Dr. Hao-Chung Cheng

Curriculum Vitae

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PRIMARY AFFILIATION

Dr. Hao-Chung Cheng（鄭皓中）is a scientist in the quantum information frontier. He is currently an Associate Professor at the Department of Electrical Engineering and the Graduate Institute of Communication Engineering, National Taiwan University (NTU).

JOINT AFFILIATION

ASSOCIATE PROFESSOR (JOINT APPOINTMENT)	Department of Mathematics National Taiwan University
CENTER SCIENTIST (& COORDINATOR)	Center for Quantum Science and Engineering National Taiwan University
CENTER SCIENTIST	National Center for Theoretical Sciences Physics Division
CORE MEMBER	National Center for Theoretical Sciences Mathematics Division
CONSULTANT	Hon Hai (Foxconn) Quantum Computing Center

RESEARCH FIELDS

PRIMARY FIELDS	Quantum Information Theory
	Quantum Information Security
	Quantum Machine Learning
SECONDARY FIELDS	Communication Engineering
	Statistical Signal Processing, Matrix Analysis

POSTDOCTORAL EXPERIENCE

University of Cambridge, *United Kingdom* (Nov 2018 – Jul 2020)
Department of Applied Mathematics and Theoretical Physics (DAMTP)
Darwin College

EDUCATION

FEB 2016 – JUL 2018	**Doctor of Philosophy in Computer Science** Centre for Quantum Software and Information School of Computer Science *University of Technology Sydney*
SEP 2011 – FEB 2018	**Doctor of Philosophy in Engineering** Graduate Institute of Communication Engineering *National Taiwan University*
SEP 2006 – JUN 2010	**Bachelor of Engineering** Department of Electrical Engineering *National Taiwan University*

DOCTORAL RESEARCH

"Error Exponent Analysis in Quantum Information Theory"

My Ph.D. research studied the trade-off between the performance of quantum information-theoretic tasks, the required resources, and the system size needed in achieving the task. The established analysis characterizes the efficiency of the underlying system. This hence allows us to take a step from theory toward practice, and lay foundation for designing the next-generation quantum information technology.
For the task of quantum learning, I proposed a unified framework to determine how much training samples is required to learn an unknown quantum state or quantum measurement. For fundamental quantum information-theoretic tasks, I studied data compression with quantum side information, and data transmission through quantum channels, and characterized the trade-off between the incurred error probability, the compression or transmission rate, and the associated coding size. This study can be extended to further quantum information processing protocols such as channel synthesis,privacy, networking, sample complexities in machine learning and resource theory.

TEACHING EXPERIENCE

2021–	Quantum Information and Computation (Graduate-level at National Taiwan University)
2024–	Linear Algebra
2020–2024	Communication System Lab
2019	Quantum Information Theory (Lecture Supervision at Cambridge University)
2019	Quantum Information and Computation (Lecture Supervision at Cambridge University)

ACADEMIC AWARDS

2025	**Sun Yat Sen Academic Achievement Award** 中山學術文化基金會「第 60 屆中山學術著作獎」	*Sun Yat Sen Academic and Cultural Foundation*
2025	**Ta-You Wu Memorial Award** 國科會「114 學年度吳大猷先生紀念獎」	*National Science and Technology Council*
2025	**Yushan Young Fellow Scholar** 教育部「114 學年度玉山青年學者」(續任)	*Ministry of Education*
2025	**NTU Outstanding Teaching Award** 國立臺灣大學「113 學年度專任教師教學優良獎」	*National Taiwan University*
2025	**2024 Young Scholar Best Paper Award** 2024 年輕學者最佳論文獎 (二次獲獎)	*IEEE ITSOC & COMSOC Taipei/Tainan Chapters*
2024	**Academic Contribution Award** 臺大電機資訊學院「學術貢獻獎」	*EECS College, NTU*
2024	**Outstanding Young Electrical Engineer Award** 中國電機工程學會「113 年度優秀青年電機工程師獎」	*The Chinese Institute of Electrical Engineering*
2024	**NTU Outstanding Teaching Award** 國立臺灣大學「112 學年度專任教師教學優良獎」	*National Taiwan University*
2024	**NTU EECS Excellent Young Scholar Lecture Award** 臺大電機資訊學院「仁民傑出青年學者講座」得主	*EECS College, NTU*
2024	**2030 Cross-Generation Young Scholars Program "Emerging Young Scholars"** 國科會 2030 跨世代年輕學者方案「新秀學者」得主	*National Science and Technology Council*
2023	**2023 K. T. Li Young Researcher Award** 中華民國資訊學會「2023 李國鼎青年研究獎」	*Institute of Information & Computing Machiner*
2023	**Young Theoretical Scientist Award** 國家理論科學研究中心數學組「年輕理論學者獎」	*National Center for Theoretical Sciences – Mathematics Division*
2023	**NTU Outstanding Teaching Award** 國立臺灣大學「111 學年度專任教師教學優良獎」	*National Taiwan University*
2021	**2021 Young Scholar Best Paper Award** 2021 年輕學者最佳論文獎	*IEEE ITSOC & COMSOC Taipei/Tainan Chapters*
2020	**Yushan Young Fellow Scholar** 教育部「109 學年度玉山青年學者」	*Ministry of Education*
2020	**MOST Young Scholar Fellowship "Einstein Program"** 科技部年輕學者養成計畫「愛因斯坦」得主	*Ministry of Science and Technology*
2018	**Ph.D. Thesis Award**	*University of Technology Sydney*
2013	**Student Paper Competition Award**	*Asia-Pacific Radio Science Conference*

ACADEMIC ACTIVITIES

LOC CO-CHAIR	**27th Conference on Quantum Information Processing (QIP 2024)**	Taipei, Taiwan, Jan. 13–19, 2024
	2021 Beyond IID in Information Theory	Taipei, Taiwan, Sept. 27–Oct. 1, 2021
TPC MEMBER	**Theory of Quantum Computation, Communication, and Cryptography (TQC 2026)**	Sherbrooke, Canada, Aug. 31–Sept. 4, 2026
	2026 IEEE International Symposiums on Information Theory	Guangzhou, China, Jun. 28–Jul. 3, 2026
	25th Asian Quantum Information Science Conference (AQIS 2025)	Hong Kong, China, Aug. 4–8, 2025

