Lijie Chen

Curriculum Vitae

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Education

2017–Now **EECS**, *Massachusetts Institute of Technology*, Cambridge.
Ph.D. in Electrical Engineering and Computer Science,
advised by Ryan Williams
S. M. thesis: *Fine-Grained Complexity Meets Communication Complexity*

2013–2017 **Institute for Interdisciplinary Information Sciences**, *Tsinghua University*, Beijing.
Bachelor of Engineering in Computer Science and Technology

Visiting

2020 Winter (Jan - Feb) **Weizmann Institute of Science**, *Rehovot*.
Visiting Student of Guy Rothblum.

2018 Fall **Simons Institute for the Theory of Computing**, *Berkeley*.
Visiting Graduate Student. Lower Bounds in Computational Complexity.

2016 Spring **EECS**, *Massachusetts Institute of Technology*, Cambridge.
Visiting Student, advised by Scott Aaronson.

Selected Awards and Scholarships

2019 **FOCS 2019 Best Student Paper**
2019 **STOC 2019 Best Student Paper**
2017 MIT Akamai Presidential Graduate Fellowship
2017 International Collegiate Programming Contest, World Final, **6th place**
2016 Tsinghua Top-Grade Scholarship (**10 best undergraduate students** a year)
2016 China Collegiate Programming Contest, Final, **1st place**
2015/2016/2017 Internet Problem Solving Contest, **4th/5th/5th Place**
2015/2016 International Collegiate Programming Contest, Asia-East Continent Final, **1st place**
2014 Topcoder Open Algorithm Finalist
2014 International Collegiate Programming Contest, World Final, **11th place**
2013 International Olympiad in Informatics, Gold model, **1st place**

Special Issue Invitations

FOCS 2019, FOCS 2019, CCC 2018, FOCS 2017, CCC 2017

Research Interests

- Computational Complexity
- Algorithm Design
- Fine-Grained Complexity
- Quantum Computing / Complexity
- Learning Theory

Languages

- Chinese (Native)
- English (Fluent)
- Japanese (N2)

Programming Languages

- C++
- Java
- Python

Selected Publications

7 Strong Average-Case Circuit Lower Bounds from Non-trivial Derandomization.
Lijie Chen, Hanlin Ren.
STOC 2020.

6 Efficient Construction of Rigid Matrices Using an NP Oracle.
Josh Alman, **Lijie Chen**.
FOCS 2019. (**Machtey Award (Best Student Paper)**)
(**Invited to the SICOMP Special Issue for FOCS 2019**)

5 Non-deterministic Quasi-Polynomial Time is Average-case Hard for ACC Circuits.
Lijie Chen.
FOCS 2019. (**Invited to the SICOMP Special Issue for FOCS 2019**)

4 Bootstrapping Results for Threshold Circuits "Just Beyond" Known Lower Bounds.
Lijie Chen, Roei Tell.
STOC 2019. (**Danny Lewin Best Student Paper Award**)

3 On The Hardness of Approximate and Exact (Bichromatic) Maximum Inner Product.
Lijie Chen.
CCC 2018. (**Invited to the Toc Special Issue for CCC 2018**)

2 On The Power of Statistical Zero Knowledge.
Adam Bouland, **Lijie Chen**, Dhiraj Holden, Justin Thaler, Prashant Nalini Vasudevan.
FOCS 2017. (**Invited to the SICOMP Special Issue for FOCS 2017**)

1 Complexity-Theoretic Foundations of Quantum Supremacy Experiments.
Scott Aaronson, **Lijie Chen**.
CCC 2017. (**Invited to the Toc Special Issue for CCC 2017**).

Manuscripts

1 On Exponential-Time Hypotheses, Derandomization, and Circuit Lower Bounds.
Lijie Chen, Ron Rothblum, Roei Tell, Eylon Yogev.

Full Publications

24 Sharp Threshold Results for Computational Complexity.
Lijie Chen, Ce Jin, Ryan Williams.
STOC 2020.

23 Strong Average-Case Circuit Lower Bounds from Non-trivial Derandomization.
Lijie Chen, Hanlin Ren.
STOC 2020.

22 Beyond Natural Proofs: Hardness Magnification and Locality.
Lijie Chen, Shuichi Hirahara, Igor Oliveira, Jan Pich, Ninad Rajgopal, Rahul Santhanam.
ITCS 2020.

21 Efficient Construction of Rigid Matrices Using an NP Oracle.
Josh Alman, **Lijie Chen**.
FOCS 2019. (**Machtey Award (Best Student Paper)**)
(**Invited to the SICOMP Special Issue for FOCS 2019**)

20 Non-deterministic Quasi-Polynomial Time is Average-case Hard for ACC Circuits.
Lijie Chen.
FOCS 2019. (**Invited to the SICOMP Special Issue for FOCS 2019**)

19 Broadcast Congested Clique: Planted Cliques and Pseudorandom Generators.
Lijie Chen, Ofer Grossman.
PODC 2019.

18 Relations and Equivalences Between Circuit Lower Bounds and Karp-Lipton Theorems.
Lijie Chen, Dylan McKay, Cody Murray, Ryan Williams.
CCC 2019.

17 Stronger Connections Between Circuit Analysis and Circuit Lower Bounds, via PCPs of Proximity.
Lijie Chen, Ryan Williams.
CCC 2019.

