Anurag Sahay

Curriculum Vitae

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Education

2018– **Doctor of Philosophy**, *Mathematics*,
University of Rochester, *GPA* – 4.0/4.0.

2011–2016 **Master of Science (Dual Degree)**, *Mathematics and Scientific Computing*,
Indian Institute of Technology, Kanpur, *CPI* – 7.9/10.0.

2011–2016 **Bachelor of Science (Dual Degree)**, *Mathematics and Scientific Computing*,
Indian Institute of Technology, Kanpur, *CPI* – 8.6/10.0.
Graduated with Distinction;
Minors in: (1) Theory of Computing; and (2) Literature

Research Interests

Additive Combinatorics, Analytic Number Theory, Applications to Theoretical Computer Science.

Project Work

Jan–Apr '16 **The Hidden Subgroup Problem**, *IITK*.
Supervised by: Dr. Rajat Mittal, Dept. of Computer Science and Engineering
The speedup over classical time of many quantum algorithms depend crucially on the ability of quantum computers to solve the Hidden Subgroup Problem for specific groups. Surveyed existing methods using the quantum Fourier transform for a class project.

Jan–Apr '16 **MS Thesis, Part II: Prime Numbers and Arithmetic Progressions**, *IITK*.
Supervised by: Dr. Somnath Jha, Dept. of Mathematics and Statistics
Studied the proof of the Prime Number Theorem in Arithmetic Progressions, a simultaneous generalization of Dirichlet's theorem on APs and the classical PNT. Presented a survey emphasizing how the proof depends on the proofs of the earlier theorems.

Jul–Nov '15 **MS Thesis, Part I: The Vinogradov Theorem**, *IITK*.
Supervised by: Dr. Somnath Jha, Dept. of Mathematics and Statistics
Studied Vinogradov's three-prime theorem, an asymptotic weakening of Goldbach's odd conjecture. Presented a proof due to Hardy and Littlewood contingent on the Generalized Riemann Hypothesis.

Jan–Apr '15 **Additive Combinatorics and Szémeredi's Regularity Lemma**, *IITK*.
Supervised by: Dr. Rajat Mittal, Dept. of Computer Science and Engineering
Studied graph-theoretic methods in Additive Combinatorics, specifically the proof of the regularity lemma, which allows one to prove structure results about random graphs.

Jul–Nov '14 **Additive Combinatorics and Incidence Geometry: Kakeya's Problem**, *IITK*.
Supervised by: Dr. Nitin Saxena, Dept. of Computer Science and Engineering
Studied the application of methods from Additive Combinatorics to Incidence Geometry, specifically to the Kakeya problem in the reals and in finite fields. Surveyed some good bounds for the real case, and presented the proof by Zeev Dvir that completely settles the finite field case.

Jan–Apr '14 **Arithmetic Progressions in Sets of Integers**, *IITK*.
Supervised by: Prof. Shobha Madan, Dept. of Mathematics and Statistics
Studied a Fourier-analytic proof of Roth's theorem via a density increase argument, with a specific emphasis in the presentation towards seeing the structure-randomness dichotomy from Additive Combinatorics.

Jul–Nov '13 **Fourier Analysis on Finite Abelian Groups**, *IITK*.
Supervised by: Prof. Shobha Madan, Dept. of Mathematics and Statistics
Studied the standard proof of Dirichlet's theorem for Arithmetic Progression via Dirichlet characters, after developing the general theory of Fourier analysis on finite Abelian groups by character theory.

May–Jul '13 **The Bombieri-Vinogradov Theorem**, *IMSc, Chennai*.
Supervised by: Prof. R. Balasubramanian, Director and Dr. Sanoli Gun, Reader
Considered a proof of the Bombieri-Vinogradov theorem (a crucial tool in the work of Goldston-Pintz-Yildirim and Maynard-Tao-Zhang in the recent small gaps between primes breakthroughs) by a large sieve inequality.

Jun–Jul '12 **Partitions and Rademacher's Exact Formula**, *IIT Delhi*.
Supervised by: Dr. Amitabha Tripathi, Dept. of Mathematics
Studied the general theory of partitions from number theory, culminating in a proof of Rademacher's exact formula for $p(n)$ using the Circle method.

Awards and Achievements

2016 **Ratan Swarup Memorial Prize**, *Indian Institute of Technology, Kanpur*.
Best all round undergraduate student graduating at the Convocation of IIT Kanpur.

2016 **IIT Kanpur Excellence Award for Leadership in Students' Affairs**.

2014 **Prof. J.N. Kanpur Prize**, *Department of Mathematics and Statistics, IITK*.
Best undergraduate/Masters student in the Department of Mathematics and Statistics at the end of the third year (for undergraduates) and first year (for Masters students).

2013–14 **Academic Excellence Award**, *Senate Scholarships and Prizes Committee, IITK*.
Top 10% among students of the Institute in an Academic Year.

2013 **Summer Research Fellowship**, *Indian Science Academies*.
Awarded by IASc, Bangalore; INSA, Delhi; and NASI, Allahabad to do a research project under the guidance of Prof. R. Balasubramanian and Dr. Sanoli Gun at the Institute of Mathematical Sciences, Chennai.

2011 **Kishore Vaigyanik Protsahan Yojana (KVPY) SX Fellowship**, *IISc Bangalore*.
Awarded to 78 (out of about 100,000 applicants) undergraduate students excelling in the fields of science to encourage them to take up research careers as scientists.

2008 **NTSE Scholarship**, *National Council of Educational Research and Training*.
Awarded to the top 1000 high school students in India on the basis of a National Talent Search Examination (NTSE).

Research Schools and Workshops

Summer'14 Summer School in Analytic Number Theory, IHÉS, France

Summer'13 Science Academies' Lecture Workshop, IMSc, Chennai

Winter'11 Vijyoshi Camp, IISc Bangalore

Summer'11 Canada/USA Mathcamp

Work Experience

Sep '16– Sep '17 **Boston Consulting Group**, *Gurgaon, Haryana, India.*
Associate

May '15– Jul '15 **Deutsche Bank (DB Centre)**, *Mumbai, Maharashtra, India.*
Summer Analyst

Positions of Responsibility

2014-2015 **Students' Senate**, *Indian Institute of Technology*, Kanpur.
Chairperson, Students' Senate

2012-2015 **Senate Undergraduate Committee**, *Indian Institute of Technology*, Kanpur.
Students' Senate Nominee

2012-2014 **Counselling Service**, *Indian Institute of Technology*, Kanpur.
(Senior) Academic Mentor

2010-2011 **Mathematical Society**, *Delhi Public School*, R.K. Puram.
Vice President

Skills

Languages: English (Native) | Hindi (Native) | French (Elementary)
Programming: C (Native) | C++ | Python
Tools: Django | HTML | MS-Word | MS-Excel | SageMath | LaTeX