	2025 IEEE International Symposiums on Information Theory	Ann Arbor, USA, Jun. 22–27, 2025
	28th Conference on Quantum Information Processing (QIP 2025)	Raleigh, USA, Feb. 22–28, 2025
	2024 IEEE Information Theory Workshop (ITW)	Shenzhen, China, Nov. 24–28, 2024
	2024 IEEE International Symposiums on Information Theory	Athens, Greece, Jul. 7–12, 2024
	2023 Beyond IID in Information Theory	Tübingen, Germany, Jul. 31–Aug. 4, 2023
	2023 IEEE International Symposiums on Information Theory	Taipei, Taiwan, Jun. 25–30, 2023
	Theory of Quantum Computation, Communication, and Cryptography (TQC 2021)	Latvia, Jul. 5–8, 2021
	IEEE VTS Asia Pacific Wireless Communications Symposium	Osaka, Japan, Aug. 30–31, 2021
LOCAL ORGANIZER	IEEE Global Communications Conference	Taipei, Taiwan, Dec. 8–12, 2025
	NCTS Phys-Math Summer School on Quantum Information	Taipei, Taiwan, Jun. 25–28, 2024
	Workshop on Entanglement Assisted Communication Networks	Taipei, Taiwan, Jun. 19–23, 2023
	International Workshop on Quantum Information Processing and Applications	Kaohsiung, Taiwan, Dec. 9–11, 2022
	ASUS-NTU Quantum Computing Forum	Taipei, Taiwan, Apr. 7, 2022
	Quantum Science and Applications (NCTS)	Hsinchu, Taiwan, Feb. 18–19, 2021
	18th Conference on Quantum Information Processing (QIP 2015)	Sydney, Australia, Jan. 10–16, 2015
SESSION CHAIR	28th Conference on Quantum Information Processing (QIP 2025)	Durham, USA, Feb. 22–28, 2025 Durham, USA, Feb. 22–28, 2025
	2024 IEEE International Symposiums on Information Theory	Athens, Greece, Jul. 7–12, 2024
	27th Conference on Quantum Information Processing (QIP 2024)	Taipei, Taiwan, Jan. 13–19, 2024
	2023 Beyond IID in Information Theory	Tübingen, Germany, Jul. 31–Aug. 4, 2023
	2023 IEEE International Symposiums on Information Theory	Taipei, Taiwan, Jun. 25–30, 2023
	2021 IEEE Information Theory Workshop	Kanazawa, Japan, Oct. 17–10/21, 2021
	2021 Beyond IID in Information Theory	Taipei, Taiwan, Sept. 27–Oct. 1, 2021
	2020 IEEE Global Communications Conference	Taipei, Taiwan, Dec. 6–8, 2020

REVIEWER

Communications in Mathematical Physics

IEEE Transactions on Information Theory

IEEE Transactions on Pattern Analysis and Machine Intelligence

IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems

Nature Communications

npj Quantum Information

PRX Quantum

Physical Review Letters

Physical Review Research

Quantum

Annales Henri Poincaré

IEEE International Conference on Quantum Computing and Engineering (2022)

IEEE Symposium on Information Theory (2021, 2022, 2023, 2024)

IEEE Information Theory Workshop (2022)

Conference on Neural Information Processing Systems (2024)

PUBLICATION LIST

Peer-Reviewed Contributed Talks (no proceedings)

- **(QIP Merged Long Plenary)** **Hao-Chung Cheng**, and Po-Chieh Liu "Quantum channel coding with a few code lengths," *29th Conference on Quantum Information Processing (**QIP 2026**)*, Riga, University of Latvia, January 24–30, 2026.

  (QIP Merged Long Plenary) Salman Beigi, **Hao-Chung Cheng**, Christoph Hirche, Po-Chieh Liu, Marco Tomamichel "Representations of f-Divergences and their role in Quantum Hypothesis Testing," *29th Conference on Quantum Information Processing (**QIP 2026**)*, Riga, University of Latvia, January 24–30, 2026.

- **(Beyond IID Long Talk)** **Hao-Chung Cheng** and Po-Chieh Liu, "A constructive proof of Holevo's conjecture," *Beyond IID in Information Theory 13 (BIID 2025)*, Technical University of Munich, Germany, July 14–18, 2025.

- Mario Berta, Michael X. Cao, **Hao-Chung Cheng**, Omar Fawzi, Aadil Oufkir and Yongsheng Yao, "Channel Simulation: Tight meta converse for error and strong converse exponents," *28th Conference on Quantum Information Processing (**QIP 2025**)*, Duke University, USA, February 22–28, 2025.

- **Hao-Chung Cheng**, Nilanjana Datta, Nana Liu, Theshani Nuradha, Robert Salzmann, Mark M. Wilde, "An invitation to the sample complexity of quantum hypothesis testing," *Beyond IID in Information Theory 12*, 29 July to 2 August, 2024.

- Pau Saus Colomer, Andreas Winter, Mario Berta, **Hao-Chung Cheng**, and Li Gao, "Bypassing Joint Typicality in Network Quantum Shannon Theory," *27th Conference on Quantum Information Processing (**QIP 2024**)*, Taipei, Taiwan, January 13–19, 2024.

- **Hao-Chung Cheng**, Li Gao, "Tight One-Shot Analysis of Convex Splitting with Applications in Quantum Information Theory," *Beyond IID in Information Theory 11*, 31 July–August 4, 2023, Tübingen, Germany.

- **(QIP Short Plenary)** **Hao-Chung Cheng**, "A Simple and Tighter Derivation of Achievability for Classical Communication over Quantum Channels," *26th Conference on Quantum Information Processing (**QIP 2023**)*, Ghent, Belgium, February 4–10, 2023.

- **Hao-Chung Cheng**, Frédéric Dupuis and Li Gao, "Joint State-Channel Decoupling and One-Shot Quantum Coding Theorem," *26th Conference on Quantum Information Processing (**QIP 2023**)*, Ghent, Belgium, February 4–10, 2023.

- Yu-Chen Shen, Li Gao and **Hao-Chung Cheng**, "Optimal Second-Order Rates for Quantum Information Decoupling and Privacy Amplification," *26th Conference on Quantum Information Processing (**QIP 2023**)*, Ghent, Belgium, February 4–10, 2023.

- Srinivasan Arunachalam, Sergey Bravyi, **Hao-Chung Cheng**, Arkopal Dutt, Ching-Yi Lai and Ted Yoder, "Learning beyond Cliffords: circuits and states," *26th Conference on Quantum Information Processing (**QIP 2023**)*, Ghent, Belgium, February 4–10, 2023.

- **Hao-Chung Cheng**, Li Gao, "Error Exponent and Strong Converse for Quantum Soft Covering," *Beyond IID in Information Theory 10*, 26–30 September, 2022, virtual at Shenzhen, China.

  Hao-Chung Cheng, "A Simple and Tighter Derivation of Achievability for Classical Communication over Quantum Channels," *Beyond IID in Information Theory 10*, 26–30 September, 2022, virtual at Shenzhen, China.

- **Hao-Chung Cheng**, Li Gao, Min-Hsiu Hsieh, "Properties of Scaled Noncommutative Rényi and Augustin Information," *Beyond IID in Information Theory 7*, Sydney, Australia, 1–5 July, 2019.

- **Hao-Chung Cheng**, Cambyse Rouzé, Nilanjana Datta, "Strong converse bounds in quantum network information theory:distributed hypothesis testing and source coding," *Beyond IID in Information Theory 7*, Sydney, Australia, 1–5 July, 2019.

- **Hao-Chung Cheng**, Cambyse Rouzé, Nilanjana Datta, "Strong Converse for Classical-Quantum Degraded Broadcast Channels," *Beyond IID in Information Theory 7*, Sydney, Australia, 1–5 July, 2019.

- **Hao-Chung Cheng**, Min-Hsiu Hsieh and Marco Tomamichel, "Moderate Deviation Analysis and Sphere-Packing Bounds for Classical-Quantum Channels," *21th Conference on Quantum Information Processing (**QIP 2018**)*, TU Delft, Netherlands, January 13–19, 2018.

