Prerona Chatterjee

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Research

Affiliation: Postdoctoral Researcher in the Institute of Mathematics of the Czech Academy of Science.

Host: Pavel Hrubeš

Funding: Grant GX19-27871X of the Czech Science Foundation.

Research Interest: Algebraic Complexity Theory, Computational Complexity Theory.

Employment

Postdoctoral Researcher at the Institute of Mathematics of the Czech Academy of Sciences
Funded by Grant GX19-27871X of the Czech Science Foundation.
June 2022 - Ongoing.

Education

I.C.S.E., La Martiniere for Girls, Kolkata (under CISCE), 2009. (95.6%)
Major Subjects: English, Mathematics, Science, Social Science, Computer Applications

I.S.C., La Martiniere for Girls, Kolkata (under CISCE), 2011. (93%)
Major Subjects: English, Mathematics, Physics, Computer Science

B.Sc. (Hons.), St. Xaviers College, Kolkata (autonomous under Calcutta University), 2011 - 14. (6.53/10)
Major Subjects: Mathematics (Hons.), Computer Science, Physics

M.Sc. in Maths and Computing, IIT Guwahati, 2014 - 16. (9.74/10)
Recieved Institute Silver medal for obtaining highest CPI in the department

Ph.D. in Computer Science, Tata Institute of Fundamental Research, Mumbai, 2016 - 2022. (8.5/10)
Recipient of Google PhD Fellowship for Algorithms and Theory.

Awards and Fellowships

Recipient of Google PhD Fellowship for Algorithms and Theory.

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

Cleared CSIR-NET exam for Eligibility of Lectureship in Mathematics.

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

Papers

Transparency Beyond VNP in the Monotone Setting

With Kshitij Gajjar and Anamay Tengse

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 to appear in ACM Transactions on Computation Theory.

Reports

Hardness and Independence of Polynomials

Ph.D. Thesis (January 2018 - December 2021)

Under the guidance of Ramprasad Saptharishi

Towards Algebraic Independence based PITs for Arbitrary Fields

Exploratory Project at TIFR (June 2017 - November 2017)

Under the guidance of Ramprasad Saptharishi

Primality Testing Algorithms

M.Sc. Project at IITG (January 2016 - April 2016)

Under the guidance of Sagarmoy Dutta

Talks

Lower Bounds in Algebraic Circuit Complexity

> TCS Women Spotlight Workshop (part of STOC 2021), Virtual, June, 2021.
>
> Theory Seminar @ IIITH, IIIT Hyderabad, Virtual, September, 2021
>
> Math Seminar Series, IIT Guwahati, Virtual, September, 2021
>
> *Survey talk based on some of my recent works.*

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

> Computational Complexity Conference 2021, Virtual, July, 2021
>
> STCS Annual Symposium 2021, TIFR Mumbai, March 2021
>
> Complexity Theory with a Human Face, 3rd Edition, Špindlerův Mlýn, Czechia, June 2022

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 assisstant 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 demonstarte 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

Conferences and Workshops Attended

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)

FSTTCS (CMI 2016, IIT Kanpur 2017, Ahmedabad University 2018, IIT Bombay 2019, Virtual 2020)

NMI workshop on Arithemtic Complexity (IMSc Chennai, Februrary - March 2017)

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

Papers Reviewed for Conferences and Journals

2019: FCT

2021: RANDOM

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

Talks Organised

I helped Ramprasad Saptharishi and Anamay Tengse in organising the STCS Annual Talks, 2018.

References

Ramprasad Saptharishi
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