussions

Sep – Dec '22

### Quiver representations and invariants | *Anne-Marie Aubert* | Sorbonne University

Read a paper on quivers by Daniele Faenzi, and learnt relevant topics in algebraic geometry

Jun '22

### Markov Chain and Monte Carlo | *R V Ramamoorthi*

A paper on MCMC by KB Athreya, M Delampady, T Krishnan from Resonance, Volume 8, 2003

Aug – Sep '21

### *p*-adic analysis | *Anup Dixit* | IMSc, Chennai

Neal Koblitz's book '*p*-adic Numbers, *p*-adic Analysis, and Zeta-Functions' and the paper 'The Derivative of *p*-adic Dirichlet Series at  $s = 0$ ' by H M Stark

May – Jul '21

### Representation theory of Lie algebras | *Apoorva Khare* | IISc, Bangalore

James E Humphreys's book 'Introduction to Lie Algebras and Representation Theory'

May – Jul '21

## RESEARCH

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

## ATTENDANCE IN CONFERENCES/WORKSHOPS

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Bayesian Statistics and Statistical Learning   <i>Workshop</i>   IMSI, Chicago	Dec '23
Algebraic Statistics for Ecological and Biological Systems   <i>Workshop</i>   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

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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

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

## HONOURS AND AWARDS

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<b>Nominated by Rutgers Math department</b> for SLMath summer school <i>Summer school at Leipzig - awarded full travel funding. Only two students from Rutgers Math were fully funded by SLMath.</i>	Jan '23
<b>Academic Excellence Award</b> at Rutgers <i>Received a certificate and \$100 based on performance in Written Qualifying Exams.</i>	Sep '22
<b>Shriram Scholarship</b> at CMI <i>Received institutional fee waiver and monthly stipend (based on entrance exam).</i>	'19 – '22
<b>Ranked 4<sup>th</sup> nationally at the Bachelor of Statistics (B.Stat.) entrance examination</b> <i>Indian Statistical Institute (ISI)</i>	'19
<b>Informatics Olympiad</b> <i>Selected among (approx) top 100-130 school students in India in Zonal Informatics Olympiad (ZIO).</i>	'17, '18, '19
<b>Mathematical Olympiad</b> <i>Selected for Indian National Mathematical Olympiad (INMO) Training Camp   top 30 school students in West Bengal.</i>	Jan '18
<b>Program in Mathematics for Young Scientists (PROMYS)</b> <i>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).</i>	'18, '19, '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

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<b>Algebra ‘N’ Geometry Learning Seminar (ANGeLS)</b>   <i>Organizer</i>   Rutgers Math Department	<b>Jan - Apr ’23</b>
<b>Student Seminar</b>   <i>Organizer</i>   Chennai Mathematical Institute	<b>Oct - Dec ’22</b>
<b>ICO Camp</b> (online)   <i>Combinatorics teacher</i>   CodeChef	<b>Nov ’20</b>

## SKILLS

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<b>Languages</b>	Bengali (mother tongue), English (fluent), Hindi (fluent)
<b>Programming</b>	JAVA, C++, Python, Haskell, R, HTML, SageMath, Maple, Macaulay2
<b>Documentation</b>	L <sup>A</sup> T <sub>E</sub> X, Microsoft Word