- **Hao-Chung Cheng**, Min-Hsiu Hsieh and Marco Tomamichel, "Sphere-Packing Bound and Moderate Deviation Analysis for Classical-Quantum Channels," *Beyond IID in Information Theory 5*, Singapore, August 2017.

- **Hao-Chung Cheng** and Min-Hsiu Hsieh, "Moderate Deviation Analysis for Classical-Quantum Channels and Quantum Hypothesis Testing," *Theory of Quantum Computation, Communication and Cryptography (**TQC 2017**)*, Paris, France, June 14–16, 2017.

  Hao-Chung Cheng and Min-Hsiu Hsieh, "n the Concavity of Auxiliary Function in Classical-Quantum Channels," *Asian Quantum Information Science Conference (AQIS)*, Academic Sinica, Taipei, Taiwan, September 2016.

Journal Papers (peer-reviewed)

Note: The "*" is marked if I am the corresponding author.

1. Po-Chieh Liu and **Hao-Chung Cheng***, "On Araki-type trace inequalities," *Linear Algebra and its Applications*, 728, 320−330, January 2026. DOI: 10.1016/j.laa.2025.08.023

2. **Hao-Chung Cheng*** and Li Gao, "Tight One-Shot Analysis for Convex Splitting with Applications in Quantum Information Theory," *IEEE Transactions on Information Theory*, Volume: 71, Issue: 11, November 2025. DOI: 10.1109/TIT.2025.3612051

3. Sreejith Sreekumar, Christoph Hirche, **Hao-Chung Cheng**, Mario Berta, "Distributed Quantum Hypothesis Testing Under Zero-Rate Communication Constraints," *Annales Henri Poincaré*, 3 October 2025. DOI: 10.1007/s00023-025-01623-6

4. Masahito Hayashi, **Hao-Chung Cheng**, and Li Gao, "Resolvability of classical-quantum channels," *IEEE Transactions on Information Theory*, 71(8): 6061–6074, August 2025. DOI: 10.1109/TIT.2025.3570569

5. **Hao-Chung Cheng**, Nilanjana Datta, Nana Liu, Theshani Nuradha, Robert Salzmann, and Mark M. Wilde, "An invitation to the sample complexity of quantum hypothesis testing" , *npj Quantum Information*, Volume 11, Number 94, 05 June 2025. DOI: 10.1038/s41534-025-00980-8

6. Barış Nakiboğlu and **Hao-Chung Cheng**, "The Mutual Information In The Vicinity of Capacity-Achieving Input Distributions," *IEEE Transactions on Information Theory*, 71, 8, 5771–5787, August 2025. DOI: 10.1109/TIT.2025.3562098

7. Chun-Tse Li, and **Hao-Chung Cheng***, "Adaptive Circuit Learning of Born Machine: Towards Realization of Amplitude Embedding and Quantum Data Loading," *Quantum Science and Technology*, 10, 025019, February 2025. DOI: 10.1088/2058-9565/adaede

8. Mario Berta, **Hao-Chung Cheng***, Li Gao, "Quantum Broadcast Channel Simulation via Multipartite Convex Splitting," *Communications in Mathematical Physics*, Volume 406, Number 36, January 2025. DOI: 10.1007/s00220-024-05191-4

9. Chin-Yi Cheng, Chien-Yi Yang, Yi-Hsiang Kuo, Ren-Chu Wang, **Hao-Chung Cheng***, Chung-Yang (Ric) Huang, "Robust Qubit Mapping Algorithm via Double-Source Optimal Routing on Large Quantum Circuits," *ACM Transactions on Quantum Computing*, Volume 5, Issue 3, Pages 1–26, 2024. DOI: 10.1145/3680291

10. Yu-Chen Shen, Li Gao, and **Hao-Chung Cheng***, "Optimal Second-Order Rates for Quantum Soft Covering and Privacy Amplification," *IEEE Transactions on Information Theory*, Volume: 70, Issue: 7, July 2024. DOI: 10.1109/TIT.2024.3351963

11. **Hao-Chung Cheng*** and Li Gao, "Error Exponent and Strong Converse for Quantum Soft Covering," *IEEE Transactions on Information Theory*, Volume: 70, Issue: 5, May 2024.
DOI: 10.1109/TIT.2023.3307437

12. **Hao-Chung Cheng*** "Simple and Tighter Derivation of Achievability for Classical Communication Over Quantum Channels," *PRX Quantum*, 4, 040330, 22 November, 2023. DOI: 10.1103/PRXQuantum.4.040330

13. **Hao-Chung Cheng***, Andreas Winter, and Nengkun Yu, "Discrimination of Quantum States Under Locality Constraints in the Many-Copy Setting," *Communications in Mathematical Physics*, 14 September, 2023. DOI: 10.1007/s00220-023-04836-0

14. **Hao-Chung Cheng***, Eric P. Hanson, Nilanjana Datta, Min-Hsiu Hsieh, "Duality Between Source Coding With Quantum Side Information and Classical-Quantum Channel Coding," *IEEE Transactions on Information Theory*, 68(11):7315–7345, November 2022.
DOI: 10.1109/TIT.2022.3182748

15. Yu Shee, Pei-Kai Tsai, Cheng-Lin Hong, **Hao-Chung Cheng**, and Hsi-Sheng Goan, "Qubit-efficient encoding scheme for quantum simulations of electronic structure," *Physical Review Research* 4, 023154, May 2022. DOI: 10.1103/PhysRevResearch.4.023154

16. Ching-Yi Lai and **Hao-Chung Cheng**, "Learning quantum circuits of some T gates," *IEEE Transactions on Information Theory*, 68(6):3951–3964, June 2022. DOI: 10.1109/TIT.2022.3151760

17. **Hao-Chung Cheng***, Li Gao, Min-Hsiu Hsieh, "Properties of Noncommutative Rényi and Augustin Information," *Communications in Mathematical Physics*, vol. 390, no. 2, 501–544, Mar. 2022. DOI: 10.1007/s00220-022-04319-8

18. **Hao-Chung Cheng***, Nilanjana Datta, and Cambyse Rouźe, "Strong converse bounds in quantum network information theory," *IEEE Transactions on Information Theory*, vol. 67, no. 4, Apr. 2021.
DOI: 10.1109/TIT.2021.3058166

19. **Hao-Chung Cheng***, Eric P. Hanson, Nilanjana Datta, and Min-Hsiu Hsieh, "Non-Asymptotic Classical Data Compression with Quantum Side Information," *IEEE Transactions on Information Theory*, vol. 67, no. 2, pp. 902–930, Feb. 2021. DOI: 10.1109/TIT.2020.3038517

20. **Hao-Chung Cheng***, Min-Hsiu Hsieh and Marco Tomamichel, "Quantum Sphere-Packing Bounds with Polynomial Prefactors," *IEEE Transactions on Information Theory*, vol. 65, no. 5, p. 2872–2898 , May 2019. DOI: 10.1109/TIT.2019.2891347

