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Research

Affiliation: Postdoctoral Student at the [Blavatnik School of Computer Science, Tel Aviv University](#)

Host: [Amir Shpilka](#)

Research Interest: Algebraic Complexity Theory, Computational Complexity Theory.

Employment

Postdoctoral Researcher at the [Institute of Mathematics of the Czech Academy of Sciences](#)

Host: [Pavel Hrubeš](#)

Funding: [Grant GX19-27871X](#) of the [Czech Science Foundation](#)

June 2022 - November 2022

Postdoctoral Student at the [Blavatnik School of Computer Science, Tel Aviv University](#)

Host: [Amir Shpilka](#)

Partially funded by the Harry Bloomfield Scholarship (December 2022 to May 2023)

Funded by the [Azrieli International Postdoctoral Fellowship](#) (June 2023 onwards)

December 2022 - present.

Education

ICSE, [La Martiniere for Girls, Kolkata](#) (under CISCE), 2009.

Major Subjects: English, Mathematics, Science, Social Science, Computer Applications

ISC, [La Martiniere for Girls, Kolkata](#) (under CISCE), 2011.

Major Subjects: English, Mathematics, Physics, Computer Science

B.Sc. (Hons.), [St. Xaviers College, Kolkata](#) (autonomous under Calcutta University), 2011 - 14.

Major Subjects: Mathematics (Hons.), Computer Science, Physics

M.Sc. in [Maths and Computing, IIT Guwahati](#), 2014 - 16.

Received Institute Silver medal for obtaining highest CPI in the department

M.Sc. & Ph.D. in [Computer Science, Tata Institute of Fundamental Research, Mumbai](#), 2016 - 22.

Recipient of the Google PhD Fellowship for Algorithms and Theory.

Awards and Fellowships

Recipient of the Azrieli International Postdoctoral Fellowship.

Recipient of the Google PhD Fellowship for Algorithms and Theory.

Awarded the Institute Silver Medal from IIT Guwahati for obtaining the highest CPI in the department.

Awarded fellowship by NCERT for clearing the National Talent Search Examination.

Papers

[Lower Bounds for Sums of Ordered Set-Multilinear ABPs](#)

With Deepanshu Kush, Shubhangi Saraf and Amir Shpilka

Manuscript.

[On Annihilators of Explicit Polynomial Maps](#)

With Anamay Tengse

Manuscript.

[New Lower Bounds against Homogeneous Non-Commutative Circuits](#)

With Pavel Hrubeš.

Conference version in the proceedings of CCC 2023.

[Monotone Classes Beyond VNP](#)

With Kshitij Gajjar, Anamay Tengse.

Conference version in the proceedings of FSTTCS 2023.

[Separating ABPs and Some Structured Formulas in the Non - Commutative Setting](#)

Conference version in the proceedings of CCC, 2021.

[Generalised Parametric Path Problems](#)

With Kshitij Gajjar, Jaikumar Radhakrishnan, Girish Varma.

Conference version in the proceedings of UAI, 2021.

[On the Existence of Algebraically Natural Proofs](#)

With Mrinal Kumar, C. Ramya, Ramprasad Saptharishi, Anamay Tengse.

Conference version in the proceedings of FOCS, 2020.

[A Quadratic Lower Bound for Algebraic Branching Programs and Formulas](#)

With Mrinal Kumar, Adrian She, Ben Lee Volk.

Conference version in the proceedings of CCC, 2020.

Full version in Computational Complexity.

[Constructing Faithful Homomorphisms over fields of Finite Characteristic](#)

With Ramprasad Saptharishi.

Conference version in the proceedings of FSTTCS, 2019.

Full version in ACM Transactions on Computation Theory.

Talks

Lower Bounds for Sums of Ordered Set-Multilinear ABPs

[CSA Department Seminar](#), IISc Bangalore, January 2024.

Based on joint work with Deepanshu Kush, Shubhangi Saraf and Amir Shpilka

Monotone Classes Beyond VNP

[FSTTCS 2023](#), IIIT Hyderabad, December 2023.

[Workshop on Algebra and Computation](#), Chalmers Conference Centre, Sweden, August 2023.

Based on joint work with Kshitij Gajjar and Anamay Tengse

New Lower Bounds against Homogeneous Non-Commutative Circuits

[Computational Complexity Conference 2023](#), University of Warwick, U.K. July, 2023.

[WACT 2023](#), University of Warwick, March 2023.

[Algebraic and Analytic Methods in Computational Complexity](#), Dagstuhl, September 2022.

Based on joint work with Pavel Hrubeš

Lower Bounds Against Non-Commutative Models of Algebraic Computation

Workshop on [Proof Complexity and Meta-Mathematics](#), Simons Institute, March 2023.

[TAU Theory Seminar](#), Tel Aviv University, January 2023.

Based on joint work with Pavel Hrubeš

Lower Bounds in Algebraic Circuit Complexity

[Theory Seminar @ IIIT Hyderabad](#), Virtual, September 2021.

[Math Seminar Series @ IIT Guwahati](#), Virtual, September 2021.

[TCS Women Spotlight Workshop](#) (part of [STOC 2021](#)), Virtual, June 2021.

Survey talk based on some of my recent works.

Separating ABPs and Some Structured Formulas in the Non-Commutative Setting

[Complexity Theory with a Human Face, 3rd Edition](#), Špindlerův Mlýn, Czechia, June 2022.

[Computational Complexity Conference 2021](#), Virtual, July, 2021.

[STCS Annual Symposium 2021](#), TIFR Mumbai, March 2021.

