

SCIENTIFIC PROGRAM QIP 2018

Location | Quantum Information Processing 2018

Aula Conference Centre

Building 20

Mekelweg 5

2628 CC DELFT

Saturday, January 13

All tutorials will take place in Auditorium

08.30 – 09.30	Registration Location: Ground floor
Session chair 09.30 – 10.30	Barbara Terhal Tutorial Ronald de Wolf <i>Title: Quantum Learning Theory</i>
10.30 – 11.00	Coffee break Location: Foyer
11.00 – 12.00	Tutorial Ronald de Wolf <i>Title: Quantum Learning Theory</i>
12.00 – 14.00	Lunch break Location: Foyer
Session chair 14.00 – 15.00	Laura Mancinska Tutorial Wolfgang Lechner <i>Title: Quantum Simulation</i>
15.00 – 15.30	Coffee/tea break Location: Foyer
15.30 – 16.30	Tutorial Wolfgang Lechner <i>Title: Quantum Simulation</i>

Sunday, January 14

All tutorials will take place in Auditorium

Session chair 09.30 – 10.30	Earl Campbell Tutorial Michael Bremner <i>Title: The Complexity of Quantum Sampling Problems</i>
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- 10.30 – 11.00 **Coffee break | Location: Foyer**
- 11.00 – 12.00 **Tutorial Michael Bremner**
Title: The Complexity of Quantum Sampling Problems
- 12.00 – 14.00 **Lunch break | Location: Foyer**
- Session chair** **Dorit Aharonov**
14.00 – 15.00 **Tutorial Christian Schaffner**
Title: Quantum Cryptography beyond Quantum Key Distribution
- 15.00 – 15.30 **Coffee/tea break | Location: Foyer**
- 15.30 – 16.30 **Tutorial Christian Schaffner**
Title: Quantum Cryptography beyond Quantum Key Distribution
- 16.30 – 18.30 **Welcome reception & registration | Location: Foyer & Ground floor**

Monday, January 15

- 08.00 – 08.45 **Registration | Location: Ground floor**
- 08.45 – 09.00 **Opening by Ronald Hanson | Location: Auditorium**
- Session chair** **Aram Harrow**
09.00 – 10.00 **Plenary talk I | Location: Auditorium**
Sergey Bravyi, David Gosset and **Robert Koenig**.
Title: Quantum advantage with shallow circuits.
- 10.00 – 10.40 **Coffee Break | Location: Foyer**
- Session chair** **David Gross**
10:40 – 11:15 **Session A | Location: Auditorium**
Merge of
Ivan Bardet and **Cambyse Rouzé**.
Title: The logarithmic Sobolev Inequality for non-primitive quantum Markov semigroups and estimation of decoherence rates.
With Ivan Bardet.
Title: Estimating the decoherence time using non-commutative Functional Inequalities.
- Session chair** **Stacey Jeffery**
10:40 – 11:15 **Session B | Location: Collegezaal A**
Andrew M. Childs, Dmitri Maslov, Yunseong Nam, Neil J. Ross and **Yuan Su**.
Title: Toward the first quantum simulation with quantum speedup.

- Session chair**
11:15 – 11:50
- David Gross**
Session A | Location: Auditorium
Christopher Cedzich, Tobias Geib, F. Alberto Grünbaum, Christoph Stahl, Luis Velázquez, **Albert H. Werner** and Reinhard F. Werner.
Title: The topological classification of one-dimensional symmetric quantum walks.
- Session chair**
11:15 – 11:50
- Stacey Jeffery**
Session B | Location: Collegezaal A
Ryan Babbush, Nathan Wiebe, Jarrod McClean, James McClain, Hartmut Neven and Garnet Chan.
Title: Low Depth Quantum Simulation of Electronic Structure.
- Session chair**
11:50 – 12:25
- David Gross**
Session A | Location: Auditorium
Samuel Leutheusser, Jim Bryan, Zinovy Reichstein, and **Mark Van Raamsdonk**.
Title: Locally Maximally Entangled States of Multipart Quantum Systems.
- Session chair**
11:50 – 12:25
- Stacey Jeffery**
Session B | Location: Collegezaal A
Yimin Ge, Jordi Tura Brugués and J. Ignacio Cirac.
Title: Faster ground state preparation and high-precision ground energy estimation on a quantum computer.
- 12.25 – 14.00
- Lunch break**
- Session chair**
14:00 – 14:35
- Norbert Schuch**
Session A | Location: Auditorium
Ciarán Lee and John Selby.
Title: A no-go theorem for theories that decohere to quantum mechanics
- Session chair**
14:00 – 14:35
- Scott Aaronson**
Session B | Location: Collegezaal A
Gorjan Alagic, Yfke Dulek, **Florian Speelman** and Christian Schaffner.
Title: Quantum Fully Homomorphic Encryption With Verification.
- Session chair**
14:35 – 15:10
- Norbert Schuch**
Session A | Location: Auditorium
Sisi Zhou, Mengzhen Zhang, John Preskill and Liang Jiang.
Title: Achieving the Heisenberg limit in quantum metrology using quantum error correction.
- Session chair**
14:35 – 15:10
- Scott Aaronson**
Session B | Location: Collegezaal A
Andrea Coladangelo, Alex Bredariol Grilo, Stacey Jeffery and Thomas Vidick.
Title: Verifier-on-a-Leash: new schemes for verifiable delegated quantum computation, with quasilinear resources.