16 Bootstrapping Results for Threshold Circuits "Just Beyond" Known Lower Bounds.
Lijie Chen, Roei Tell.
STOC 2019. (**Danny Lewin Best Student Paper Award**)

15 Classical Algorithms from Quantum and Arthur-Merlin Communication Protocols.
Lijie Chen, Ruosong Wang.
ITCS 2019.

14 An Equivalence Class for Orthogonal Vectors.
Lijie Chen, Ryan Williams.
SODA 2019.

13 Fine-grained Complexity Meets IP = PSPACE.
Lijie Chen, Shafi Goldwasser, Kaifeng Lyu, Guy N. Rothblum, Aviad Rubinstein.
SODA 2019.

12 Nearly Optimal Separation Between Partially And Fully Retroactive Data Structures.
Lijie Chen, Erik D. Demaine, Yuzhou Gu, Virginia Vassilevska Williams, Yinzhan Xu, Yuancheng Yu.
SWAT 2018.

11 Improved Algorithms for Maintaining DFS Tree in Undirected Graphs.
Lijie Chen, Ran Duan, Ruosong Wang, Hanrui Zhang, Tianyi Zhang.
SWAT 2018.

10 On The Hardness of Approximate and Exact (Bichromatic) Maximum Inner Product.
Lijie Chen.
CCC 2018. (**Invited to the Toc Special Issue for CCC 2018**)

9 On The Power of Statistical Zero Knowledge.
Adam Bouland, **Lijie Chen**, Dhiraj Holden, Justin Thaler, Prashant Nalini Vasudevan.
FOCS 2017. (**Invited to the SICOMP Special Issue for FOCS 2017**)

8 Nearly Optimal Sampling Algorithms for Combinatorial Pure Exploration.
Lijie Chen, Anupam Gupta, Jian Li, Mingda Qiao and Ruosong Wang.
COLT 2017.

7 Towards Instance Optimal Bounds for Best Arm Identification.
Lijie Chen, Jian Li, Mingda Qiao.
COLT 2017.

6 Complexity-Theoretic Foundations of Quantum Supremacy Experiments.
Scott Aaronson, **Lijie Chen**.
CCC 2017. (**Invited to the Toc Special Issue for CCC 2017**).

5 Nearly Instance Optimal Sample Complexity Bounds for Top-k Arm Selection.
Lijie Chen, Jian Li, Mingda Qiao.
AISTATS 2017.

4 K-Memory Strategies in Repeated Games.
Lijie Chen, Fangzhen Lin, Pingzhong Tang, Kangning Wang, Ruosong Wang, Shiheng Wang.
AAMAS 2017 (extended abstract).

3 Bounded rationality of restricted Turing machines.
Lijie Chen, Pingzhong Tang, Ruosong Wang.
AAAI 2017.

2 Adaptivity vs Postselection, and Hardness Amplification in Polynomial Approximation.
Lijie Chen.
ISAAC 2016 (**Best Student Paper**).

1 Pure Exploration of Multi-armed Bandit Under Matroid Constraints.
Lijie Chen, Anupum Gupta, Jian Li.
COLT 2016.

Teaching Experiences

2017 Spring Introduction to Computational Complexity
Teaching Asistant, Tsinghua University

2019 Fall Advanced Complexity Theory
Teaching Asistant, Massachusetts Institute of Technology

Academic Talks

2019 - 2020 Strong Average-Case Circuit Lower Bounds from Non-trivial Derandomization
Theory Seminar, University of Chicago
Lower Bounds in Computational Complexity Reunion, Simons Institute
Theory Seminar, Weizmann Institute of Science
Theory Seminar, Hebrew University of Jerusalem
Theory Seminar, Technion âĂŞ Israel Institute of Technology

2019 Efficient Construction of Rigid Matrices Using an NP Oracle
FOCS 2019

2019 Non-deterministic Quasi-Polynomial Time is Average-case Hard for ACC Circuits
FOCS 2019

2019 On Algebraic and Number Theoretical Methods in Fine-Grained Complexity
Nanjing University

2019 Recent Developments on the Algorithmic Approach Towards Circuit Lower Bounds
Tsinghua University

2019 Recent Developments in Fine-Grained Complexity via Communication Complexity
Tsinghua University

2019 Stronger Connections Between Circuit Analysis and Circuit Lower Bounds, via PCPs of Proximity
CCC 2019

2019 Bootstrapping Results for Threshold Circuits "Just Beyond" Known Lower Bounds
STOC 2019

2019 Non-deterministic Quasi-Polynomial Time is Average-case Hard for ACC Circuits
Theory Seminar of UT Austin
Harvard TGINF
CMU Theory Lunch

2019 Classical Algorithms from Quantum and Arthur-Merlin Communication Protocols
ITCS 2019

2019 An Equivalence Class for Orthogonal Vectors
SODA 2019

2018 Recent Structure Lemmas for Depth-Two Threshold Circuits
Simons Institute for the Theory of Computing

2018 On The Hardness of Approximate and Exact (Bichromatic) Maximum Inner Product
CCC 2018
Algorithms & Complexity Seminar, MIT

2017 On The Power of Statistical Zero Knowledge
FOCS 2017
Algorithms & Complexity Seminar, MIT

2017 Complexity-Theoretic Foundations of Quantum Supremacy Experiments
CCC 2017

2016 Adaptivity vs Postselection
ISAAC 2016

2016 Pure Exploration of Multi-armed Bandit Under Matroid Constraints
COLT 2016

Service

Conference Reviewing **STOC 2020**, **ITCS 2020**, **ESA 2019**, **FOCS 2019**, **ICALP 2019**, **COLT 2019**, **ITCS 2019**, **CCC 2019**, **ISAAC 2018**, **RANDOM 2018**, **COLT 2018**