Liyi Zhou

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Citizenship: Australia

Research interests

I primarily focus my research on `Security`, `Privacy`, and Blockchain Extractable Value (`BEV` [1]). My work often integrates `System Analysis` [2] and `Machine Learning` methodologies, particularly within the domains of blockchain and decentralized finance (DeFi).

Education

PhD candidate in Computer Science — Imperial College London
Supervisor: Associate Professor Arthur Gervais — *Oct 2019 – Present*
Expected Graduation: between Oct 2023 and Apr 2024

MRes in Web Science and Big Data Analytics — University College London
Supervisor: Associate Professor Shi Zhou — *Oct 2017 – Sep 2018*

MSci & ARCS in Mathematics and Computer Science (4 years) — Imperial College London
Supervisor: Professor Yike Guo / Research Professor Chao Wu — *Oct 2010 – Sep 2014*

Publications

The CORE ranking is one assessment metric for academic conference quality. Of the 792 assessed venues, `A*` occupies the top 7.45%, whereas `A` encompasses the top 16.41%. Regarding authorship, the first author indicates a primary contribution, "co-first (*)" authors denote equivalent principal contributions, following authors are sequenced by diminishing contributions, and the last author(s) generally signify supervisory roles.

SoK: Decentralized Finance (DeFi) Attacks `Security`
Liyi Zhou, Xihan Xiong, Jens Ernstberger, Stefanos Chaliasos, Zhipeng Wang, Ye Wang, Kaihua Qin, Roger Wattenhofer, Dawn Song, Arthur Gervais
`A*` *IEEE Symposium on Security and Privacy (SP'23)*

High-Frequency Trading on Decentralized On-Chain Exchanges `Security` `BEV`
Liyi Zhou, Kaihua Qin, Christof Ferreira Torres, Duc V Le, Arthur Gervais.
`A*` *IEEE Symposium on Security and Privacy (SP'21)*

On the Just-In-Time Discovery of Profit-Generating Transactions in DeFi Protocols `Security` `BEV` `System Analysis`
Liyi Zhou, Kaihua Qin, Antoine Cully, Benjamin Livshits, Arthur Gervais.
`A*` *IEEE Symposium on Security and Privacy (SP'21)*

Quantifying Blockchain Extractable Value: How dark is the forest? `Security` `BEV`
Kaihua Qin, Liyi Zhou, Arthur Gervais.
`A*` *IEEE Symposium on Security and Privacy (SP'22)*

The Blockchain Imitation Game `Security` `BEV` `System Analysis`
Kaihua Qin, Stefanos Chaliasos, Liyi Zhou, Ben Livshits, Dawn Song, Arthur Gervais.
`A*` *Usenix Security Symposium (USENIX-Security'23)*

On How Zero-Knowledge Proof Blockchain Mixers Improve, and Worsen User Privacy `Privacy`
Zhipeng Wang, Stefanos Chaliasos, Kaihua Qin, Liyi Zhou, Lifeng Gao, Pascal Berrang, Ben Livshits, Arthur Gervais
`A*` *International World Wide Web Conference (WWW'23)*

Smart Contract and Defi Security: Insights from Tool Evaluations and Practitioner Surveys `Security`

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[1] `BEV` refers to the opportunity to extract value from transaction order manipulation, encompassing activities like arbitrage, liquidations, attacks, and more.
[2] `System Analysis` denotes the examination of systems using algorithmic techniques, such as taint analysis, SMT solvers, optimization, and transaction synthesis.

Stefanos Chaliasos, Marcos Antonios Charalambous, Liyi Zhou, Rafaila Galanopoulou, Arthur Gervais, Dimitris Mitropoulos, Ben Livshits.
A* *International Conference on Software Engineering (ICSE'24)*

Mitigating Decentralized Finance Liquidations with Reversible Call Options BEV
Kaihua Qin, Jens Ernstberger, Liyi Zhou, Philipp Jovanovic, Arthur Gervais
A *Financial Cryptography and Data Security (FC'23)*

Attacking the DeFi ecosystem with flash loans for fun and profit Security System Analysis
Kaihua Qin, Liyi Zhou, Benjamin Livshits, Arthur Gervais.
A *Financial Cryptography and Data Security (FC'21)*

An Empirical Study of DeFi Liquidations: Incentives, Risks, and Instabilities BEV
Kaihua Qin, Liyi Zhou, Pablo Gamito, Philipp Jovanovic, Arthur Gervais.
A *ACM Internet Measurement Conference (IMC'21)*

SoK: Data Sovereignty
Jens Ernstberger, Jan Lauinger, Fatima Elsheimy, Liyi Zhou, Sebastian Steinhorst, Ran Canetti, Andrew Miller, Arthur Gervais, Dawn Song.
IEEE European Symposium on Security and Privacy (EuroS&P'23)

Cyclic Arbitrage in Decentralized Exchanges BEV
Ye Wang, Yan Chen, Haotian Wu, Liyi Zhou, Shuiguang Deng, Roger Wattenhofer.
Companion Proceedings of the Web Conference (WWW'22)

CeFi vs. DeFi — Comparing Centralized to Decentralized Finance
Kaihua Qin* (equal), Liyi Zhou* (equal), Arthur Gervais.
Crypto Valley Conference (CVC'21)

Preprints

Do you still need a manual smart contract audit? Security Machine Learning
Isaac David, Liyi Zhou, Kaihua Qin, Dawn Song, Lorenzo Cavallaro, Arthur Gervais.