21. **Hao-Chung Cheng*** and Min-Hsiu Hsieh, "Matrix Poincaré, Φ-Sobolev Inequalities, and Quantum Ensembles," *Journal of Mathematical Physics*, vol. 60, no. 3, p. 032201, 2019. DOI: 10.1063/1.5035381

22. **Hao-Chung Cheng***, Min-Hsiu Hsieh, "Moderate Deviation Analysis for Classical-Quantum Channels and Quantum Hypothesis Testing," *IEEE Transactions on Information Theory*, vol. 64, no. 2, page 1-19, Feb 2018. DOI: 10.1109/TIT.2017.2781254

23. **Hao-Chung Cheng***, Min-Hsiu Hsieh, and Marco Tomamichel, "Exponential Decay of Matrix Φ-Entropies on Markov Semigroups with Applications to Dynamical Evolutions of Quantum Ensembles," *Journal of Mathematical Physics*, vol. 58, no. 9, p. 092202, 2017. DOI: 10.1063/1.5000846

24. **Hao-Chung Cheng***, and Min-Hsiu Hsieh, "On the Concavity of Auxiliary Function in Classical-Quantum Channels," *IEEE Transactions on Information Theory*, vol. 62, no. 10, Oct 2016. DOI: 10.1109/TIT.2016.2598835

25. **Hao-Chung Cheng***, and Min-Hsiu Hsieh, "Characterizations of Matrix and Operator-Valued Φ-Entropies, and Operator Efron-Stein Inequalities," *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Science*, vol. 472, no. 2187, p. 20150563, Mar 2016. DOI: 10.1098/rspa.2015.0563

26. **Hao-Chung Cheng***, Min-Hsiu Hsieh, and Ping-Cheng Yeh, "The Learnability of Unknown Quantum Measurements," *Quantum Information and Computation*, vol. 16, no. 7&8, pp. 0615–0656, 2016. URL

Conference Proceedings (peer-reviewed)

1. Bo-An Shi and **Hao-Chung Cheng***, "A Simple Derivation of The Refined Sphere-Packing Bound for Classical-Quantum Channels," *IEEE Information Theory Workshop (ITW)*, September 2025. DOI: 10.1109/ITW62417.2025.11240452

2. Michael X. Cao, Aadil Oufkir, **Hao-Chung Cheng**, Mario Berta, "Exponents for Shared Randomness-Assisted Channel Simulation," *IEEE International Symposium on Information Theory (ISIT)*, June 2025. DOI: 10.1109/10.1109/ISIT63088.2025.11195307

3. Sreejith Sreekumar, Christoph Hirche, **Hao-Chung Cheng**, Mario Berta, "Distributed Quantum Hypothesis Testing Against Product States Under Zero-Rate Communication Constraints," *IEEE International Symposium on Information Theory (ISIT)*, June 2025. DOI: 10.1109/ISIT63088.2025.11195560

4. **Hao-Chung Cheng** and Barış Nakiboğlu, "Augustin Information In The Vicinity of Augustin Capacity-Achieving Input Distributions," *IEEE Information Theory Workshop*, November 2024. DOI: 10.1109/ITW61385.2024.10807029

5. Guan-Ren Wang, Chung-En Tsai, **Hao-Chung Cheng**, Yen-Huan Li, "Computing Augustin Information via Hybrid Geodesically Convex Optimization," *IEEE International Symposium on Information Theory (ISIT)*, July 2024. DOI: 10.1109/ISIT57864.2024.10619657

6. Bo-Yu Yang, Hsuan Yu, **Hao-Chung Cheng***, "Maximal α-Leakage for Quantum Privacy Mechanisms and Operational Meaning of Measured Rényi Capacity," *IEEE International Symposium on Information Theory (ISIT)*, July 2024. DOI: 10.1109/ISIT57864.2024.10619592

7. Ian George and **Hao-Chung Cheng***, "Coherent Distributed Source Simulation as Multipartite Quantum State Splitting," *IEEE International Symposium on Information Theory (ISIT)*, July 2024. DOI: 10.1109/ISIT57864.2024.10619569

8. **Hao-Chung Cheng** and Barış Nakiboğlu, "A New Characterization Of Augustin Information And Mean," *IEEE International Symposium on Information Theory (ISIT)*, July 2024. DOI: 10.1109/ISIT57864.2024.10619569

9. **Hao-Chung Cheng***, Christopher Hirche, and Cambyse Rouzé, "Sample Complexity of Locally Differentially Private Quantum Hypothesis Testing," *IEEE International Symposium on Information Theory (ISIT)*, July 2024. DOI: 10.1109/ISIT57864.2024.10619433

10. Chung-En Tsai, **Hao-Chung Cheng**, Yen-Huan Li, "Fast Minimization of Expected Logarithmic Loss via Stochastic Dual Averaging," *Proceedings of The 27th International Conference on Artificial Intelligence and Statistics (AISTATS 2024)*, PMLR 238:2908-2916, May 2024. https://proceedings.mlr.press/v238/tsai24a.html

11. Yu-Chen Shen, Li Gao, and **Hao-Chung Cheng***, "Privacy Amplification Against Quantum Side Information via Regular Random Binning," *59th Annual Allerton Conference on Communication, Control, and Computing*, September 2023. DOI: 10.1109/Allerton58177.2023.10313465

12. Hsiang-Ray Wu, Chun-Tse Li, and **Hao-Chung Cheng***, "Data Loading with Quantum Autoencoders," *2023 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, June 2023. DOI: 10.1109/ICASSP49357.2023.10096496

13. **Hao-Chung Cheng** and Barış Nakiboğlu, "Mutual Information in the Vicinity of Capacity-Achieving Input Distributions," *IEEE International Symposium on Information Theory (ISIT)*, June 2023. DOI: 10.1109/ISIT54713.2023.10206497

14. Yu-Chen Shen, Li Gao, and **Hao-Chung Cheng***, "Optimal Second-Order Rates for Quantum Information Decoupling," *IEEE International Symposium on Information Theory (ISIT)*, June 2023.
DOI: 10.1109/ISIT54713.2023.10206502

15. **Hao-Chung Cheng*** and Li Gao, "Tight Analysis for Convex Splitting with Applications in Quantum Information Theory," *IEEE International Symposium on Information Theory (ISIT)*, June 2023.
DOI: 10.1109/ISIT54713.2023.10206913

16. **Hao-Chung Cheng***, "A Simple Derivation of Achievability for Classical-Quantum Channel Coding," *IEEE International Symposium on Information Theory (ISIT)*, June 2023.
DOI: 10.1109/ISIT54713.2023.10206495

17. Chung-En Tsai, Hao-Chung Cheng Yen-Huan Li, "Faster Stochastic First-Order Method for Maximum-Likelihood Quantum State Tomography," *Proceedings of The 34th International Conference on Algorithmic Learning Theory*, PMLR 201:1481–1483, February 2023. Link

18. Yu-Cheng Shen, Li Gao, **Hao-Chung Cheng*** , "Strong Converse for Privacy Amplification against Quantum Side Information," *IEEE International Symposium on Information Theory (ISIT)*, June 2022. DOI: 10.1109/ISIT50566.2022.9834467