15.10 – 15.50 **Coffee/Tea break | Location: Foyer**

Session chair
15:50 – 16:50

Raul Garcia-Patron

Plenary talk II | Location: Auditorium

Alex Neville, Chris Sparrow, Raphael Clifford, Eric Johnston, Patrick Birchall, Ashley Montanaro and Anthony Laing; and Peter Clifford and Raphael Clifford.

Title: Classical boson sampling algorithms and the outlook for experimental boson sampling.

16.50 – 18.30

Riggetti Poster session I

Location: Senaatszaal, Commissiekamer 3 and vide 2 (second floor)

18.30

Free Time

Tuesday, January 16

Session Chair
09.00 – 10.00

Steve Flammia

Invited talk I | Location: Auditorium

Carl Caves

Title: Quantum Gerrymandering: Positivity, Bias, and Anisotropy Among Quantum States.

10.00 – 10.40
10.10 – 10.40

Coffee break | Location: Foyer

Mentoring Sessions (optional: students only) |

Location: Commissiekamer 2

Session Chair
10:40 – 11:15

Steve Flammia

Session A | Location: Auditorium

Earl Campbell

Title: Shorter gate sequences for quantum computing by mixing unitaries.

Session Chair
10:40 – 11:15

Matthias Christandl

Session B | Location: Collegezaal A

Andrea Coladangelo, Koon Tong Goh and Valerio Scarani.

Title: All pure bipartite entangled states can be self-tested.

Session Chair
11:15 – 11:50

Steve Flammia

Session A | Location: Auditorium

Rui Chao and Ben Reichardt.

Title: Fault-tolerant quantum computation with few qubits.

Session Chair
11:15 – 11:50

Matthias Christandl

Session B | Location: Collegezaal A

Anand Natarajan and Thomas Vidick.

Title: Low-degree testing for quantum states.

Session Chair 11:50 – 12:25	Steve Flammia Session A Location: Auditorium Tomas Jochym-O'Connor, Aleksander Kubica and Theodore Yoder . <i>Title: The disjointness of stabilizer codes and limitations on fault-tolerant logical gates.</i>
Session Chair 11:50 - 12:25	Matthias Christandl Session B Location: Collegezaal A Jalex Stark and Andrea Coladangelo. <i>Title: Robust self-testing for linear constraint system games.</i>
12.25 – 14.00	Lunch break Location: Foyer
Session chair 14:00 - 14:35	Norbert Schuch Session A Location: Auditorium Daniel Grier and Luke Schaeffer . <i>Title: The Classification of Clifford Gates over Qubits.</i>
Session chair 14:00 – 14:35	Harry Buhrman Session B Location: Collegezaal A Debbie Leung, Ashwin Nayak, Ala Shaveghi , Dave Touchette, Penghui Yao and Nengkun Yu. <i>Title: Capacity Approaching Codes for Low Noise Interactive Quantum Communication.</i>
Session chair 14:35 – 15:10	Norbert Schuch Session A Location: Auditorium Sepehr Nezami, David Gross and Michael Walter . <i>Title: Schur-Weyl Duality for the Clifford Group, Quantum Property Testing, and a Robust Hudson Theorem.</i>
Session chair 14:35 – 15:10	Harry Buhrman Session B Location: Collegezaal A Ken Dykema, Vern I. Paulsen and Jitendra Prakash . <i>Title: Non-closure of the set of quantum correlations via graphs.</i>
15.10 – 15.50	Coffee/Tea break Location: Foyer
Session chair 15:50 – 16:50	Omar Fawzi Plenary talk III and best student paper prize Location: Auditorium Geoffrey Penington and Patrick Hayden. <i>Title: Approximate Quantum Error Correction Revisited: Introducing the Alphabet.</i>
16.50 – 18.30	Poster session II Location: Senaatszaal, Commissiekamer 3 and vide 2 (second floor)
18.30	Free time

