

## Tianyi Peng (2026/09/01)

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CONTACT INFORMATION      tianyi.peng@columbia.edu      <https://tianyipeng.github.io>

RESEARCH INTERESTS      Agentic Swarms, AI for Science, World Model, Reinforcement Learning

ACADEMIC APPOINTMENTS      **Columbia University, Graduate School of Business**      2024 - present  
Decision, Risk, & Operations Division  
Assistant Professor

ACADEMIC DEGREES      **Massachusetts Institute of Technology**      2017 - 2023  
Ph.D. in Statistics and Aeronautics/Astronautics, GPA: 5.0/5.0  
Field in Operations Research  
Advisor: Vivek Farias

**Tsinghua University**      2013 - 2017  
Bachelor in Computer Science  
★ Selected for the *Yao Class* (a CS pilot program led by Prof. Andrew C. Yao)  
★ Graduated with Best Thesis Award

HONORS AND AWARDS      Winner, INFORMS Junior Faculty Interest Group Paper Competition      2025  
Second Place, George Nicholson Student Paper Competition      2025  
Finalist, Jeff McGill Student Paper Award      2025  
Winner, Jeff McGill Student Paper Award      2022  
Winner, Applied Probability Society Best Student Paper Prize      2022  
Winner, Daniel H. Wagner Prize for Excellence      2022  
Finalist, MSOM Best Student Paper Prize      2022  
Best Paper Award, International Conference on Computing, Networking and Communications      2020  
1st place, MIT Quantum Hackathon      2020  
2nd place (among 2780 teams), IEEE programming competition IEEEExtreme 13.0      2019  
Best Thesis Award, Tsinghua University      2017  
China 12-person team for International Olympiad in Informatics (IOI)      2013  
International Gold Prize, Asia-Pacific Informatics Olympiad (APIO)      2012

PREPRINTS      *\* indicates that the authors are in alphabetical order*

[1] **Prove2Me: An Open Collaborative Platform for Scaling Math Formalization**  
Shuze Chen, Kunal Marwaha, Xiaoyang Lu, Henry Yuen, Tianyi Peng  
*arXiv preprint arXiv:2608.28433*

[2] **ExploraTwin, a Non-Profit Research Platform for Digital Twin Simulations**  
Naveen Venkat, Yuchen Qiu, Tianyi Peng, George Gui, Olivier Toubia  
*arXiv preprint arXiv:2608.20539*

[3] **Agentic Data Environments**  
Elaine Ang, Chenxi Huang, Georgios Liargkovas, Jerry Liu, Jinhui Liu, Nikos Pagonas,

Charlie Summers, Haonan Wang, Jiakai Xu, Tianle Zhou, Yusen Zhang, Zhou Yu, Zhuo Zhang, Tianyi Peng, Kostis Kaffes, Eugene Wu  
*arXiv preprint arXiv:2607.07397*

[4] **Corporate Digital Twins from Email: Using Language Models to Mirror Organizational Life**

Grace Jiarui Fan, Tianyi Peng, Xiaotong Tang, Glen Park, Vivian Zhang  
*Columbia Business School Research Paper, forthcoming*

[5] **VineLM: Trie-Based Fine-Grained Control for Agentic Workflows**

Nikos Pagonas, Matthew Lou, Tianyi Peng, Dan Rubenstein, Kostis Kaffes  
*arXiv preprint arXiv:2605.23914*

[6] **SYN-DIGITS: A Synthetic Control Framework for Calibrated Digital Twin Simulation**

Grace Jiarui Fan, Chengpiao Huang, Tianyi Peng, Kaizheng Wang, Yuhang Wu  
*arXiv preprint arXiv:2604.07513*

[7] **AgentOpt v0.1 Technical Report: Client-Side Optimization for LLM-Based Agent**

Wenyue Hua, Sripad Karne, Qian Xie, Armaan Agrawal, Nikos Pagonas, Kostis Kaffes, Tianyi Peng  
*arXiv preprint arXiv:2604.06296*