19. **Hao-Chung Cheng***, Li Gao, "Error Exponent and Strong Converse for Quantum Soft Covering," *IEEE International Symposium on Information Theory (ISIT)*, June 2022.
DOI: 10.1109/ISIT50566.2022.9834450

20. Ching-Yi Lai and **Hao-Chung Cheng**, "Learning quantum circuits of some *T* gates," *IEEE International Symposium on Information Theory (ISIT)*, June 2022. DOI: 10.1109/ISIT50566.2022.9834467

21. Jun-Kai You, Hao-Chung Cheng, Yen-Huan Li, "Minimizing Quantum Rényi Divergences via Mirror Descent with Polyak Step Size," *IEEE International Symposium on Information Theory (ISIT)*, June 2022. DOI: 10.1109/ISIT50566.2022.9834452

22. **Hao-Chung Cheng**, Barış Nakiboğlu, "On The Existence of The Augustin Mean," *IEEE Information Theory Workshop (ITW)*, 2021. DOI: 10.1109/ITW48936.2021.9611513

23. **Hao-Chung Cheng***, Andreas Winter and Nengkun Yu, "Discrimination of quantum states under locality constraints in the many-copy setting," *IEEE Symposium on Information Theory (ISIT)*, 2021. DOI: 10.1109/isit45174.2021.9518100

24. **Hao-Chung Cheng***, Nilanjana Datta, and Cambyse Rouźe, "Strong converse bounds in quantum network information theory: distributed hypothesis testing and source coding," *IEEE Symposium on Information Theory (ISIT)*, 2020. DOI: 10.1109/isit44484.2020.9174427

25. **Hao-Chung Cheng**, Barış Nakiboğlu, "Refined Strong converses for Constant Composition Codes," *IEEE Symposium on Information Theory (ISIT)*, 2020. DOI: 10.1109/isit44484.2020.9174315

26. **Hao-Chung Cheng***, Li Gao, and Min-Hsiu Hsieh, "Properties of Scaled Noncommutative Rényi and Augustin Information," *IEEE Symposium on Information Theory (ISIT)*, 2019.
DOI: 10.1109/ISIT.2019.8849281

27. **Hao-Chung Cheng***, Eric P. Hanson, Nilanjana Datta, and Min-Hsiu Hsieh, "Duality between source coding with quantum side information and c-q channel coding," *IEEE Symposium on Information Theory (ISIT)*, 2019. DOI: 10.1109/ISIT.2019.8849457

28. **Hao-Chung Cheng***, Eric P. Hanson, Nilanjana Datta, and Min-Hsiu Hsieh, "Error Exponents and Strong Converse Exponents for Classical Data Compression with Quantum Side Information," *IEEE Symposium on Information Theory (ISIT)*, 2018. DOI: 10.1109/ISIT.2018.8437348

29. **Hao-Chung Cheng***, Min-Hsiu Hsieh, and Marco Tomamichel, "Sphere-Packing Bound for Classical-Quantum Channels," *IEEE Information Theory Workshop (ITW)*, 2017 DOI: 10.1109/itw.2017.8278039

30. **Hao-Chung Cheng***, Min-Hsiu Hsieh, and Marco Tomamichel, "Sphere-Packing Bound for Symmetric Classical-Quantum Channels," *IEEE Symposium on Information Theory (ISIT)*, 2017. DOI: 10.1109/isit.2017.8006535

31. **Hao-Chung Cheng***, and Min-Hsiu Hsieh, "Moderate Deviations for Quantum Hypothesis Testing and a Martingale Inequality," *IEEE Symposium on Information Theory (ISIT)*, 2017. DOI: 10.1109/isit.2017.8006875

32. **Hao-Chung Cheng***, and Min-Hsiu Hsieh, "Moderate Deviations for Classical-Quantum Channels," *IEEE Symposium on Information Theory (ISIT)*, 2017. DOI: 10.1109/isit.2017.8006537

33. **Hao-Chung Cheng***, Sheng-Yi Ho, Ping-Cheng Yeh, "Collaborative Non-Cryptographic Physical Layer Authentication Schemes in Wireless Networks," *Radio Science Bulletin of International Union of Radio Science*, no. 349, pp. 18–31, 2014. URL

ArXiv Preprints

- **Hao-Chung Cheng***, Gilad Gour, Ludovico Lami, Po-Chieh Liu "The operator layer cake theorem is equivalent to Frenkel's integral formula," arXiv:2512.04345 [quant-ph].
- **Hao-Chung Cheng***, Li Gao, Christoph Hirche, Hao-Wei Huang, and Po-Chieh Liu "Sharp estimates of quantum covering problems via a novel trace inequality," arXiv:2507.07961 [quant-ph].
- Po-Chieh Liu, Christoph Hirche and **Hao-Chung Cheng***, "Layer Cake Representations for Quantum Divergences," arXiv:2507.07065 [quant-ph].
- **Hao-Chung Cheng*** and Po-Chieh Liu, "Error Exponents for Quantum Packing Problems via An Operator Layer Cake Theorem," arXiv:2507.06232 [quant-ph].
- Aadil Oufkir, Michael X. Cao, **Hao-Chung Cheng**, Mario Berta, "Exponents for Shared Randomness-Assisted Channel Simulation," arXiv:2410.07051 [quant-ph].
- Chellasamy Jebarathinam, Huan-Yu Ku, **Hao-Chung Cheng**, Hsi-Sheng Goan, "The aspect of bipartite coherence in quantum discord to semi-device-independent nonlocality and its implication for quantum information processing," arXiv:2410.04430 [quant-ph].
- **Hao-Chung Cheng***, Frédéric Dupuis, and Li Gao, "Joint State-Channel Decoupling and One-Shot Quantum Coding Theorem," arXiv:2409.15149 [quant-ph].
- Chung-En Tsai, Guan-Ren Wang, **Hao-Chung Cheng**, Yen-Huan Li, "Linear Convergence in Hilbert's Projective Metric for Computing Augustin Information and a Rényi Information Measure," arXiv:2409.02640 [math.OC].
- **Hao-Chung Cheng***, Christoph Hirche, Cambyse Rouzé, "Sample Complexity of Locally Differentially Private Quantum Hypothesis Testing," arXiv:2406.18658 [quant-ph].
- Bo-Yu Yang, Hsuan Yu, and **Hao-Chung Cheng***, "Maximal -Leakage for Quantum Privacy Mechanisms," arXiv:2403.14450 [quant-ph].
- Yu-Chen Shen, Li Gao, **Hao-Chung Cheng***, "Optimal Second-Order Rates for Quantum Information Decoupling," arXiv:2403.14338 [quant-ph].
- **Hao-Chung Cheng*** and Li Gao, "On Strong Converse Theorems for Quantum Hypothesis Testing and Channel Coding," arXiv:2403.13584 [quant-ph].
- Guan-Ren Wang, Chung-En Tsai, **Hao-Chung Cheng**, Yen-Huan Li, "Computing Augustin Information via Hybrid Geodesically Convex Optimization," arXiv:2402.02731 [cs.IT].
- Chung-En Tsai, **Hao-Chung Cheng**, and Yen-Huan Li, "Fast Minimization of Expected Logarithmic Loss via Stochastic Dual Averaging," arXiv:2311.02557 [math.OC].
- Chung-En Tsai, **Hao-Chung Cheng**, and Yen-Huan Li, "Online Self-Concordant and Relatively Smooth Minimization With Applications to Online Portfolio Selection and Learning Quantum States," 2210.00997 [stat.ML].
- Yu-Chen Shen, Li Gao, **Hao-Chung Cheng***, "Strong Converse for Privacy Amplification Against Quantum Side Information," arXiv:2202.10263 [quant-ph].
- Chien-Ming Lin, **Hao-Chung Cheng**, and Yen-Huan Li, "Maximum-Likelihood Quantum State Tomography by Cover's Method with Non-Asymptotic Analysis," arXiv:2110.00747 [quant-ph].
- Jun-Kai You, **Hao-Chung Cheng**, Yen-Huan Li, "Minimizing Quantum Rényi Divergences via Mirror Descent with Polyak Step Size," arXiv:2109.06054 [quant-ph].

