



Xin Wang

Hartree Postdoctoral Fellow

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RESEARCH INTERESTS

Quantum Information, Entanglement Theory, Optimization, Quantum Computation, Quantum Communication, Quantum Resource Theories, Quantum Programming.

RESEARCH POSITIONS

09/2018 – present **Hartree Postdoctoral Fellow**
Joint Center for Quantum Information and Computer Science (QuICS)
University of Maryland, College Park, MD.

EDUCATION

08/2014 – 08/2018 **Ph.D. in Quantum Information, University of Technology Sydney.**
Supervisors: Prof. Runyao Duan and Prof. Andreas Winter (external supervisor)
Thesis: Semidefinite Optimization for Quantum Information.

09/2010 – 06/2014 **B.S. in Mathematics, Mathematics Department, Sichuan University.**
With a honor degree from the Wu Yuzhang Honors College of Sichuan University.

REFEREED CONFERENCE TALKS

The Conference on Quantum Information Processing (QIP) is the most competitive and important conference in quantum information science (5 talks). AQIS (2 long+6 short talks) and TQC (1 talk) are both international leading conferences in the field, and ISIT is the main event in information theory (6 talks). In the following list, (*) indicates delivery by my co-author.

- 01/2019 **QIP 2019**, *Entanglement cost of quantum state preparation and channel simulation*, JILA, University of Colorado Boulder, USA.
- 01/2018 **QIP 2018**, *On converse bounds for classical communication over quantum channels*, QuTech, Delft University of Technology, Netherlands.
- 01/2018* **QIP 2018**, *Efficiently computable upper bounds for quantum communication*, QuTech, Delft University of Technology, Netherlands.
- 07/2018* **TQC 2018**, *Quantum Channel Simulation and the Channel's Smooth Max Information*, UTS, Sydney, Australia.
- 09/2018* **AQIS 2018**, *Distillation of quantum coherence in non-asymptotic settings*, Nagoya University, Nagoya, Japan.
- 06/2018 **ISIT 2018**, *On finite blocklength converse bounds for classical communication over quantum channels*, Vail, Colorado, USA.
- 06/2018 **ISIT 2018**, *Converse bounds for classical communication over quantum broadcast channels and quantum multi-access channels*, Vail, Colorado, USA.

- 06/2018* **ISIT 2018**, *Quantum Channel Simulation and the Channel's Smooth Max Information*, Vail, Colorado, USA.
- 01/2017 **QIP 2017**, *Asymptotic entanglement manipulation under PPT operations: new SDP bounds and irreversibility*, Microsoft Research, Redmond, USA.
- 01/2017 **QIP 2017**, *Semidefinite programming strong converse bounds for quantum channel capacities*, Microsoft Research, Redmond, USA.
- 09/2017 **AQIS 2017 (long talk, top 10% of all submissions)**, *Irreversibility of Asymptotic Entanglement Manipulation Under PPT Operations*, Centre for Quantum Technologies, National University of Singapore, Singapore.
- 09/2017* **AQIS 2017 (long talk, top 10% of all submissions)**, *Non-asymptotic entanglement distillation*, Centre for Quantum Technologies, National University of Singapore.
- 09/2017* **AQIS 2017**, *Semidefinite programming converse for quantum communication*, Centre for Quantum Technologies, National University of Singapore.
- 09/2017* **AQIS 2017**, *Approximate broadcasting of quantum correlations*, Centre for Quantum Technologies, National University of Singapore.
- 06/2017 **ISIT 2017**, *Semidefinite programming converse bounds for classical communication over quantum channels*, RWTH Aachen University, Aachen.
- 08/2016 **AQIS 2016**, *Separation between quantum Lovász number and entanglement-assisted zero-error classical capacity*, Academia Sinica, Taipei.
- 08/2016* **AQIS 2016**, *Improved Semidefinite Programming Upper Bound on Distillable Entanglement and Non-additivity of Rains' Bound*, Academia Sinica, Taipei.
- 08/2016* **AQIS 2016**, *Tripartite-to-bipartite entanglement transformation by SLOCC and the classification of matrix spaces*, Academia Sinica, Taipei.
- 07/2016 **ISIT 2016**, *A semidefinite programming upper bound of quantum capacity*, Universitat Pompeu Fabra, Barcelona.
- 07/2016 **ISIT 2016**, *On the quantum no-signalling assisted zero-error simulation cost of non-commutative bipartite graphs*, Universitat Pompeu Fabra, Barcelona.