[8] **Quantifying Trust: Financial Risk Management for Trustworthy AI Agents**

Wenyue Hua, Tianyi Peng, Chi Wang, Jiaxin Pei, Ian Kaufman, Bryan Lim, Chandler Fang  
*arXiv preprint arXiv:2604.03976*

[9] **AI Agents for Inventory Control: Human-LLM-OR Complementarity**

Jackie Baek, Yaopeng Fu, Will Ma, Tianyi Peng  
*arXiv preprint arXiv:2602.12631*

[10] **E-GEO: A Testbed for Generative Engine Optimization in E-Commerce**

\* Puneet S Bagga, Vivek F Farias, Tamar Korkotashvili, Tianyi Peng, Yuhang Wu  
*arXiv preprint arXiv:2511.20867*

[11] **RAISE: Reliable Agent Improvement via Simulated Experience**

Sahar Omid Shayegan, Joshua Meyer, Victor Shih, Sebastian Sosa, Tianyi Peng, Kostis Kaffes, Eugene Wu, Andi Partovi, Mehdi Jamei  
*Scaling Environments for Agents Workshop, NeurIPS 2025 Workshop*

[12] **Estimation of Treatment Effects Under Nonstationarity via Truncated Difference-in-Q's**

\* Ramesh Johari, Tianyi Peng, Wenqian Xing  
*arXiv preprint arXiv:2506.05308*

[13] **Agents for Web Testing: A Case Study in the Wild**

Naimeng Ye, Xiao Yu, Ruize Xu, Tianyi Peng, Zhou Yu  
*NeurIPS 2025 Workshop on Bridging Language, Agent, and World Models*

[14] **Throughput-Optimal Scheduling Algorithms for LLM Inference and AI Agents**

Yueying Li, Tianze Deng, Jim Dai, Tianyi Peng  
*arXiv*: <https://arxiv.org/abs/2504.07347>

[15] **How Well Do LLMs Compress Their Own Chain-of-Thought? A Token Complexity Approach**

Ayeong Lee, Ethan Che, Tianyi Peng  
*arXiv*: <https://arxiv.org/abs/2503.01141>

PUBLICATIONS

*\* indicates that the authors are in alphabetical order*

[1] **Digital Twins are Funhouse Mirrors: Five Systematic Distortions**

Tianyi Peng, George Gui, Daniel J. Merlau, Grace Jiarui Fan, Malek Ben Sliman, Melanie Brucks, Eric J. Johnson, Vicki Morwitz, Abdullah Althenayyan, Silvia Bellezza, Dante Donati, Hortense Fong, Elizabeth Friedman, Ariana Guevara, Mohamed Hussein, Kinshuk Jerath, Bruce Kogut, Akshit Kumar, Kristen Lane, Hannah Li, Patryk Perkowski, Oded Netzer, Olivier Toubia  
*Science Advances* **12**(36), eaeh8260, 2026

[2] **Speculative Actions: A Lossless Framework for Faster Agentic Systems**

\* Naimeng Ye, Arnav Ahuja, Georgios Liargkovas, Yunan Lu, Kostis Kaffes, Tianyi Peng  
*ICLR Oral 2026*

[3] **Multi-Agent Markov Entanglement**

Shuze Chen, Tianyi Peng  
*NeurIPS 2025 (Spotlight)*

★ *Winner*, INFORMS Junior Faculty Interest Group (JFIG) Paper Competition 2025

★ *Second Place*, George Nicholson Student Paper Competition 2025

[4] **Tail-Optimized Caching for LLM Inference**

Wenxin Zhang, Yueying Li, Ciamac C. Moallemi, Tianyi Peng  
*NeurIPS 2025*

[5] **Twin-2K-500: A Dataset for Building Digital Twins of Over 2,000 People Based on Their Answers to Over 500 Questions**

Olivier Toubia, George Z. Gui, Tianyi Peng, Daniel J. Merlau, Ang Li, Haozhe Chen  
*Marketing Science*

[6] **Data Mixture Optimization: A Multi-Fidelity Multi-Scale Bayesian Framework**

