

Current and Past Positions

- 9/2018–8/2020 Research Fellow, [Engineering Systems and Design Pillar](#), Singapore University of Technology and Design (SUTD), Singapore. Mentor: [Dr. Georgios Piliouras](#)
- 9/2016–8/2018 Postdoctoral Fellow, [Department of Algorithms and Complexity](#), Max-Planck-Institut (MPI) für Informatik, Germany. Direktor: [Prof. Kurt Mehlhorn](#)
- 9/2014–7/2016 Postdoctoral Researcher, [Theory and Applications of Algorithms](#) Research Group, University of Vienna, Austria. Mentor: [Prof. Monika Henzinger](#)

Education

- 9/2009–8/2014 PhD in Computer Science. Courant Institute of Mathematical Sciences, New York University (NYU), NY, USA. Advisor: [Prof. Richard Cole](#)
- 9/2007–8/2009 MPhil in Mathematics. Hong Kong University of Science & Technology (HKUST), Hong Kong. Advisor: [Prof. Mordecai Golin](#)
- 9/2004–6/2007 BSc, Dual Major in Mathematics and Physics, Minor in Information Technology. HKUST, Hong Kong.

Research Interests

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|-------------------|--|--------------------------------------|
| General | Theoretical Computer Science | Combinatorics & Discrete Mathematics |
| Interests: | Algorithm Design & Analysis | |
| Specific | Computational Economics | Algorithmic Game Theory |
| Areas: | Asynchronous Optimization & Dynamics | Graph Sparsification & Partitioning |
| | Dynamical Systems in Games, Markets and Machine Learning | |

For more elaborations about my research interests, [click here](#).

Awards and Scholarships (Highlights)

- [NeurIPS 2019 Best Reviewers](#).
- [MacCracken Fellowship](#), GSAS, NYU, 2009–2014.
- [4th places \(team member\)](#) at two regional contests of ACM International Collegiate Programming Contest (ACM ICPC), 2007.
- [Academic Achievement Medal](#), awarded by HKUST, 2007.
- [Epsilon Fund Award](#), Department of Mathematics, HKUST, 2006 and 2009.
- Swire International Young Fellows Scholarship, 2006.
- HSBC Hong Kong Scholarship, 2006.
- So Hok Scholarship, 2004.
- University Scholarship, HKUST, 2004 and 2007.
- [Bronze Medal, International Mathematical Olympiad \(IMO\) 2004](#). Representative of Hong Kong team.
- Silver Award (2004) and Bronze Award (2003), Asian Pacific Mathematics Olympiad.
- Third Class Award, Chinese Mathematical Olympiad, 2004. Representative of Hong Kong team (invited foreign team).

Publications (Sorted by Topics)

To see the official and full versions of these papers, [click here](#).

(A) Preprints

- [1] *Parallel Stochastic Asynchronous Coordinate Descent: Tight Bounds on the Possible Parallelism* with Richard Cole, Yixin Tao. Under journal submission. [arxiv](#) latest update on 15 Oct, 2019.
- [2] *Chaos, Extremism and Optimism: Volume Analysis of Learning in Games* with Georgios Piliouras. Under conference submission. [arxiv](#) latest update on 28 May, 2020.
- [3] *Chaos of Learning Beyond Zero-sum and Coordination via Game Decompositions* with Yixin Tao. Under conference submission. [arxiv](#) latest update on 2 Aug, 2020.

(B) Market/Game/Learning Dynamics and Asynchronous Optimization/Systems

- [4] *Fully Asynchronous Stochastic Coordinate Descent: A Tight Lower Bound on the Parallelism Achieving Linear Speedup* with Richard Cole, Yixin Tao. [arxiv](#) latest update on 2 August, 2020. Accepted in **2020** to **Mathematical Programming (Series A)**.
- [5] *Vortices Instead of Equilibria in MinMax Optimization: Chaos and Butterfly Effects of Online Learning in Zero-Sum Games* with Georgios Piliouras. In **COLT 2019**.
- [6] *Tatonnement Beyond Gross Substitutes? Gradient Descent to the Rescue* with Richard Cole, Nikhil R. Devanur. In **STOC 2013**. Journal version accepted in **2019** to **Games and Economic Behavior**.
- [7] *Tracing Equilibrium in Dynamic Markets via Distributed Adaptation* with Martin Hoefer, Paresh Nakhe. In **AAMAS 2019**.
- [8] *Multiplicative Weights Updates with Constant Step-Size in Graphical Constant-Sum Games* In **NeurIPS 2018**.
- [9] *Amortized Analysis of Asynchronous Price Dynamics* with Richard Cole. In **ESA 2018**.
- [10] *Dynamics of Distributed Updating in Fisher Markets* with Richard Cole, Yixin Tao. In **ACM EC 2018**. Contributed talk by me in **HALG 2018**.
- [11] *Analyzing Tatonnement Dynamics in Economics Markets* **PhD Thesis 2014**. Chapter 10 is an analysis of tatonnement in general Nested-CES Fisher markets, generalizing the results in [6].
- [12] *Tatonnement in Ongoing Markets of Complementary Goods* with Richard Cole, Ashish Rastogi. In **ACM EC 2012**.