Intellectual Property Rights

- **Hao-Chung Cheng**, Jhe-Syong Jiang, Ling-San Meng, Ping-Cheng Yeh, Yu-Chih Jen, "Method of Handling Coordinated Scheduling for Base Stations and Mobile Devices and Related Communication Device," US20130016671A1, 2013.

RESEARCH GRANT AND SCHOLARSHIP

2025 – 2027	Higher Education SPROUT Project – NTU Core Consortiums	*Ministry of Education*
2024 – 2028	2030 Cross-Generation Young Scholars Program "Emerging Young Scholars"	*National Science and Technology Council*
2022 – 2027	Taiwan Quantum Program	*National Science and Technology Council*
2022 – 2024	Higher Education SPROUT Project – NTU Core Consortiums	*Ministry of Education*
2020 – 2025	Yushan Young Scholar Program 教育部玉山青年學者	*Ministry of Education*
2020 – 2024	Young Scholar Fellowship Program (Einstein) 科技部年輕學者養成方案「愛因斯坦培植計畫」	*Ministry of Science and Technology*
2019 – 2020	University of Cambridge Fellowship	*DAMTP, University of Cambridge*
2019 – 2019	Postdoctoral Research Abroad Program	*Ministry of Science and Technology*
2018 – 2018	Post Thesis Publication Scholarship	*University of Technology Sydney*
2016 – 2018	Quantum Computing Scholarship	*FEIT, University of Technology Sydney*
2016 – 2016	Overseas Project for Post Graduate Research	*Ministry of Science and Technology*
2015 – 2015	Outstanding Management Personnel Scholarship	*E.SUN Commercial Bank*
2015 – 2015	Irving T. Ho Scholarship	*Irving T. Ho Memorial Foundation*
2014 – 2016	Hsing Tian Kong Superior Students Scholarship	*Hsing Tian Kong Education Foundation*
2014 – 2016	The Seed of Hope Scholarship	*Huaku Education Foundation*
2013 – 2014	National Science Council Fellowship	*National Taiwan University*
2011 – 2017	National Taiwan University Fellowship	*GICE, National Taiwan University*
2010 – 2012	Academia-Industry Collaboration Fellowship	*HTC Corporation*

ACADEMIC PRESENTATIONS

1 **H.-C. Cheng**, "Reliable Communication Over Noisy Quantum Channels," *NCTS Theoretical Physics Symposium, 2026 Annual Meeting of the Physical Society of Taiwan* , National Chung Cheng University, Taiwan, January 14, 2026. (Invited Talk)

2 **H.-C. Cheng**, "Adaptive Circuit Learning of Born Machine: Towards Realization of Quantum Data Loading," *Joint Meetings of 2025 & Taipei International Statistical Symposium* , Bristol University, UK (Online Seminar), December 17, 2025. (Invited Talk)

3 **H.-C. Cheng**, "Quantum Channel Coding With A Few Code Lengths: The Error Exponent Analysis Approach," *Quantum Computing and Quantum Information Theory Workshop*, Wuhan University, China, November 29, 2025. (Invited Talk)

4 **H.-C. Cheng**, "Simple and tighter derivation of achievability for classical communication over quantum channels," *Bristol Quantum Information Theory Seminars*, Bristol University, UK (Online Seminar), September 24, 2025. (International Seminar Talk)

5 **H.-C. Cheng**, "Simple and tighter derivation of achievability for classical communication over quantum channels," *2025 Joint Symposium on Quantum Computing*, Keio University, Japan, August 21, 2025. (International Invited Talk)

6 **H.-C. Cheng**, "A constructive proof of Holevo' s conjecture," *Beyond IID in Information Theory 13*, Technical University of Munich, July 15, 2025. (**Long Talk**, Peer-Reviewed International Conference, acceptance rate < 5%)

7 **H.-C. Cheng**, "Sharp one-shot bound for quantum covering-type problems with relative entropy criterion," *Mathematics of Quantum Information*, RWTH Aachen University, July 11, 2025. (International Invited Talk)

8 **H.-C. Cheng**, "Recent developments of one-shot quantum information theory," *London Symposium on Information Theory 2025*, Cambridge University, United Kingdom, 16 May, 2025. (International Invited Talk)

9 **H.-C. Cheng**, "Simple and tighter derivation of achievability for classical communication over quantum channels," *2025 Taiwan Telecommunications Annual Symposium*, Lunghwa University of Science and Technology, 16 January, 2025. (Invited Talk)

10 **H.-C. Cheng**, "Adaptive Circuit Learning of Born Machine: Towards Realization of Quantum Data Loading," *2024 Workshop on Applications of Machine Learning and Artificial Intelligence for Physics and Chemistry Problems*, Taipei, Taiwan, 8 November, 2024. (Invited Talk)

11 **H.-C. Cheng**, "Simple and tighter derivation of achievability for classical communication over quantum channels," Department of Physics, National Taiwan Normal University, Taiwan, 4 September, 2024. (Invited Seminar Talk)

12 **H.-C. Cheng**, "Adaptive Circuit Learning of Born Machine: Towards Realization of Quantum Data Loading," *2024 Joint Symposium on Quantum Computing*, National Taiwan University, Taipei, 21 August, 2024. (International Invited Talk)

13 **H.-C. Cheng**, "Joint State-Channel Decoupling," *Bridging Quantum Information and Mathematical Physics Symposium*, Cambridge University, UK, 16 August, 2024. (International Invited Talk)

14 **H.-C. Cheng**, "An Introduction to Quantum Machine Learning," Department of Electrical Engineering, Middle East Technical University, 16 July, 2024. (Invited Seminar Talk)

15 **H.-C. Cheng**, "A Novel Matrix Concentration Inequality and Error Exponents for Quantum Soft Covering," School of Mathematics and Statistics, Wuhan University, 18 June, 2024. (Invited Seminar Talk)

16 **H.-C. Cheng**, "Simple and Tighter Derivation of Achievability for Classical Communication Over Quantum Channels," *2024 QFort Workshop*, National Cheng Kung University, Taiwan, 17 April, 2024. (Invited Talk)

17 **H.-C. Cheng**, "An Invitation to Quantum Information Science for Mathematicians," *2024 Taiwan Mathematical Society Annual Symposium*, 22 January, 2024. (Invited Talk)

18 **H.-C. Cheng**, "Privacy Amplification Against Quantum Side Information via Regular Random Binning," *59th Annual Allerton Conference on Communication, Control, and Computing* Allerton Park, Illinois, USA, 27 September, 2023.