Tzu-Ching Yen, Andrew Wei Tung Siah, Haozhe Chen, C. Daniel Guetta, Tianyi Peng, Hongseok Namkoong  
*NeurIPS 2025*

[7] **LLM-Generated Persona is a Promise with a Catch**

Ang Li, Haozhe Chen, Hongseok Namkoong, Tianyi Peng  
*NeurIPS 2025 Position Paper*

[8] **Speeding up Policy Simulation in Supply Chain RL**

\* Vivek Farias, Joren Gijsbrechts, Aryan Khojandi, Tianyi Peng, Andrew Zheng  
*ICML 2025*

[9] **Performance of LLMs on Stochastic Modeling Operations Research Problems: From Theory to Practice**

\* Akshit Kumar, Tianyi Peng, Yuhang Wu, Assaf Zeevi  
*Winter Simulation Conference 2024*

[10] **Differences-in-Neighbors for Network Interference in Experiments**

\* Tianyi Peng, Naimeng Ye, Andrew Zheng  
*EC 2025*

★ *Finalist*, **Revenue Management and Pricing 2025 Jeff McGill Student Paper Award**

[11] **QGym: Scalable Simulation and Benchmarking of Queuing Network Controllers**

Haozhe Chen, Ang Li, Ethan Che, Tianyi Peng, Jing Dong, Hongseok Namkoong  
*NeurIPS 2024 Datasets and Benchmarks Track*

[12] **Correcting for interference in experiments: A case study at douyin**

\* Vivek Farias, Hao Li, Tianyi Peng, Xinyuyang Ren, Huawei Zhang, Andrew Zheng  
*Recsys 2023*

[13] **Learning Treatment Effects in Panels with General Intervention Patterns**

\* Vivek Farias, Andrew Li, Tianyi Peng  
*NeurIPS 2021 (Oral, top 0.6% of submissions)*

Major revision in *Operations Research*

★ *Finalist*, **MSOM Best Student Paper Prize 2022**

[14] **Markovian Interference in Experiments**

\* Vivek Farias, Andrew Li, Tianyi Peng, Andrew Zheng  
*NeurIPS 2022 (Oral, top 2% of submissions)*

Minor revision in *Management Science*

★ *Winner*, **Applied Probability Society Best Student Paper Prize 2022**

★ *Winner*, **RMP Jeff McGill Student Paper Award 2022**

[15] **Generalized Synthetic Control for TestOps at ABI**

\* Vivek Farias, Tianyi Peng, et al.

*INFORMS Journal on Applied Analytics*

★ *Winner*, **INFORMS Daniel H. Wagner Prize 2022**

[16] **Fixing Inventory Inaccuracies at Scale**

\* Vivek Farias, Andrew Li, Tianyi Peng

*ICML 2021, MSOM Supply Chain SIG 2022*

*Manufacturing & Service Operations Management*

[17] **Synthetically Controlled Bandits**

\* Vivek Farias, Ciamac Moallemi, Tianyi Peng, Andrew Zheng

*MSOM Service Management SIG 2022*  
Major revision in *Management Science*

[18] **The Limits to Learning a Diffusion Model**

\* Jackie Baek, Vivek Farias, Andreea Georgescu, Retsef Levi, Tianyi Peng, Deeksha Sinha, Joshua Wilde, Andrew Zheng  
*EC 2021*  
*Management Science*

[19] **Uncertainty Quantification for Low-Rank Matrix Completion with Heterogeneous and Sub-Exponential Noise**

\* Vivek Farias, Andrew Li, Tianyi Peng  
*AISTATS 2022*

[20] **Optimal Entanglement Swapping and Distribution**

Wenhan Dai, Tianyi Peng, Moe Win  
*IEEE Journal on Selected Areas in Communications*, vol. 38, pp. 540–556, 2020  
★ **Best Paper Award**, *International Conference on Computing, Networking and Communications (ICNC 2020)*

[21] **Quantum Queuing Delay**

Wenhan Dai, Tianyi Peng, Moe Win  
*IEEE Journal on Selected Areas in Communications*, vol. 38, pp. 605–618, 2020