A Quadratic Lower Bound against Algebraic Branching Programs

[Computational Complexity Conference 2020](#), Virtual, July 2020.

[STCS Annual Symposium 2020](#), TIFR Mumbai, February 2020.

[Theory CS Reading Group](#), IIT Bombay, February 2020.

Based on joint work with Mrinal Kumar, Adrian She, Ben Lee Volk

Faithful Homomorphisms and PIT

[Bootcamp on Polynomial Identity Testing](#), IIT Kanpur, November 2018.

Based on joint work with Ramprasad Saptharishi

Constructing Faithful Maps over Arbitrary Fields

[FSTTCS 2019](#), IIT Bombay, December 2019.

[WACT 2018](#), Universite Paris Diderot, March 2018.

[STCS Day 2018](#), TIFR, Mumbai, February 2018.

Based on joint work with Ramprasad Saptharishi

Algebraic Independence Testing over Arbitrary Fields

[Student Rump Session at WIT 2018](#), Harvard University, June 2018.

Outreach Activities

One of the organisers for [STCS Vigyan Vidushi, 2021](#). It was an online workshop organised by the School of Technology and Computer Science, TIFR Mumbai; that aimed to attract bright undergraduate women students towards research in computer science and system science. I also helped Ramprasad and Jaikumar as a teaching assistant in the mini-courses that they taught as part of this workshop.

One of the student-members of the [Science Popularisation and Outreach Committee](#) of TIFR for the year 2020-21. This committee handles all the outreach activities that are organised by TIFR Mumbai.

In June 2020, I was part of the TIFR Outreach team that conducted two [Chai and Why?](#) sessions titled [Just a box of Matches](#) and [Just a bit of String](#) respectively. The aim was to demonstrate some simple experiments that can be carried out using items available at home during the COVID-19 lockdown.

In June 2020, I helped out in [Vigyan Vidushi 2020](#) as a technical co-ordinator. It was an online workshop organised by TIFR Mumbai, aimed at MSc Physics women students at the end of their first year.

In July 2019, I gave a talk titled [How to convince ourselves that we are NOT stupid](#) in the [CSA Summer School](#) held at IISc Bangalore. This talk was aimed at undergraduate students of Computer Science.

In June 2019, I was part of the STCS Outreach team (a.k.a. the Infostaan team) that conducted a [Summer Special Chai and Why?](#) titled [Fantastic Puzzles - and how to solve them](#). The aim was to attract the audience towards theoretical computer science and information theory, through puzzles that can be demonstrated.

In May 2019, I helped Siva Athreya and Anita Naolekar in organising the [Summer School for Women in Mathematics and Statistics](#) as a tutor. This school was aimed at girls who are in their first year of under-graduate studies and are interested in Mathematics and Statistics.

In January 2019, I gave a public talk titled [Can computers do everything?](#) as part of the public talk series [Chai and Why?](#) hosted by the TIFR Outreach team.

In November 2018, I gave a shorter version of the same talk in the annual event, [Frontiers of Science](#), hosted by the TIFR Outreach team. This was aimed at students in their 9th or 10th standard.

In 2012-13, I taught maths at a night school in St. Xavier's Kolkata for my extra-curricular credits. The students were children from nearby areas and were mostly from an under-privileged background.

Additional Academic Details

Sub-Reviewer for Conferences and Journals

2019: FCT

2021: RANDOM

2022: ITCS, STACS, STOC, ToCT (journal), IWOCA, CCC, MFCS, RANDOM, FSTTCS

2023: CALDAM, STOC, ISSAC, MFCS, ToCT (journal), TAA (journal)

2024: ITCS, STACS, STOC

Conferences and Workshops Attended/Attending

[Algebraic and Analytic Methods in Computational Complexity](#) (Dagstuhl, Germany, September 2024)

[FSTTCS 2023](#) (IIIT Hyderabad, India, December 2023)

[Workshop on Algebra and Computation](#) (Chalmers University of Technology, Sweden, August 2023)

[CCC 2023](#) (University of Warwick, Coventry, U.K., July 2023)

[WACT 2023](#) (University of Warwick, Coventry, U.K., March 2023)

[Proof Complexity and Meta-Mathematics](#) (Simons Institute, Berkeley, U.S.A., March 2023)

[TAU Theory-Fest](#) (Tel Aviv University, Israel, December 2022)

[Algebraic and Analytic Methods in Computational Complexity](#) (Dagstuhl, Germany, September 2022)

[Complexity Theory with a Human Face, 3rd Edition](#) (Špindlerův Mlýn, Czechia, June - July 2022)

[STOC 2020, CCC 2020, FOCS 2020, STOC 2021, CCC 2021](#) (Virtual)

[Sensitivity, Query Complexity, Communication Complexity and Fourier Analysis of Boolean Function](#)
(ISI Kolkata, India, February 2020)

[WACT 2019](#) (ICTS, Bengaluru, India, March 2019)

[ACM India Grad Cohort 2018](#) (IIT Bombay, Mumbai, India, July 2018)

[WIT 2018](#) (Harvard University, Boston, U.S.A., June 2018)

[WACT 2018](#) (Universite Diderot, Paris, France, March 2018)

[NMI workshop on Arithmetic Complexity](#) (IMSc, Chennai, February - March 2017)

[FSTTCS](#) (CMI 2016, IIT Kanpur 2017, Ahmedabad University 2018, IIT Bombay 2019)

[MTTS Programme](#) (SSN College of Engineering, Chennai, May - June 2015)

Talks Organised

I helped Ramprasad Saptharishi and Anamay Tengse in organising the [STCS Annual Talks, 2018](#).

References

Ramprasad Saptharishi
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