CV

PERSONAL INFORMATION

Full Name: Shuo Pang

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RESEARCH INTERESTS

Computational complexity, discrete math, proof complexity, optimization

EMPLOYMENTS

Postdoc, University of Copenhagen   2022/11–Present
Algorithms and Complexity Section, Department of Computer Science
Host: Jakob Nordström

EDUCATION

Ph.D. in Mathematics, University of Chicago   2016/10–2022/4
Dissertation: *Some Results in Proof Complexity and SAT Solving*
Adviser: Alexander Razborov

B.S. in Mathematics, Peking University   2012/9–2016/7

PAPER REFEREEING

- Journal

Computational Complexity (2020, 2021), SIAM Journal on Discrete Mathematics (2023), ACM Transactions on Computational Logic (2024), Journal of the ACM (2024)

- Conference

STOC (2019, 2023), CCC (2021,2024), ICALP (2024, 2024), SAT (2023, 2024)

CONFERENCE ATTENDANCE

1. Annual IEEE Symposium on Foundations of Computer Science (FOCS 2023)   2023/11
   Paper, *Graph Colouring Is Hard on Average for Polynomial Calculus and Nullstellensatz*

2. Computational Complexity Conference (CCC 2021)   2021/7
   Paper & talk, *SoS Degree Lower Bounds for Exact Planted Clique*

3. International Computer Science Symposium in Russia (CSR 2021)
   Paper & talk, *Large Clique Is Hard on Average for Resolution*   2021/7

4. Theory and Applications of Satisfiability Testing (SAT 2020)   2020/7
   Paper, *On CDCL-based Proof Systems with the Ordered Decision Strategy*

WORKSHOP AND SEMINAR

1. *Workshop on New Frontiers in Robust Statistics*, Toyota Technology Institute Chicago
   Organizers: Ilias Diakonikolas, Gautam Kamath, and Daniel M. Kane   2024/6
   Invited talk, *Sum-of-Squares Lower Bounds for Non-Gaussian Component Analysis: Challenges and New Techniques*

2. *Automata Seminar*, Faculty of Mathematics, Informatics, and Mechanics, University of Warsaw   2024/4

   Invited talk, *Robust Trade-off for Weisfeiler–Leman via Compression*

   Hosted by Mikołaj Bojańczyk

3. *Proof Complexity and Beyond*, Oberwolfach Workshop   2024/3

   Invited talk, *Supercritical and Robust Trade-off for Resolution Depth Versus Width and Weisfeiler–Leman*

4. *Danish Digitalization, Data Science and AI Conference (D3A)* by Danish Data Science Academy and Digital Research Center Denmark   2024/2

   Invited talk, *Graph Colouring is Hard on Average for Polynomial Calculus and Nullstellenstatz*

5. *SAT Extended Reunion*, Simons Institute at UC Berkeley   2023/4

   Invited visiting scientist. Talk: *Graph Colouring is Hard on Average for Polynomial Calculus and Nullstellensatz*

6. MIAO seminar, University of Copenhagen   2022/12

   Invited talk, *SoS Degree Lower Bound for Exact Clique*

7. *Complexity Workshop*, Banff International Research Station   2020/1

   Invited talk, *(Mildly) Large Clique is Hard on Average for Resolution*

8. BARC seminar and MIAO seminar, University of Copenhagen and Lund University 2019/9

   Invited talks, 1. *Large Clique is Hard on Average for Resolution*; 2. *On CDCL-based Proof Systems with the Ordered Decision Strategy*

   Hosted by Jakob Nordström

9. *Complexity Theory Workshop*, Clay Math Institute   2018

   Student attendee

10. Math REU at Peking University   2014

    Project *On Bott Periodicity*, supervised by Houhong Fan

Teaching Experience

Instructor   2018–21

Undergraduate math courses, University of Chicago (f/w/s: fall/winter/spring quarter)
- *Calculus I*, MATH 15100 (f19)
- *Calculus II*, MATH 15200 (f18, w20, f21)
- *Calculus III*, MATH 15300 (w19, s19, s20, f20, w21)

Co-instructor

Graduate courses in computer science, University of Copenhagen   2023–24

- *Computability and Complexity*, 2023 (with Jakob Nordström), 2024 (with Jakob Nordström, Srikanth Srinivasan and Amir Yehudayoff)

TA

Math courses, University of Chicago   2017–18
- *Honors Calculus 3*, MATH 16300, with Sarah Ziesler (fall 2017)
- *Point Set Topology*, MATH 26200, with Kurt Vinhage (winter 2018)
- *Complex Variables*, MATH 27000, with Danny Calegari (fall 2018)

Publications

1 Sum-of-Squares Lower Bounds for Non-Gaussian Component Analysis   2024

With Ilias Diakonikolas, Sushrut Karmalkar, and Aaron Potechin.

To appear at FOCS 2024

2 Graph Colouring Is Hard on Average for Polynomial Calculus and Nullstellensatz   2023

With Jonas Conneryd, Susanna de Rezende, Jakob Norström, and Kilian Risse.

Proceedings of the 64th Annual IEEE Symposium on Foundations of Computer Science (FOCS 2023)

⋆ Some Results in Proof Complexity and SAT Solving   2022

PhD dissertation, UChicago open access

3 SoS Lower Bound for Exact Planted Clique   2021

Proceedings of the 36th Computational Complexity Conference (CCC 2021)

4 On CDCL-Based Proof Systems With the Ordered Decision Strategy   2019

With Nathan Mull and Alexander Razborov.

Proceedings of the 23rd Theory and Applications of Satisfiability Testing (SAT 2020)

SIAM Journal on Computing (SICOMP), Volume 51, Issue 4, 2022

5 Large Clique Is Hard on Average for Resolution   2019

Proceedings of the 16th International Computer Science Symposium in Russia (CSR 2021)

Work in Preparation

6 Supercritical and Robust Trade-offs for Resolution Depth Versus Width and Weisfeiler–Leman

With Duri Janett and Jakob Norström.

Awards

Fellowships

- EU Horizon MSCA Postdoctoral Fellowship, Project "NoShortProof"   2024/4–present
  Amount: 230774.40 EUR
- S. McCormick Fellowship, University of Chicago   2016–17

Student National Contest

- S.-T. Yau College Student Math Contest, 1st in Team, 3rd in Geometry & Topology   2015
- The Chinese Mathematics Competition, math major, First Prize   2014
- High school MO: CMO Silver (2012), CWMO Gold (2010), CNMO Gold (2010)
  Physics: CPhO provincial first prize (Shanxi, 2011)

Reference

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