

## Nitin Saurabh

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### CONTACT INFORMATION

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### RESEARCH INTEREST

Theoretical Computer Science: more specifically, Boolean complexity, Analysis of Boolean functions, Algebraic complexity theory, and lower bounds.

### EMPLOYMENT

**Technion - IIT**, Haifa, Israel

Postdoctoral Fellow (November 2019 - till present)  
Host: [Prof. Yuval Filmus](#)

**Max Planck Institut für Informatik**, Saarbrücken, Germany

Postdoctoral Fellow (January 2018 - August 2019)  
Department 1: Algorithms and Complexity  
Host: [Dr. Christian Ikenmeyer](#).

**Charles University**, Prague, Czech Republic

Postdoctoral Fellow (September 2016 - November 2017)  
Host: [Prof. Michal Koucký](#).

### EDUCATION

**The Institute of Mathematical Sciences**, Chennai, India

Integrated Ph.D. (Theoretical Computer Science) (August 2010 - July 2016)  
Thesis: [Analysis of Algebraic Complexity Classes and Boolean Functions](#) (Defended: December 2016)  
Advisor: [Prof. Meena Mahajan](#).

**Chennai Mathematical Institute**, Chennai, India

Bachelor of Science (Hons. in Mathematics and Computer Science) (Aug 2007 - April 2010)

### ACADEMIC VISITS

Centrum Wiskunde & Informatica (CWI), Amsterdam, July-August 2017. My host here was [Prof. Ronald de Wolf](#).

Swedish Summer School in Computer Science, Stockholm, Sweden, July 2017.

Chebyshev Laboratory, St. Petersburg State University, St. Petersburg, Russia, May-June 2016.

Department of Computer Science, Tel Aviv University, Tel Aviv, Israel, Feb 2016.

Department of Computer Science, Simon Fraser University, Vancouver, Canada, Jan-July 2013. My host here was [Prof. Valentine Kabanets](#).

Mathematical Computer Science group, Aarhus university, Aarhus, Denmark, August 2011. My host here was [Prof. Kristoffer Arnsfelt Hansen](#).

Microsoft Research India, Research Intern, May-July 2011. My host here was [Dr. Satya Lokam](#).

## PUBLICATIONS

### On the complexity of detecting hazards

Balagopal Komarath and Nitin Saurabh.

*To appear in Information Processing Letters (IPL)* 2020.

### Algebraic Branching Programs, Border Complexity, and Tangent Spaces

Markus Bläser, Christian Ikenmeyer, Meena Mahajan, Anurag Pandey and Nitin Saurabh.

*To appear in 35th Computational Complexity Conference (CCC)* 2020.

### Lower bounds for Linear Decision Lists

Arkadev Chattopadhyay, Meena Mahajan, Nikhil Mande and Nitin Saurabh.

*Chicago Journal of Theoretical Computer Science (CJTCS)* 2020(1), 2020.

### Improved bounds on Fourier entropy and Min-entropy

Srinivasan Arunachalam, Sourav Chakraborty, Michal Koucký, Nitin Saurabh and Ronald de Wolf.

*Preliminary version in 37th International Symposium on Theoretical Aspects of Computer Science (STACS)* 2020.

### Space-optimal quasi-Gray codes with logarithmic read complexity

Diptarka Chakraborty, Debarati Das, Michal Koucký and Nitin Saurabh.

*Preliminary version in 26th European Symposium on Algorithms (ESA)* 2018.

### Fourier entropy-Influence Conjecture for random Linear Threshold Functions

Sourav Chakraborty, Sushrut Karmalkar, Srijita Kundu, Satya Lokam and Nitin Saurabh.

*Preliminary version in 13th Latin American Theoretical Informatics Symposium (LATIN)* 2018.

### Some Complete and Intermediate polynomials in algebraic complexity theory

Meena Mahajan and Nitin Saurabh.

*Theory of Computing Systems (TOCS)*, 62(3), 2018. *Special issue of CSR* 2016.

*Preliminary version in 11th International Computer Science Symposium in Russia (CSR)*, 2016.

Winner of the **Best Paper Award** at CSR 2016.

### VNP=VP in the multilinear world

Meena Mahajan, Nitin Saurabh and Sébastien Tavenas.

*Information Processing Letters (IPL)*, 116(2), 2016.

### Upper bounds on Fourier entropy

Sourav Chakraborty, Raghav Kulkarni, Satya Lokam and Nitin Saurabh.

*Theoretical Computer Science (TCS)*, vol. 654, 2016. *Special issue of COCOON* 2015.

*Preliminary version in 21st International Computing and Combinatorics Conference (COCOON)*, 2015.

### Homomorphism polynomials complete for VP

Arnaud Durand, Meena Mahajan, Guillaume Malod, Nicolas de Rugy-Altherre and Nitin Saurabh.

*Chicago Journal of Theoretical Computer Science (CJTCS)* 2016(3), 2016.

*Preliminary version in 34th Foundations of Software Technology and Theoretical Computer Science Conference (FSTTCS)*, 2014.

### An improved deterministic #SAT algorithm for small de Morgan formulas

Ruiwen Chen, Valentine Kabanets and Nitin Saurabh.

*Algorithmica* 76(1), 2016.

*Preliminary version in 39th International Symposium on Mathematical Foundations of Computer Science (MFCS)*, 2014.

### Counting paths in planar width 2 branching programs

Meena Mahajan, Nitin Saurabh and Karteeek Sreenivasaiiah.

*Preliminary version in 18th Computing: the Australasian Theory Symposium (CATS), 2012.*

#### TALKS

*“Improved upper bounds on Fourier entropy”*, **Workshop on Sensitivity, Query Complexity, Communication Complexity and Fourier Analysis of Boolean Function**, ISI, Kolkata, February 2020.