INVITED AND WORKSHOP TALKS

- 12/2018 **Fundamental resource costs of quantum channels.**
Department of Physics and Astronomy, Louisiana State University, USA.
- 06/2018 **Quantum state redistribution with and without communication.**
Rocky Mountain Summit on Quantum Info, University of Colorado, Boulder, USA.
- 06/2018 **Semidefinite optimization for quantum information.**
UTS:QSI Seminar, University of Technology Sydney, Sydney, Australia.
- 01/2018 **Asymptotic entanglement manipulation under PPT operations.**
Maths Seminar, University of Nottingham, UK.
- 01/2018 **Semidefinite optimization for quantum information processing.**
GAMP/QMATH Lecture, University of Copenhagen, Denmark.
- 11/2017 **Evaluating communication capabilities of quantum channels.**
QCQIP 2017, AMSS, Beijing, China.
- 07/2017 **Semidefinite programming strong converse bounds for channel capacities.**
Beyond i.i.d. in Information Theory Workshop, NUS, Singapore.

- 06/2017 **Strong converse bounds for communication over quantum channels.**
Quantum Information Seminar, SUSTech, Shenzhen, China.
- 12/2015 **Activated zero-error classical communication of quantum channels.**
Sydney Quantum Information Theory Workshop, UTS, Sydney, Australia.

PUBLICATIONS

I have 13 papers published in refereed journals, 7 papers published in peer-reviewed conference proceedings and 5 preprint papers under review. I published 3 papers in Physical Review Letters (premier journal in physics), 3 papers in IEEE Transactions on Information Theory (premier journal in information theory), and 1 paper in Communications in Mathematical Physics (premier journal in mathematical physics). My publications are also available on arXiv and Google Scholar.

PEER-REVIEWED JOURNAL ARTICLES

- (J1) **X. Wang**, K. Fang, and R. Duan, *Semidefinite programming converse bounds for quantum communication*, IEEE Transactions on Information Theory (in press), (**Contributed talk QIP 2018**).
- (J2) **X. Wang** and R. Duan, *Separation between quantum Lovász number and entanglement-assisted zero-error classical capacity*, IEEE Transactions on Information Theory 64(3): 1454-1460 (2018).
- (J3) **X. Wang** and R. Duan, *Irreversibility of Asymptotic Entanglement Manipulation Under Quantum Operations Completely Preserving Positivity of Partial Transpose*, Physical Review Letters 119, 180506 (2017), (**Contributed talk QIP 2017**).
- (J4) **X. Wang**, W. Xie, and R. Duan, *Semidefinite programming strong converse bounds for classical capacity*, IEEE Transactions on Information Theory 64(1): 640-653 (2018), (**Contributed talk QIP 2017**).
- (J5) K. Fang, **X. Wang**, L. Lami, B. Regula, and G. Adesso, *Probabilistic distillation of quantum coherence*, Physical Review Letters 121, 070404 (2018).
- (J6) Y. Li, Y. Qiao, **X. Wang**, and R. Duan, *Tripartite-to-bipartite Entanglement Transformation by Stochastic Local Operations and Classical Communication and the Classification of Matrix Spaces*, Communications in Mathematical Physics 358(2): 791-814 (2018).
- (J7) L. Lami, B. Regula, **X. Wang**, R. Nichols, A. Winter, and G. Adesso, *Gaussian quantum resource theories*, available at Physical Review A 98, 022335 (**Editors' Suggestion**) (2018).
- (J8) B. Regula, K. Fang, **X. Wang**, and G. Adesso, *One-shot coherence distillation*, Physical Review Letters 121, 010401 (2018).
- (J9) M. G. Díaz, K. Fang, **X. Wang**, M. Rosati, M. Skotiniotis, J. Calsamiglia, A. Winter, *Using and reusing coherence to realize quantum processes*, Quantum 2, 100 (2018).
- (J10) **X. Wang** and R. Duan, *Nonadditivity of Rains bound for distillable entanglement*, Physical Review A 95, 062322 (2017).
- (J11) Y. Li, **X. Wang**, R. Duan, *Indistinguishability of bipartite states by positive-partial-transpose operations in the many-copy scenario*, Physical Review A 95, 052346 (2017).
- (J12) W. Xie, K. Fang, **X. Wang**, and R. Duan, *Approximate broadcasting of quantum correlations*, Physical Review A 96, 022302 (2017).
- (J13) **X. Wang** and R. Duan, *Improved semidefinite programming upper bound on distillable entanglement*, Physical Review A 94, 050301 (**Rapid Communication**) (2016).