(C) Graph Sparsification and Partitioning

- [13] *Steiner Point Removal — Distant Terminals Don't (Really) Bother* In **SODA 2018**.
- [14] *Spanning Tree Congestion and Computation of Generalized Györi-Lovász Partition* with L. Sunil Chandran, Davis Issac. In **ICALP 2018**. Contributed talk by Davis in **HALG 2018**.
- [15] *Graph Minors for Preserving Terminal Distances Approximately — Lower and Upper Bounds* with Gramoz Goranci, Monika Henzinger. In **ICALP 2016**. This paper forms a part of a contributed talk by Gramoz in **HALG 2017**.

(D) Algorithmic Mechanism Design

- [16] *On Fair Division of Indivisible Items* with Bhaskar Ray Chaudhury, Jugal Garg, Naveen Garg, Martin Hoefer, Kurt Mehlhorn. In **FSTTCS 2018**.

- [17] *Better Strategyproof Mechanisms without Payments or Prior — An Analytic Approach*
In **IJCAI 2016**.
- [18] *Combinatorial Auctions with Conflict-Based Externalities*
with Monika Henzinger, Martin Hoefer, Martin Starnberger. In **WINE 2015**.
- (E) Analytic Combinatorics and Exact Analysis of Algorithms**
- [19] *Divide-and-Conquer Recurrences and the Mellin-Perron Formula*
with Mordecai Golin. To appear as a chapter in **Collected Works of Philippe Flajolet**.
- [20] *Analyzing a Weighted Digital Sum Variant*
with Mordecai Golin. In **AofA 2010**.
- [21] *Analysis of Weighted Digital Sums by Mellin Transform*
MPhil Thesis 2009. Chapter 6 is an *elementary* analysis of one of the MDC recurrences studied in [22]; its analysis in [22] uses advanced technique of Mellin transform.
- [22] *Multidimensional Divide-and-Conquer and Weighted Digital Sums*
with Philippe Flajolet, Mordecai Golin, C.Y. James Lee. In **ANALCO 2009**.

Synergistic Activities

Program Committee: ACM EC 2020, AAMAS 2020

Reviewer: NeurIPS 2020, ICML 2020, NeurIPS 2019 (Best Reviewers)

Reviewer for conferences: STOC (x1), FOCS (x1), SODA (x7), ICALP (x3), WWW (x2), WINE (x5), SAGT (x3), CIAC (x1)

Referee for journals: Games and Economic Behavior, SIAM Journal on Discrete Mathematics, Machine Learning, Algorithmica, Information Processing Letters

Teaching Activities, Administration Activities and Guest Lectures

- Lecturer of the course “[Algorithmic Game Theory, Mechanism Design and Computational Economics](#)” in Max-Planck-Institut für Informatik (advanced course for master students), Winter Semester 2017.
- Administrator of Noon Seminars of the Algorithm and Complexity Department in Max-Planck-Institut für Informatik, August 2017 – June 2018.
- Committee Member for Selection of Master Fellows in Max-Planck-Institut für Informatik, December 2016 – January 2018.
- Guest Lecture in Georgia Institute of Technology on “Market Dynamics – Tatonnement and Proportional Response Dynamics”, 24/2/2014.
- Teaching Assistant in NYU for MS-level required course “Fundamental Algorithms”, 2010.
- Teaching Assistant in HKUST for UG-level courses “Game Theory”, “Combinatorial Analysis” and “Euclidean and non-Euclidean Geometries”, 2007–2009.
- Grader in NYU for PhD-level course “Honors Analysis of Algorithms” and MS-level courses “Fundamental Algorithms” and “Algorithmic and Economic Aspects of the Internet”, 2010–2013.
- Teaching Mathematical Olympiad to gifted students in three high schools in Hong Kong, 2000–2009.

Academic Activities

- Visitor at Indiana University Bloomington, hosted by Wai Tong Fan, 1–5/7/2019.
- Hosting Hadi Khodabandeh (Sharif University of Technology, Iran) at Max-Planck-Institut für Informatik, 3/8/2017–30/9/2017.