*“On Fourier entropy-influence conjecture”*, **MPI-INF and MPI-MiS joint workshop on Theoretical Computer Science and Algebraic Geometry**, Saarbrücken, January 2019.

*“Space-Optimal Quasi-Gray Codes with Logarithmic Read Complexity”*, **MPII**, Saarbrücken, February 2018.

*“Upper bounds on Fourier entropy”*, **MPII**, Saarbrücken, August 2017.

*“Some Complete and Intermediate polynomials in Algebraic complexity theory”*, **CSR**, St. Petersburg, June 2016.

*“Upper bounds on Fourier entropy”*, **Charles University**, Prague, March 2016.

*“Homomorphism Polynomials Complete for VP”*, **FSTTCS**, Delhi, Dec 2014.

*“Deterministic #SAT algorithm for de Morgan formulas”*, **MFCS**, Budapest, Aug 2014.

*“Deterministic #SAT algorithm for de Morgan formulas”*, **IMSc**, Chennai, Aug 2014.

*“Counting paths in planar width 2 branching programs”*, **CATS**, Melbourne, Feb 2012.

*“Counting paths in planar width 2 branching programs”*, **IMSc**, Chennai, Jan 2012.

#### AWARDS AND HONOURS

Winner of the **best paper award** at CSR 2016.

<https://people.mpi-inf.mpg.de/~nsaurabh/CSR.pdf>

Recipient of the **Canadian Commonwealth Scholarship Program** 2012-13 by the Canadian Bureau for International Education. This enabled me to visit Simon Fraser University, Canada, where I was working under the guidance of [Prof. Valentine Kabanets](#).

<https://people.mpi-inf.mpg.de/~nsaurabh/CCSP-award-letter.pdf>

One of the two recipients of the **student travel award** by ACM India to attend ACM Turing centenary celebration, San Francisco, June 2012.

<https://people.mpi-inf.mpg.de/~nsaurabh/ACMPressRelease.pdf>

Recipient (2007-2010) of **Scholarship for Higher Education** (SHE), an INSPIRE Scholarship given by the Department of Science and Technology, Government of India.

Secured the **first** place in the **Regional Mathematics Olympiad** (RMO), 2006, in the State of Jharkhand, India.

#### TEACHING EXPERIENCE

**Introduction to Boolean Function Complexity** (Advanced Course).

Course Lecturer – Max Planck Institut für Informatik, Saarbrücken (April - July 2019).

**Discrete Mathematics** (Graduate Course).

Teaching Assistant – The Institute of Mathematical Sciences, Chennai (August - December 2014).

**Incidence Theorems and their Applications** (Reading Group).

jointly organized with Swaroop N P, Syed Meesum and Meena Mahajan – The Institute of Mathematical Sciences, Chennai (January - April 2014).

**Linear Programming and Combinatorial Optimization** (Graduate Course).

Teaching Assistant – The Institute of Mathematical Sciences, Chennai (August - December 2012).

PROFESSIONAL  
ACTIVITIES

**Participation in conferences and workshops (selected)**

- Workshop on Sensitivity, Query Complexity, Communication Complexity and Fourier Analysis of Boolean Function. Kolkata, India (February 2020).
- Complexity, Algorithms, Automata and Logic Meet. Chennai, India (January 2019).
- MPI-INF and MPI-MiS joint workshop on Theoretical Computer Science and Algebraic Geometry, Saarbrücken (January 2019).
- Summer School on Algorithms and Lower Bounds. Prague, Czechia (July 2018).
- S3CS: Swedish Summer School in Computer Science. Stockholm, Sweden (July 2017).
- Perspectives on Complexity Theory and Cryptography. Bangalore, India (January 2017).
- 11th Computer Science Symposium in Russia. St. Petersburg, Russia (June 2016).
- Special semester program on Complexity Theory. St. Petersburg, Russia (May-June 2016).
- Workshop on Algebraic Complexity Theory (Saarbrücken 2014, Tel Aviv 2016, Paris 2018, Bangalore 2019).
- Foundations of Software Technology and Theoretical Computer Science Conference (December 2014, 2012, 2011 and 2010).
- Workshop on Computational Complexity at Banff International Research Station. Banff, Canada (July 2013).
- Mysore Park workshop on *Recent trends in Algorithms and Complexity* at Infosys Mysore, India, in 2012, 2011, and 2010.
- ACM A.M. Turing Centenary Celebration. San Francisco, USA (June 2012).
- ICM-2010 satellite conference on Algebraic and Probabilistic Aspects of Combinatorics and Computing at IISc Bangalore 2010.

**Review Service**

- **Journal:** Journal of Computer and System Sciences (JCSC).
- **Conferences:** FOCS, CCC, SODA, ICALP, STACS, FSTTCS, CSR, RANDOM, ISSAC, FAW, ISAAC, CIAC, SWAT.

## REFERENCES

**Dr. Meena Mahajan**

Professor

The Institute of Mathematical Sciences, Chennai

*E-mail:* meena@imsc.res.in

**Dr. Michal Koucký**

Professor

Charles University, Prague

*E-mail:* koucky@iuuk.mff.cuni.cz

**Dr. V. Arvind**

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The Institute of Mathematical Sciences, Chennai

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Nitin Saurabh, Curriculum Vitae

**Dr. Satya V. Lokam**

Researcher

Microsoft Research India, Bangalore

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**Dr. Sourav Chakraborty**

Associate Professor

Indian Statistical Institute, Kolkata

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**Dr. Christian Ikenmeyer**

Senior Lecturer

University of Liverpool

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