Yanxiao Liu

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Background

Imperial College London   **2025.9 –**
Postdoctoral Research Associate, Project: Machine Learning and Information Theory
Advisor: Prof. Deniz Gündüz (IEEE Fellow)

The Chinese University of Hong Kong   **2021.8 – 2025.7**
PhD, Department of Information Engineering
Advisors: Prof. Cheuk Ting Li and Prof. Raymond W. Yeung (IEEE Life Fellow, Shannon Award 2022)
GPA: 3.794/4.000

Stanford University   **2024.1 – 2024.6**
Visiting Researcher, Department of Electrical Engineering
Advisor: Prof. Ayfer Özgür

The Chinese University of Hong Kong, Shenzhen   **2017.9 – 2021.6**
B.Eng. in Electronic Information Engineering and minor in Philosophy
Advisor: Prof. Shenghao Yang

Research

I am an information theorist with broad interests in theoretical aspects of computer science and engineering, including information processing, inference, privacy, security, and distributed learning.

- **Information Theory and Communications**: I provide nonasymptotic coding schemes, low-complexity algorithms and theoretic analyses for fundamental problems in information theory and network communications.
- **Compression and Privacy for Distributed Learning**: I employ information-theoretic techniques (specifically, *remote source generations*) to compress privacy mechanisms, and solve various canonical tasks in distributed analytics and federated learning.
- **Security and Watermarking**: I design novel watermarking schemes that are distortion-free to original texts and distributionally-robust against attacks, applicable to effective protection and detection of content from generative AI models.

Selected Awards

- CUHK PhD International Mobility for Partnerships and Collaborations Award 2023-24 ($\approx 1.5\%$).
- ISIT Travel Award (2024).
- NeurIPS Scholar Award (2024).

Publications

Preprints

[1] **Yanxiao Liu**, Shenghao Yang, and Cheuk Ting Li. "Joint Scheduling and Multiflow Maximization in Wireless Networks". In: *[Preprint available] for IEEE Transactions on Networking* (2025).

[2] **Yanxiao Liu** and Cheuk Ting Li. "One-Shot Information Hiding and Compound Wiretap Channels". In: *[Preprint available] for IEEE Transactions on Information Theory* (2025).

[3] **Yanxiao Liu**, Sepehr Heidari Advary, and Cheuk Ting Li. "Nonasymptotic Oblivious Relaying and Variable-Length Noisy Lossy Source Coding". In: *[Preprint available] for IEEE Transactions on Information Theory* (2025).

[4] **Yanxiao Liu** and Cheuk Ting Li. "Multi-Draft Speculative Decoding via Poisson Processes". In: *In preparation for ICLR* (2025).

[5] **Yanxiao Liu** and Cheuk Ting Li. "Zero-Bit LLM Watermarking via Gumbel-Max Trick with Error Correction". In: *In preparation for ICLR* (2025).

Journal Articles

[6] **Yanxiao Liu** and Cheuk Ting Li. "One-Shot Coding over General Noisy Networks". In: *IEEE Transactions on Information Theory, early access.* (2025).

[7] Chih Wei Ling*, **Yanxiao Liu*(co-first author)**, and Cheuk Ting Li. "Weighted Parity-Check Codes for Channels with State and Asymmetric Channels". In: *IEEE Transactions on Information Theory* 70.8 (2024), pp. 5573–5588.

[8] Shenghao Yang, Jun Ma, and **Yanxiao Liu**. "Wireless Network Scheduling with Discrete Propagation Delays: Theorems and Algorithms". In: *IEEE Transactions on Information Theory* 70.3 (2024), pp. 1852–1875.

Conference Proceedings

[9] **Yanxiao Liu**, Wei-Ning Chen, Ayfer Özgür, and Cheuk Ting Li. "Universal Exact Compression of Differentially Private Mechanisms". In: *The Thirty-Eighth Annual Conference on Neural Information Processing Systems (**NeurIPS**)*. 2024.

[10] **Yanxiao Liu**, Sepehr Heidari Advary, and Cheuk Ting Li. "Nonasymptotic Oblivious Relaying and Variable-Length Noisy Lossy Source Coding". In: *2025 IEEE International Symposium on Information Theory (**ISIT**)*. 2025.

[11] **Yanxiao Liu** and Cheuk Ting Li. "One-Shot Coding over General Noisy Networks". In: *2024 IEEE International Symposium on Information Theory (**ISIT**)*. 2024.

[12] **Yanxiao Liu** and Cheuk Ting Li. "One-Shot Information Hiding". In: *2024 IEEE Information Theory Workshop (**ITW**)*. 2024.