19 **H.-C. Cheng**, "One-Shot Analysis for Classical Communication over Quantum Channels," Department of Mathematics, University of Houston, USA, 22 September, 2023. (Invited Seminar Talk)

20 **H.-C. Cheng**, "Robust Qubit Mapping Algorithm via Double-Source Optimal Routing on Large Quantum Circuits," *Joint Symposium on Quantum Computing*, Yonsei University, Seoul, Korea, 25 August, 2023. (Invited Talk)

21 **H.-C. Cheng**, "Tight One-Shot Analysis of Convex Splitting with Applications in Quantum Information Theory," *Beyond IID in Information Theory 11*, Tübingen, Germany, 2 August, 2023.

22 **H.-C. Cheng**, "A Simple Derivation of Achievability for Classical-Quantum Channel Coding," *IEEE International Symposium on Information Theory (ISIT)*, Taipei, Taiwan.

23 **H.-C. Cheng**, "Tight Analysis for Convex Splitting with Applications in Quantum Information Theory," *IEEE International Symposium on Information Theory (ISIT)*, Taipei, Taiwan.

24 **H.-C. Cheng**, "One-Shot Entanglement-Assisted Classical Capacity," *Workshop on Entanglement Assisted Communication Networks*, 23 June 2023. (Invited Talk)

25 **H.-C. Cheng**, "An Introduction to Quantum Machine Learning," Department of Electrical Engineering, National Tsing Hua University, Taiwan, 17 March, 2023. (Invited Seminar Talk)

26 **H.-C. Cheng**, "Quantum Advantages in Non-Local Games," Department of Physics, National Taiwan University, Taiwan. 11 March, 2023. (Invited Popular Science Talk)

27 **H.-C. Cheng**, "A Novel Matrix Concentration Inequality and Error Exponents for Quantum Soft Covering," Department of Mathematics, National Tsing Hua University, Taiwan, 5 March, 2023.

28 **H.-C. Cheng**, "Private Communication Over Quantum Wiretap Channels," *Taiwanese-German Young Researchers Forum on Quantum Information Science*, National Cheng Kung University, Taiwan. (Invited Talk)

29 **H.-C. Cheng**, "A Simple and Tighter Derivation of Achievability for Classical Communication over Quantum Channels, *26th Conference on Quantum Information Processing (QIP 2023)*, Ghent, Belgium, February 4–10, 2023.

30 **H.-C. Cheng**, "Quantum Soft Covering and Its Relation to Convex Splitting" Centre for Quantum Technologies, National University of Singapore, Singapore. 10 January, 2023. (Invited Seminar Talk)

31 **H.-C. Cheng**, "A Simple and Tighter Derivation of Achievability for Classical Communication Over Quantum Channels," Hon-Hai (Foxconn) Quantum Computing Center, Taipei, 6 January, 2023. (Invited Seminar Talk)

32 **H.-C. Cheng**, "Qubit Mapping Toward Quantum Advantage," *2022 International Workshop on Quantum Information Processing and Applications*, National National Sun Yat-sen University, Kaohsiung, Taiwan, 9 December, 2022. (Invited Talk)

33 **H.-C. Cheng**, "Understanding The Fundamental Capabilities of Quantum Information Processing," *2022 Quantum Science, Engineering and Technology Workshop*, Maioli, Taiwan, 15 October, 2022.

34 **H.-C. Cheng**, "A Novel Matrix Concentration Inequality and Error Exponent for Quantum Soft Covering," Department of Mathematics, National Taiwan University, Taiwan, 4 October, 2022. (Invited Seminar Talk)

35 **H.-C. Cheng**,"Error Exponent and Strong Converse for Quantum Soft Covering," *Beyond IID in Information Theory 10*, 26–30 September, 2022, virtual at Shenzhen, China.

H.-C. Cheng, "A Simple and Tighter Derivation of Achievability for Classical Communication over Quantum Channels," *Beyond IID in Information Theory 10*, 26–30 September, 2022, virtual at Shenzhen, China.

36 **H.-C. Cheng**, "An Introduction to Quantum Information Theory," *IEEE Taiwan Workshop on Information Theory and Communication*, Yuan Ze University, Taiwan, 18 August, 2022. (Invited Talk)

37 **H.-C. Cheng**, "Strong Converse for Privacy Amplification against Quantum Side Information," *IEEE International Symposium on Information Theory (ISIT)*, Espoo, Finland, 29 June, 2022.

38 **H.-C. Cheng**, "Error Exponent and Strong Converse for Quantum Soft Covering," *IEEE International Symposium on Information Theory (ISIT)*, Espoo, Finland, 28 June, 2022.

39 **H.-C. Cheng**, "Strong Converse and Second-Order Analysis for Privacy Amplification (Proof)," Institute of Information Science, Academia Sinica, 8 April, 2022. (Invited Seminar Talk)

40 **H.-C. Cheng**, "An Introduction to Quantum Machine Learning," Department of Physics, National Taiwan University, 15 March, 2022. (Invited Seminar Talk)

41 **H.-C. Cheng**, "Strong Converse and Second-Order Analysis for Privacy Amplification," Institute of Information Science, Academia Sinica, 11 March, 2022. (Invited Seminar Talk)

42 **H.-C. Cheng**, "An Introduction to Quantum Machine Learning," Department of Physics, National Cheng Kung University, Taiwan, 22 November, 2021. (Invited Seminar Talk)

43 **H.-C. Cheng**, "On the Existence of Augustin Mean," *IEEE Information Theory Workshop (ITW)*, virtual at Kanazawa, Japan.

44 **H.-C. Cheng**, "On learning quantum states and measurements," *2021 NCTS Workshop on Quantum Science and Technology*, National Cheng Kung University, Taiwan, 26 August, 2021. (Invited Speaker)

45 **H.-C. Cheng**, "Quantum Information and Computation," *2021 Summer School on Information/Communication Theory and Technologies*, virtual event, 12 August, 2021.

46 **H.-C. Cheng**, "Discrimination of quantum states under locality constraints in the many-copy setting," *IEEE International Symposium on Information Theory (ISIT)*, virtual at Melbourne, Australia, July, 2021.

47 **H.-C. Cheng**, "Quantum State Discrimination in the NISQ Era," *2021 National Symposiums on Telecommunications*, Taipei, Taiwan. 22 January, 2021. (Invited Speaker)

48 **H.-C. Cheng**, "An Introduction to Quantum Information Technology," Department of Computer Science and Information Engineering, National Taiwan Normal University, Taiwan, 16 December, 2020. (Invited Seminar Talk)

49 **H.-C. Cheng**, "Progress, Prospect, and Challenges in Quantum Computing," *2020 Workshop on High Performance Computing and its Applications*, Taipei, Taiwan, 8 December, 2020.

