

# Lexiao Lai

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<b>Employment</b>	<b>The University of Hong Kong</b> Assistant Professor, Department of Mathematics	Hong Kong, China July 2024 -
<b>Interests</b>	Nonconvex optimization, applied semialgebraic geometry, data science	
<b>Education</b>	<b>Columbia University in the City of New York</b> Ph.D. in Operations Research [ <a href="#">thesis</a> ] Advisor: Cédric Josz	New York, U.S. Sept. 2019 - May 2024
	<b>The University of Hong Kong</b> B.Sc. in Mathematics	Hong Kong, China Sept. 2015 - June 2019
<b>Publications</b>	<ol style="list-style-type: none"><li>Phase transitions in phase-only compressed sensing (with Junren Chen and Arian Maleki), <i>IEEE International Symposium on Information Theory (ISIT)</i>, 2025 [<a href="#">preprint</a>] [<a href="#">proceeding</a>]</li><li>Nonsmooth rank-one symmetric matrix factorization landscape (with Cédric Josz), <i>Optimization Letters</i>, 2025 [<a href="#">preprint</a>] [<a href="#">journal</a>]</li><li>Sufficient conditions for instability of the subgradient method with constant step size (with Cédric Josz), <i>SIAM Journal on Optimization</i>, 2024 [<a href="#">preprint</a>] [<a href="#">journal</a>]</li><li>Convergence of the momentum method for semialgebraic functions with locally Lipschitz gradients (with Cédric Josz and Xiaopeng Li), <i>SIAM Journal on Optimization</i>, 2023 [<a href="#">preprint</a>] [<a href="#">journal doi</a>]</li><li>Global stability of first-order methods for coercive tame functions (with Cédric Josz), <i>Mathematical Programming</i>, 2023 [<a href="#">preprint</a>] [<a href="#">journal</a>]</li><li>Lyapunov stability of the subgradient method with constant step size (with Cédric Josz), <i>Mathematical Programming</i>, 2023 [<a href="#">preprint</a>] [<a href="#">journal</a>]</li><li>Nonsmooth rank-one matrix factorization landscape (with Cédric Josz), <i>Optimization Letters</i>, 2022 [<a href="#">preprint</a>] [<a href="#">journal doi</a>]</li><li>Time-dependent surveillance-evasion games (with Elliot Cartee, Qianli Song, and Alexander Vladimirsksy), <i>IEEE Conference on Decision and Control (CDC)</i>, 2019 [<a href="#">preprint</a>] [<a href="#">proceeding</a>]</li></ol>	
<b>Preprints</b>	<ol style="list-style-type: none"><li>Global convergence of the subgradient method for robust signal recovery (with Zesheng Cai and Tiansheng Li), 2026 [<a href="#">preprint</a>]</li><li>Non-convex self-concordant functions: Practical algorithms and complexity analysis (with Donald Goldfarb, Tianyi Lin, and Jiayu Zhang), 2025 [<a href="#">preprint</a>]</li><li>On the diameter of subgradient sequences in o-minimal structures (with Mingzhi Song), 2025 [<a href="#">preprint</a>]</li><li>Proximal random reshuffling under local Lipschitz continuity (with Cédric Josz and Xiaopeng Li), 2024 [<a href="#">preprint</a>]</li></ol>	
<b>Talks</b>	<ol style="list-style-type: none"><li>International Conference on Scientific Machine Learning, Hong Kong, December 3rd 2025, <i>On the diameter of subgradient sequences in o-minimal structures</i></li><li>International Conference on Scientific Machine Learning, Hong Kong, December 3rd 2024, <i>Proximal random reshuffling under local Lipschitz continuity</i></li><li>14th Triennial International Conference of APORS, Hangzhou, November 17th 2024, <i>Proximal random reshuffling under local Lipschitz continuity</i></li><li>International Symposium on Mathematical Programming, Montréal, July 23rd 2024, <i>Global stability of first-order methods for coercive tame functions</i></li><li>IMS Young Mathematical Scientists Forum – Applied Mathematics, Singapore, January 9th 2024, <i>Global stability of first-order methods for coercive tame functions</i></li><li>INFORMS Annual Meeting, Phoenix, October 17th 2023, <i>Global stability of first-order methods for coercive tame functions</i></li></ol>	

7. UCSD Optimization and Data Science Seminar, San Diego, October 4th 2023, *Global stability of first-order methods for coercive tame functions*
8. International Congress on Industrial and Applied Mathematics, Tokyo, August 24th 2023, *Global stability of first-order methods for coercive tame functions*
9. SIAM Conference on Optimization, Seattle, June 1st 2023, *Global stability of first-order methods with constant step size for coercive tame functions*
10. CUHK SEEM Department Seminar, Hong Kong, December 8th 2022, *Lyapunov stability of the subgradient method with constant step size*
11. HKU Optimization and Machine Learning Seminar, Hong Kong, December 6th 2022, *Lyapunov stability of the subgradient method with constant step size*
12. PGMODAYS, Paris, November 29th 2022, *Lyapunov stability of the subgradient method with constant step size*
13. INFORMS Annual Meeting, Indianapolis, October 17th 2022, *Lyapunov stability of the subgradient method with constant step size*

## Grants

1. ECS grant 27301425, *A study of first-order methods for structured nonconvex optimization problems in data science*, HKD778,276, Jan. 2026 - Dec. 2028

## Awards & Honours

- Columbia IEOR Department Fellowship 2019
- Walter Brown Memorial Prizes in Mathematics, HKU 2019
- Doris Chen Undergraduate Project Prize, HKU 2018
- Liu Ming-Chit Prize in Mathematics, HKU 2018
- Alan John Allis Prize in Mathematics, HKU 2016,2017
- Dean's Honours List, HKU 2016,2017,2019
- HKSAR Government Scholarship, HKU 2015-2019

## Teaching Experience

- As course instructor:  
HKU: Operations Research I Spring 2025
- As teaching assistant:  
Columbia:  
  - Optimization Methods & Models Spring 2024
  - Convex Optimization Spring 2023
  - Optimization Methods & Models for Financial Engineering Fall 2023  
HKU: Linear Algebra I Spring 2019

## Student Mentoring

- PhD students:  
  - Kaiwei Yang (2025-)
  - Mingzhi Song (2024-)
On thesis defending committee:  
  - Zimeng Wang (HKU)
  - Tan Zhang (HKU)
Undergraduate students:  
  - Zesheng Cai (HKU)
  - Shiyang Chen (HKU)
  - Pinxi Gong (HKU)
  - Tiansheng Li (HKU)
  - Qi Peng (HKU)
  - Han Zheng (HKU)

## Service

- Session chair:  
  - *Optimization Theory and Algorithms I*, APORS Youth Forum, 2025
  - *Recent advances in first-order methods*, International Conference on Continuous Optimization (ICCOPT), 2025
  - HKMS-HKSIAM Joint Young Scholars Symposium, 2024
  - *First-order methods and large-scale optimization*, International Symposium on Mathematical Programming (ISMP), 2024
  - *Structured and tame optimization*, INFORMS Annual Meeting, 2023

Reviewer:

- AISTATS
- Applied Mathematics and Optimization
- Computational Optimization and Applications
- Journal of Optimization Theory and Applications
- Mathematics of Operations Research

**Internship**

TCL Corporate Research (Hong Kong) Company Limited  
Research Intern, AI Research Lab

Hong Kong, China  
May-Sept. 2021

**Computer Skills**

Python, MATLAB, L<sup>A</sup>T<sub>E</sub>X