[22] **Simulating Large Quantum Circuits on a Small Quantum Computer**

Tianyi Peng, Maris Ozols, Aram Harrow, Xiaodi Wu  
*Physical Review Letters* **125**, 150504 (2020)

[23] **Quantum Uncertainty Relation of Coherence**

Xiao Yuan, Ge Bai, Tianyi Peng, Xiongfeng Ma  
*Physical Review A* **96**(3), 032313

[24] **Tight Detection Efficiency Bounds of Bell Tests in No-Signaling Theories**

Zhu Cao, Tianyi Peng  
*Physical Review A* **94**, 042126

[25] **Efficient and Robust Physical Layer Key Generation**

Tianyi Peng, Wenhan Dai, Moe Win  
*MILCOM 2019*

[26] **Remote State Preparation for Multiple Parties**

Wenhan Dai, Tianyi Peng, Moe Win  
*IEEE ICASSP 2019*, pp. 7983–7987, **Invited Paper**

TEACHING  
EXPERIENCE

**Generative AI: Technical and Social (B9153)**

*Instructor*, Columbia University

Fall 2024, 2025

**Business Analytics (B6101)**

*Instructor*, Columbia University

Spring 2025

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
|                            | <b>Hands-on Deep Learning (15.S04)</b><br><i>Teaching Assistant</i> for MBA Students, MIT, Rating 6.9/7.0                                                                                                                                                                                                                                                                                                                                                                       | Spring 2022       |
|                            | <b>Quantum Information and Quantum Computation</b><br><i>Lecturer</i> for MIT High School Studies Program (Not Rated)                                                                                                                                                                                                                                                                                                                                                           | Summer 2019       |
| SERVICE                    | Reviewer for <i>Management Science</i> , <i>Operations Research</i> , <i>Annals of Statistics</i> , <i>Mathematical Programming</i> , <i>Biometrika</i> , <i>ICLR 2026</i> , <i>AAAI 2026</i> , <i>NeurIPS 2025</i> , <i>ICML 2025</i> , <i>NeurIPS 2024</i> , <i>EC2024</i> , <i>AAAI 2023</i> , <i>AISTATS 2022</i> , <i>IEEE Journal on Selected Areas in Communications</i> , <i>Quantum</i> , <i>ACM Transactions on Quantum Computing</i> , <i>New Journal of Physics</i> |                   |
|                            | Organizer, Frontiers in AI Symposium at Columbia Business School,<br>Organizer, MIT LIDS Student Conference                                                                                                                                                                                                                                                                                                                                                                     | Fall 2024<br>2020 |
| PROFESSIONAL<br>EXPERIENCE | <b>Cimulate.AI</b><br>Develop rerank models and shopping agents in e-commerce.<br><i>AI Scientist, Founding team</i>                                                                                                                                                                                                                                                                                                                                                            | 2023 - 2024       |
|                            | <b>Anheuser-Busch InBev</b><br>Leading the development of TestOps, a pioneering experimentation platform for physical retailers.<br><i>Student collaborator</i>                                                                                                                                                                                                                                                                                                                 | 2020 - 2023       |
|                            | <b>TikTok (ByteDance)</b><br>Addressing interference problems in the experimentation platform at Bytedance and developing recommendation algorithms at TikTok.<br><i>Student collaborator</i>                                                                                                                                                                                                                                                                                   | 2021 - 2023       |
|                            | <b>Liberty Mutual</b><br>Developing novel data-imputation methods for improving insurance pricing.<br><i>Student collaborator</i>                                                                                                                                                                                                                                                                                                                                               | 2021 - 2023       |
| OUTSIDE<br>ACTIVITIES      | Columbia Business School requires its faculty members to disclose any activities that might present a real or apparent conflict of interest. The list below complies with this requirement                                                                                                                                                                                                                                                                                      |                   |
|                            | <b>Anthropic</b><br><i>Member of Technical Staff</i>                                                                                                                                                                                                                                                                                                                                                                                                                            | 2026 - current    |
|                            | <b>Cimulate.AI</b><br><i>Consultant</i>                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2024 - 2026       |