

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
Department of Computer Science
Host: Jakob Nordström
- Invited visiting scientist, Simons Institute at UC Berkeley 2023/3–2023/5
Program: SAT Extended Reunion

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

PEER REVIEWS

- Journal: Computational Complexity (2020, 2021), SIAM Journal on Discrete Mathematics (2023), Journal of the ACM (2024), ACM Transactions on Computational Logic (2024)
- Conference: STOC (2019, 2023), CCC (2021, 2024), SAT (2023, 2024), ICALP (2024, 2024)

CONFERENCES

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) 2021/7
Paper & talk, *Large Clique Is Hard on Average for Resolution*
4. Theory and Applications of Satisfiability Testing (SAT 2020) 2020/7
Paper, *On CDCL-based Proof Systems with the Ordered Decision Strategy*

WORKSHOPS AND SEMINARS

1. Workshop on New Frontiers in Robust Statistics, Toyota Technology Institute Chicago 2024/6
Organizers: Ilias Diakonikolas, Gautam Kamath, and Daniel M. Kane
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 Nullstellensatz*
5. SAT Extended Reunion, Simons Institute at UC Berkeley 2023/3–2023/5
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) and 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 Supercritical Trade-offs: from Weisfeiler–Leman to Resolution, and Applications via Tight Lifting**
In preparation.
- 2 Sum-of-Squares Lower Bounds for Non-Gaussian Component Analysis** 2024
Joint work with Ilias Diakonikolas, Sushrut Karmalkar, and Aaron Potechin
FOCS 2024
- 3 Graph Colouring Is Hard on Average for Polynomial Calculus and Nullstellensatz** 2023
Joint work with Jonas Conneryd, Susanna DeRezende, Jakob Nordström, and Kilian Risse
FOCS 2023
- * Some Results in Proof Complexity and SAT Solving** 2022
PhD dissertation, UChicago open access.
- 4 SoS Lower Bound for Exact Planted Clique** 2021
CCC 2021
- 5 On CDCL-Based Proof Systems With the Ordered Decision Strategy** 2019
Joint work with Nathan Mull and Alexander Razborov
SAT 2020, SIAM Journal on Computing (SICOMP), Volume 51, Issue 4, 2022
- 6 Large Clique Is Hard on Average for Resolution** 2019
CSR 2021 (16th International Computer Science Symposium in Russia)

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 Contest

- S.-T. Yau College Student Math Contest, 1st in Team, 3rd in Geometry & Topology 2015
- The Chinese Mathematics Competition, first prize 2014
- High school MO: CMO silver (2012), CWMO gold (2010), CNMO gold (2010)

REFERENCE

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