



Xin Wang

Hartree Postdoctoral Fellow

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RESEARCH INTERESTS

Quantum Information Theory, Entanglement Theory, Optimization Theory,
Quantum Cryptography, Quantum Gaussian Information, Quantum Computation.

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 (UAB)
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 (4 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.

- 01/2018 **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*, NUS, Singapore.
- 09/2017* **AQIS 2017** (long talk, top 10% of all submissions), *Non-asymptotic entanglement distillation*, NUS, Singapore.
- 09/2017* **AQIS 2017**, *SDP converse for quantum communication*, NUS, Singapore.
- 09/2017* **AQIS 2017**, *Approximate broadcasting of quantum correlations*, NUS, 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

- 06/2018 **Quantum state redistribution with and without communication.**
Rocky Mountain Summit on Quantum Info, University of Colorado, Boulder, USA.
- 07/2018 **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.

PUBLICATIONS

I have 11 papers published in refereed journals, 6 papers published in peer-reviewed conference proceedings and 5 preprint papers (available at arXiv).

PEER-REVIEWED JOURNAL ARTICLES

- (J1) **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)**.
- (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) K. Fang, **X. Wang**, L. Lami, B. Regula, and G. Adesso, *Probabilistic distillation of quantum coherence*, *Physical Review Letters* (in press, 2018).
- (J4) 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).
- (J5) L. Lami, B. Regula, **X. Wang**, R. Nichols, A. Winter, and G. Adesso, *Gaussian quantum resource theories*, available at *Physical Review A* (in press, 2018).
- (J6) B. Regula, K. Fang, **X. Wang**, and G. Adesso, *One-shot coherence distillation*, *Physical Review Letters* 121, 010401 (2018).
- (J7) **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)**.
- (J8) 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).
- (J9) **X. Wang** and R. Duan, *Nonadditivity of Rains bound for distillable entanglement*, *Physical Review A* 95, 062322 (2017).
- (J10) W. Xie, K. Fang, **X. Wang**, and R. Duan, *Approximate broadcasting of quantum correlations*, *Physical Review A* 96, 022302 (2017).
- (J11) **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*, to appear in Proceedings of the IEEE International Symposium on Information Theory (ISIT 2018).

- (C2) K. Fang, **X. Wang**, M. Tomamichel, and M. Berta, *Quantum Channel Simulation and the Channel's Smooth Max-Information*, to appear in Proceedings of the IEEE International Symposium on Information Theory (ISIT 2018).
- (C3) 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).
- (C4) **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).
- (C5) **X. Wang** and R. Duan, *A semidefinite programming upper bound of quantum capacity*, Proceedings of IEEE International Symposium on Information Theory (ISIT 2016).
- (C6) **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, available at arXiv:1709.05258, (**Contributed talk QIP 2018**).
- (P2) **X. Wang**, K. Fang, and R. Duan, *Semidefinite programming converse bounds for quantum communication*, submitted to IEEE Transactions on Information Theory, available at arXiv:1709.00200, (**Contributed talk QIP 2018**).
- (P3) K. Fang, **X. Wang**, M. Tomamichel, and R. Duan, *Non-asymptotic entanglement distillation*, available at 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) S. Liu, **X. Wang**, L. Zhou, J. Guan, Y. Li, Y. He, R. Duan, and M. Ying, *Q|SI): A Quantum Programming Environment*, available at arXiv:1710.09500.

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	QIP 2015, International Workshop on Quantum Computing and Quantum Information Processing 2017, TQC 2018.

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 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).

REFERENCES

Prof. Runyao Duan

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(More references upon request.)