50 **H.-C. Cheng**, "An Introduction to Quantum Information Technology," Department of Electrical Engineering, National Sun-Yat-Sen University, 24 November, 2020. (Invited Seminar Talk)

51 **H.-C. Cheng**, "Mathematics in Quantum Information Theory" Department of Mathematics, National Sun-Yat-Sen University, 23 November, 2020. (Invited Seminar Talk)

52 **H.-C. Cheng**, "Mathematics in Quantum Information Theory" NTU Math Colloquium, National Taiwan University, 16 November, 2020. (Invited Seminar Talk)

53 **H.-C. Cheng**, "A Glimpse of the Quantum Information Industry," Graduate Institute of Communication Engineering & Graduate Institute of Electrical Engineering, National Taiwan University, 26 October, 2020. (Invited Seminar Talk)

54 **H.-C. Cheng**, "Quantum Communication Theory," *Quantum Information Science and and Mathematics (NCTS)*, Department of Mathematics, National Taiwan University, Taiwan, 17 October, 2020. (Invited Talk)

55 **H.-C. Cheng**, "On the sample complexity of learning quantum states and measurements," Department of Physics, National Taiwan University, Taiwan, 16 October, 2020. (Invited Seminar Talk)

56 **H.-C. Cheng**, "Current Challenges of Communication in the Quantum World," *2020 NCTS Workshop on Quantum Science and Technology* , Taitung, Taiwan, 20 August, 2020. (Invited Talk)

57 **H.-C. Cheng**, "Revisiting LOCC Hypothesis Testing," *Institute of Information Science, Academia Sinica*, November 2019. (Invited Seminar Talk)

58 **H.-C. Cheng**, "An Introduction to Quantum Statistical," Graduate Institute of Communication Engineering, National Taiwan University, November 2019.

59 **H.-C. Cheng**, "The Learnability of Quantum States and Measurements," Department of Mathematics, Technical University of Munich, Germany November 2019. (Invited Seminar Talk)

60 **H.-C. Cheng**, "Properties of Scaled Noncommutative Rényi and Augustin Information," *IEEE Symposium on Information Theory (ISIT)*, Paris, France, July 2019.

61 **H.-C. Cheng**, "Duality between source coding with quantum side information and c-q channel coding," *IEEE Symposium on Information Theory (ISIT)*, Paris, France, July 2019.

62 **H.-C. Cheng**, "Properties of Scaled Noncommutative Rényi and Augustin Information," *Beyond IID in Information Theory 7*, Sydney, Australia, 1–5 July, 2019.

63 **H.-C. Cheng**, "Strong converse bounds in quantum network information theory:distributed hypothesis testing and source coding," *Beyond IID in Information Theory 7*, Sydney, Australia, 1–5 July, 2019.

64 **H.-C. Cheng**, "Strong Converse for Classical-Quantum Degraded Broadcast Channels," *Beyond IID in Information Theory 7*, Sydney, Australia, 1–5 July, 2019.

65 **H.-C. Cheng**, "An Introduction to Quantum Technology," Graduate Institute of Communication Engineering, National Taiwan University, November 2018. (Invited Seminar Talk)

66 **H.-C. Cheng**, "Error Exponents and Strong Converse Exponents for Classical Data Compression with Quantum Side Information," *IEEE Symposium on Information Theory (ISIT)*, Colorado, USA, July 2018.

67 **H.-C. Cheng**, "Error Exponent Analysis in Quantum Information Theory," Department of Applied Mathematics and Theoretical Physics, University of Cambridge, January 2018. (Invited Seminar Talk)

68 **H.-C. Cheng**, "Moderate Deviation Analysis and Sphere-Packing Bounds for Classical-Quantum Channels," *21th Conference on Quantum Information Processing (QIP 2018)*, TU Delft, Netherlands, January 13–19, 2018.

69 **H.-C. Cheng**, "Sphere-Packing Bound for Classical-Quantum Channels," *IEEE Information Theory Workshop (ITW)*, Kaohsiung, Taiwan, November 2017. **(Invited IEEE Conference Talk)**

70 **H.-C. Cheng**, "Sphere-Packing Bound and Moderate Deviation Analysis for Classical-Quantum Channels," *Beyond IID in Information Theory 5*, Singapore, August 2017.

71 **H.-C. Cheng**, "Sphere-Packing Bound for Symmetric Classical-Quantum Channels," *IEEE Symposium on Information Theory (ISIT)*, Aachen, Germany, July 2017.

72 **H.-C. Cheng**, "Moderate Deviations for Quantum Hypothesis Testing and a Martingale Inequality," *IEEE Symposium on Information Theory (ISIT)*, Aachen, Germany, July 2017.

73 **H.-C. Cheng**, "Moderate Deviations for Classical-Quantum Channels," *IEEE Symposium on Information Theory (ISIT)*, Aachen, Germany, July 2017.

74 **H.-C. Cheng**, "Moderate Deviation Analysis for Classical-Quantum Channels and Quantum Hypothesis Testing," *Theory of Quantum Computation, Communication and Cryptography (TQC 2017)*, Paris, France, June 14–16, 2017.

75 **H.-C. Cheng**, "Moderate Deviation Analysis for Classical-Quantum Channels and Quantum Hypothesis Testing," *Institute for Quantum Information and Matter*, California Institute of Technology, USA, January 2017. (Invited Seminar Talk)

76 **H.-C. Cheng**, "Exponential Decay of Matrix -Entropies on Markov Semigroups with Applications to Dynamical Evolutions of Quantum Ensembles," Institute of Information Science, Academia Sinica, Taiwan, December 2016. (Invited Seminar Talk)

77 **H.-C. Cheng**, "On the Concavity of Auxiliary Function in Classical-Quantum Channels," *Asian Quantum Information Science Conference (AQIS)*, Academic Sinica, Taipei, Taiwan, September 2016. (Invited Seminar Talk)

78 **H.-C. Cheng**, "On the Concavity of Auxiliary Function in Classical-Quantum Channels," *Sydney Information Technology Workshop: Celebration of Shannon's 100th Birthday*, Sydney, April 2016. (Invited Talk)

79 **H.-C. Cheng**, "Exponential Decay of Matrix -Entropies on Markov Semigroups with Applications to Dynamical Evolutions of Quantum Ensembles," Joint Center for Quantum Information and Computer Science, University of Maryland, USA, January 2016. (Invited Seminar Talk)

80 **H.-C. Cheng**, "On the Concavity of Auxiliary Function in Classical-Quantum Channels," Institute of Information Science, Academia Sinica, Taiwan, December 2015. (Invited Seminar Talk)

81 **H.-C. Cheng**, "Collaborative Non-Cryptographic Physical Layer Authentication Schemes in Wireless Networks," Cross-Strait Forum on Postgraduate Education, Macao, China, November 2013.

82 **H.-C. Cheng**, "Collaborative Non-Cryptographic Physical Layer Authentication Schemes in Wireless Networks," The 8th Asia-Oceania Top University League on Engineering (AOTULE) Meetings and Conference, Bangkok, Thailand, October 2013.

83 **H.-C. Cheng**, "Collaborative Non-Cryptographic Physical Layer Authentication Schemes in Wireless Networks," *Asia-Pacific Radio Science Conference*, September 2013.