Blockchain Large Language Models Security Machine Learning
Yu Gai* (equal), Liyi Zhou* (equal), Kaihua Qin, Dawn Song, Arthur Gervais.

Blockchain Censorship Security
Anton Wahrstätter, Jens Ernstberger, Aviv Yaish, Liyi Zhou, Kaihua Qin, Taro Tsuchiya, Sebastian Steinhorst, Davor Svetinovic, Nicolas Christin, Mikolaj Barczentewicz, Arthur Gervais

Time to Bribe: Measuring Block Construction Market Security
Anton Wahrstätter, Liyi Zhou, Kaihua Qin, Davor Svetinovic, Arthur Gervais.

Towards Automated Security Analysis of Smart Contracts based on Execution Property Graph Security
Kaihua Qin, Zhe Ye, Zhun Wang, Weilin Li, Liyi Zhou, Chao Zhang, Dawn Song, Arthur Gervais.

A2MM: Mitigating Frontrunning, Transaction Reordering and Consensus Instability in Decentralized Exchanges BEV System Analysis
Liyi Zhou, Kaihua Qin, Arthur Gervais.

Speculative Denial-of-Service Attacks in Ethereum Security
Aviv Yaish, Kaihua Qin, Liyi Zhou, Aviv Zohar, Arthur Gervais.

Teaching experience	**Lecturer**	*July 2023*
	University of Zurich Summer School: Deep Dive into Blockchain	
	Teaching assistant	*July 2021 — Present*
	DeFi MOOC - a collaborative MOOC course between Stanford, UC Berkeley, UIUC, and UCL	

Academic Services

Program Committee
Ⓐ Financial Cryptography and Data Security (FC), 2024
The Science of Blockchain (SBC), 2023
CESC Crypto Economics Security Conference, 2022
ACM CCS Workshop on Decentralized Finance and Security, (2021, 2022, 2023)

Invited Reviewer
Financial Innovation (2021, 2022, 2023)

External Reviewer
IEEE Symposium on Security and Privacy (IEEE SP'23)

Academic Grants

Ethereum Academic Grant 2023, 72k USD, Blockchain Censorship DoS (part of a team)
Ethereum Academic Grant 2023, 25k USD, Blockchain Censorship Measurement (part of a team)

Invited Talks

Ecole Polytechnique, Blockchain@polytechnique-OMI workshop, 2023
Imperial College London Summer School, DeFi Hack Detection and Prevention, 2023
Second DeFi Security Summit (DSS Paris), DeFi Hack Detection and Prevention, 2023
The Hong Kong Polytech University, Real-time DeFi IDS/IPS, 2023
0xU Hong Kong Blockchain Club, Real-time DeFi IDS/IPS, 2023

Decentralised Finance Research Group Oxford–Man Institute, Real-time DeFi IDS/IPS, 2023
8th International Workshop P2PFISY workshop 2022, DeFi Attacks
The Science of Blockchain (SBC) 2022, Dark Forest
IEEE S&P 2022, Dark Forest

IEEE S&P 2021, High Frequency Trading (Sandwich Attacks)
Monash University, DeFi Security (Invited Presentation), 2021
University of Guelph, DeFi Security (Group Research Seminar), 2021

Industry experience

Decentralized Intelligence AG (D23E),	Switzerland
Co-founder,	*Dec 2022 – Present*
Chainlink Labs,	London, United Kingdom
Research Intern,	*Sep 2022 – Dec 2022*
Imperial College London, Data Science Institute,	London, United Kingdom
Software Engineer,	*24th June 2019 – 7th Oct 2019*
Automic,	Sydney, Australia
Full-Stack Software Engineer,	*23rd Mar 2017 – 20th June 2017*
SuperChoice,	Sydney, Australia
Software Engineer,	*20th Oct 2014 – 4th Jan 2016*
NewVoiceMedia,	Basingstoke, United Kingdom
Internship,	*3rd Jun 2013 – 20th Sep 2013*
J P Morgan, Global Credit Operate Team,	London, United Kingdom
Internship,	*25th July 2012 – 31st Aug 2012*

Skills

Programming: Golang, Python, Solidity, SQL.
Languages: Chinese (native), English (fluent)