PEER-REVIEWED CONFERENCE PROCEEDINGS

- (C1) **X. Wang**, Kun Fang, and Marco Tomamichel, *On finite blocklength converse bounds for classical communication over quantum channels*, in Proceedings of the IEEE International Symposium on Information Theory (ISIT 2018).
- (C2) S. Liu, **X. Wang**, L. Zhou, J. Guan, Y. Li, Y. He, R. Duan, and M. Ying, *Q|ST): A Quantum Programming Environment*, in Symposium on Real-Time and Hybrid Systems. Lecture Notes in Computer Science, vol 11180 (2018).
- (C3) K. Fang, **X. Wang**, M. Tomamichel, and M. Berta, *Quantum Channel Simulation and the Channel's Smooth Max-Information*, in Proceedings of the IEEE International Symposium on Information Theory (ISIT 2018).
- (C4) W. Xie, **X. Wang**, and R. Duan, *Converse bounds for classical communication over quantum broadcast channels and quantum multi-access channels*, in Proceedings of the IEEE International Symposium on Information Theory (ISIT 2018).
- (C5) **X. Wang**, W. Xie, and R. Duan, *Semidefinite programming converse bounds for classical communication over quantum channels*, Proceedings of the IEEE International Symposium on Information Theory (ISIT 2017).
- (C6) **X. Wang** and R. Duan, *A semidefinite programming upper bound of quantum capacity*, Proceedings of IEEE International Symposium on Information Theory (ISIT 2016).
- (C7) **X. Wang** and Runyao Duan, *On the quantum no-signalling assisted zero-error simulation cost of non-commutative bipartite graphs*, Proceedings of the IEEE International Symposium on Information Theory (ISIT 2016).

PREPRINTS

- (P1) **X. Wang**, K. Fang, and M. Tomamichel, *On converse bounds for classical communication over quantum channels*, submitted to IEEE Transactions on Information Theory, arXiv:1709.05258, (**Contributed talk QIP 2018**).
- (P2) **X. Wang** and M. M. Wilde, *Exact entanglement cost of quantum states and channels under PPT operations*, arXiv:1809.09592, (**Contributed talk at QIP 2019**).
- (P3) K. Fang, **X. Wang**, M. Tomamichel, and R. Duan, *Non-asymptotic entanglement distillation*, submitted to IEEE Transactions on Information Theory, arXiv:1706.06221.
- (P4) R. Duan and **X. Wang**, *Activated zero-error classical capacity of quantum channels in the presence of quantum no-signalling correlations*, available at arXiv:1510.05437.
- (P5) W. Xie, **X. Wang**, and R. Duan, *Converse bounds for classical communication over quantum networks*, available at arXiv:1712.05637.

HONORS, AWARDS AND SCHOLARSHIPS

- 2018 QuICS Hartree Fellowship, University of Maryland, College Park.
- 2018 UTS PHD Post Thesis Publication Award.
- 2017 UTS FEIT Higher Degree by Research Publication Award.
- 2017 UTS Faculty of Engineering and Information Technology Scholarship (until 2018).
- 2014 Australian Research Council Discovery Scholarship (until 2017).
- 2014 UTS International Research Scholarship (until 2018).

- 2013 Comprehensive Merit Scholarship, Sichuan University.
- 2011 Excellent Student, Sichuan University.
- 2010 Wu Yuzhang Honors (top 1.5% of ten thousand freshmen in Sichuan University).

ACADAMIC VISITS

- 2018 Department of Physics and Astronomy, Louisiana State University, hosted by Prof. Mark M. Wilde (December 3 - December 14).
- 2018 Quantum Correlations Group, University of Nottingham, hosted by Prof. Gerardo Adesso (January 26 - January 31).
- 2018 Department of Computing, Imperial College London, hosted by Prof. Mario Berta (January 22 - January 25).
- 2018 QMATH, University of Copenhagen, hosted by Prof. Matthias Christandl (January 8 - January 12).
- 2017 Institute for Interdisciplinary Information Sciences, Tsinghua University, hosted by Prof. Xiongfeng Ma (June 13 - June 21).
- 2017 Department of Physics, Southern University of Science and Technology, hosted by Prof. Man-Hong Yung (June 7 - June 12).

PROFESSIONAL SERVICE

- Journal Referee Communications in Mathematical Physics, IEEE Transactions on Information Theory, and Journal of Physics A: Mathematical and Theoretical.
- Conference Referee Conference on Quantum Information Processing (QIP), Asian Quantum Information Science Conference (AQIS), and IEEE Information Theory Workshop (ITW).
- Coordinator The 18th Conference on Quantum Information Processing (QIP 2015), International Workshop on Quantum Computing and Information Processing 2017, The 13th Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC 2018).

REFERENCES

Prof. Runyao Duan

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(More references upon request.)