[13] Yijun Fan, **Yanxiao Liu**, Yi Chen, Shenghao Yang, and Raymond W. Yeung. "Reliable Throughput of Generalized Collision Channel Without Synchronization". In: *2023 IEEE International Symposium on Information Theory (**ISIT**)*. 2023.

[14] Yijun Fan, **Yanxiao Liu**, and Shenghao Yang. "Continuity of Link Scheduling Rate Region for Wireless Networks with Propagation Delays". In: *2022 IEEE International Symposium on Information Theory (**ISIT**)*. 2022.

[15] Chih Wei Ling, **Yanxiao Liu**, and Cheuk Ting Li. "Weighted Parity-Check Codes for Channels with State and Asymmetric Channels". In: *2022 IEEE International Symposium on Information Theory (**ISIT**)*. 2022.

[16] Jun Ma, **Yanxiao Liu**, and Shenghao Yang. "Rate Region of Scheduling a Wireless Network with Discrete Propagation Delays". In: *IEEE INFOCOM 2021-IEEE Conference on Computer Communications (**INFOCOM**)*. 2021.

Teaching Assistance

I have served as a teaching assistant for 9 courses, 8 of which were unique, including 2 at the PhD level. My areas of assistance spanned information theory, optimization, probability theory, statistics, discrete mathematics, electronic circuits, and practical computer network laboratories.

Graduate School PhD Program Courses:
- ENGG5301: Information Theory (Fall 2022-23, Instructor: Prof. Cheuk Ting Li)
  - I was the sole TA supporting ≈ 60 PhD students. I prepare materials, give weekly tutorials, hold weekly office hours, and grade homework and exams.
- CIE6010 (CUHKSZ): Optimization Theory and Examples (Fall 2019-20, Instructor: Prof. Stark Draper)
  - I build up, organize and compile lecture notes (155 pages) from scratch, see → [Notes].

Undergraduate Courses:
- IERG2060-ESTR2304: Basic Analog and Digital Circuits (Fall 2021-22, Instructor: Dr. Marco Ho)
- IERG2470-ESTR2308: Probability Models and Applications (Spring 2021-22, Instructor: Prof. Raymond W. Yeung)
- IERG2470-ESTR2308: Probability Models and Applications (Spring 2022-23, Instructor: Prof. Cheuk Ting Li)
- IERG3800: Information Infrastructure Design Lab (Fall 2023-24, Instructor: Prof. Yiu Bun Lee)
- IERG3050: Simulation and Statistical Analysis (Fall 2023-24, Instructor: Prof. Cheuk Ting Li)
- ENGG2440: Discrete Mathematics for Engineers (Fall 2024-25, Instructor: Prof. Cheuk Ting Li)
- MIEG2440-ESTR2362: Discrete Structures and Probability (Spring 2024-25, Instructor: Prof. Cheuk Ting Li)

Postgraduate Courses Studied

- ENGG5301 Information Theory (Fall 2021-22, Instructor: Prof. Raymond W. Yeung)
- ENGG5781 Matrix Analysis and Computations (Fall 2021-22, Instructor: Prof. Wing-Kin (Ken) Ma)
- ENGG5303 Advanced Wireless Communications (Spring 2021-22, Instructor: Prof. Ying-Jun Angela Zhang)
- IERG5200 Channel Coding and Modulation (Spring 2021-22, Instructor: Prof. Pascal O. Vontobel)
- IERG6300 Theory of Probability (Spring 2021-22, Instructor: Prof. Chandra Nair)

- ○ IERG5290 Network Coding Theory (Fall 2022-23, Instructor: Prof. Raymond W. Yeung)
- ○ IERG6154 Network Information Theory (Spring 2022-23, Instructor: Prof. Chandra Nair)
- ○ IERG6130 Positive Definite Matrices (Sit-in, Spring 2024–25, Instructor: Prof. Amin Gohari)

Industrial Experience

Shenzhen Research Institute of Big Data   **2021.5–2021.8**
Research Intern

Pingan Technology   **2020.8–2020.10**
Software Engineer Intern

References

Raymond W. Yeung   **PhD Advisor**
Choh-Ming Li Professor   *The Chinese University of Hong Kong*
IEEE Life Fellow, Claude E. Shannon Award (2022)

Cheuk Ting Li   **PhD Advisor**
Assistant Professor   *The Chinese University of Hong Kong*

Ayfer Özgür   **Visiting Host**
Associate Professor   *Stanford University*

Chandra Nair   **Thesis Committee Chair**
Professor   *The Chinese University of Hong Kong*
IEEE Fellow