- Visitor at Courant Institute of Mathematical Sciences (alma mater), hosted by Richard Cole, 9–28/7/2016, 26/6/2017–13/8/2017, 15–19/1/2018 and 23/6/2018–14/7/2018.
- Visitor at Goethe-Universität Frankfurt am Main, hosted by Martin Hoefler, 10–14/4/2017 and 6–9/12/2017.
- [Game Theory Workshop](#), Hausdorff Research Institute for Mathematics, 14–17/12/2015.
- [Greece Economic and Algorithmic Theory \(GREAT\) Week](#), 18–24/7/2014.
- Visitor at Simons Institute for the Theory of Computing, hosted by Christos Papadimitriou, 20–24/1/2014.
- Visitor at Microsoft Research Redmond, hosted by Nikhil Devanur, 11–18/3/2012.
- [Memphis-Budapest Summer School in Combinatorics](#), organized by Béla Bollobás, 7–20/8/2011.

Math Competition and Website Organization

- Organizer and Problem Poser for [Pui Ching Invitational Mathematics Competition](#) (one of the largest mathematics competitions for high school students in Hong Kong), 2004–2012.
- Vice-chairperson (for 2 years) and Secretary (for 1 year) of *Mathematical Database*, which was one of the largest mathematics websites in Hong Kong, 2003–2008. (The website is no longer operating.)

Languages

Cantonese – Native (see [this WSJ post](#) to know more of the “identity” of Cantonese and Hong Kong)

English – Professional

Mandarin Chinese – Fluent

Programming Skills

- C++ (most frequently used PL when I was a HKUST representative for programming contests; have been using it since grade 10)
- Python (used for simulations of game/market dynamics via parallelism and their numerical analyses)
- OCaml (wrote an interpreter using OCaml; the first functional PL I learnt)
- JAVA (wrote a simulator for concurrent database system using JAVA)
- PHP, Ajax+JavaScript (together with the use of some Apache functionality, I wrote a very short but powerful website tracker for my own old personal website)
- SageMath (with Gurobi), MATLAB, MAPLE

Talks and Poster Presentations

- Online Optimization in Games via Control Theory
 - Talk in SUTD Group Meeting (24/7/2020)
- Vortices Instead of Equilibria in MinMax Optimization: Chaos and Butterfly Effects of Online Learning in Zero-Sum Games
 - Talk and Poster Presentation at COLT 2019 (25/6/2019)
 - Talk in SUTD Group Meeting (26/3/2019)
- Tracing Equilibrium in Dynamic Markets via Distributed Adaptation
 - Talk and Poster Presentation at AAMAS 2019 (16/5/2019)
- Multiplicative Weights Updates with Constant Step-Size in Graphical Constant-Sum Games
 - Poster Presentation at NeurIPS 2018 (5/12/2018)

- Dynamics of Distributed Updating in Fisher Markets
 - Short Talk and Poster Presentation at HALG 2018 (5/6/2018)
- Steiner Point Removal — Distant Terminals Don't (Really) Bother
 - Probability and Related Fields Seminar in Indiana University Bloomington (1/7/2019)
 - Talk at SODA 2018 (8/1/2018)
- Asynchronous Coordinate Descent and Tatonnement
 - Talk at ESA 2018 (22/8/2018)
 - Talk at OR 2016 – International Conference of the German Operations Research Society (2/9/2016)
 - Talk at Hasso Plattner Institute (HPI) (4/2/2016)
 - Talk at Game Theory Workshop, Hausdorff Research Institute for Mathematics (14/12/2015)
 - Talk at Max-Planck-Institut für Informatik (24/2/2015)
 - Talk at University of Vienna (7/11/2014)
 - Talk at Greece Economic and Algorithmic Theory Week (GREAT) 2014 (22/7/2014)
- Graph Minors for Preserving Terminal Distances Approximately — Lower and Upper Bounds
 - Talk at Hong Kong University of Science and Technology (4/7/2016)
 - Talk at Georgia Institute of Technology (29/2/2016)
- Better Strategyproof Mechanisms without Payments or Prior — An Analytic Approach
 - Talk at IJCAI 2016 (14/7/2016)
- Combinatorial Auctions with Conflict-Based Externalities
 - Talk at WINE 2015 (11/12/2015)
 - Joint talk with Martin Starnberger at University of Vienna (19/6/2015)
- Tatonnement Beyond Gross Substitutes? Gradient Descent to the Rescue
 - Talk at Hong Kong University of Science and Technology (4/4/2014)
 - Talk at Georgia Institute of Technology (24/2/2014)
 - Talk at STOC 2013 (2/6/2013)
 - Poster Presentation at NYCE 2012 (3/12/2012)
- Exact Analysis on Multidimensional Divide-and-Conquer
 - Talk at Polytechnic Institute of New York University (31/1/2013)
- Tatonnement in Ongoing Markets of Complementary Goods
 - Talk at ACM EC 2012 (6/6/2012)
 - Poster Presentation at STOC 2012 (20/5/2012) and NYCE 2011 (16/9/2011)
- Analyzing a Weighted Digital Sum Variant
 - Talk at AofA 2010 (2/7/2010)
- Multidimensional Divide-and-Conquer and Weighted Digital Sums
 - Talk at ANALCO 2009 (3/1/2009)