Wednesday, January 17

- Session chair**
09.00 – 10.00
- Ashley Montanaro**
Invited talk II | Location: Auditorium
John Martinis
Title: The Quantum Supremacy Benchmark: Improving Qubit Quantity and Quality at the Same Time.
- 10.00 – 10.40
10.10 – 10.40
- Coffee break | Location: Foyer**
Mentoring Sessions (optional/students only) |
Location: Commissiekamer 2
- Session chair**
10:40 – 11:15
- Robert Koenig**
Session A | Location: Auditorium
Aleksander Kubica, Nicolas Delfosse, Michael Beverland, Fernando Brandao, John Preskill and Krysta Svore.
Title: Local efficient decoders and optimal thresholds of topological toric and color codes beyond two dimensions.
- Session chair**
10:40 – 11:15
- Jens Eisert**
Session B | Location: Collegezaal A
Henrik Wilming and Rodrigo Gallego.
Title: The third law of thermodynamics as a single inequality.
- Session chair**
11:15 – 11:50
- Robert Koenig**
Session A | Location: Auditorium
Antoine Grospellier, Anthony Leverrier and Omar Fawzi.
Title: Efficient decoding algorithm for constant rate quantum LDPC codes.
- Session chair**
11:15 – 11:50
- Jens Eisert**
Session B | Location: Collegezaal A
Philippe Faist and Renato Renner.
Title: Fundamental work cost of quantum processes.
- Session chair**
11:50 – 12:25
- Robert Koenig**
Session A | Location: Auditorium
Nicolas Delfosse and **Naomi Nickerson**.
Title: Almost-linear time decoding algorithm for topological codes.
- Session chair**
11:50 – 12:25
- Jens Eisert**
Session B | Location: Collegezaal A
Markus P. Mueller, Matteo Lostaglio, Michele Pastena and Jakob Scharlau.
Title: Majorization, correlating catalysts, and the single-shot interpretation of entropic quantities.
- Session chair**
12:25 – 13:00
- Robert Koenig**
Session A | Location: Auditorium
Sergey Bravyi, Matthias Englbrecht, Robert Koenig and Nolan Peard.
Title: Correcting coherent errors with surface codes.

Session chair
12:25 – 13:00

Jens Eisert
Session B | Location: Collegezaal A
Paul Boes, Henrik Wilming, Jens Eisert and Rodrigo Gallego.
Title: Statistical ensembles without typicality.

13.00 – 13.45

Lunch break | Location: foyer

13.45 – 15.00

Lab tours QuTech
Location starting point: Ground floor

Session chair
15.00 – 17.45

Robert Broberg
Industry Expo
Location: Auditorium

15:00 - 15:30 Qutech.
"The QuTech Roadmaps"
Stephanie Wehner, Ronald Hanson, Leo DiCarlo, Lieven Vandersypen

15:30 - 15:45 Quantum Campus
"Quantum Campus: the QuTech ecosystem for innovation"
Freeke Heijman, Director Strategic Development at QuTech and Special Advisor to the Minister of Economic Affairs.

15:45 - 16:15 Rigetti
"Easy, Hybrid Quantum Programming with Forest"
Will Zeng, Product Lead for Forest, and Chris Osborn, Quantum Software Engineer

16:15 - 16:45 Microsoft
"Q# and the Quantum Development Kit"
John Azariah, Principal Software Engineer

16:45 - 17:15 Google.
"Challenges For Near Term Quantum Computers"
Dave Bacon, Staff Software Engineer

17:15 - 17:45 IBM
"QISKit: A Quantum Computing Platform"
Erick Winston, Research Staff Member

17.45 – 18.30

Free time

18.30 – 22.00

Conference dinner
Location:
Lijm & Cultuur
Rotterdamseweg 272
2628 AT DELFT

Thursday, January 18

Session chair
9.00 – 10.00

Andris Ambainis
Invited talk III | Location: Auditorium
Boaz Barak
Title: Entangling Algorithms and Proofs.

- 10.00 – 10.40 **Coffee break | Location: Foyer**
- Session chair** **Rahul Jain**
10:40 – 11:15 **Session A | Location: Auditorium**
Merge of Anurag Anshu, Min-Hsiu Hsieh and Rahul Jain.
Title: Quantifying resources in general resource theory with catalysts.
with
Mario Berta and Christian Majenz. Disentanglement Cost of Quantum States.
- Session chair** **Isaac Kim**
10:40 – 11:15 **Session B | Location: Collegezaal A**
Ramis Movassagh.
Title: Generic Local Hamiltonians are Gapless.
- Session chair** **Rahul Jain**
11:15 - 11:50 **Session A | Location: Auditorium**
Joseph M. Renes.
Title: Duality of channels and codes.
- Session chair** **Isaac Kim**
11:15 – 11:50 **Session B | Location: Collegezaal A**
Daniel Ranard and Xiao-Liang Qi.
Title: Determining a local Hamiltonian from a ground state or excited state.
- Session chair** **Rahul Jain**
11:50 – 12:25 **Session A | Location: Auditorium**
Christoph Hirche and David Reeb.
Title: Bounds on Information Combining With Quantum Side Information.
- Session chair** **Isaac Kim**
11:50 – 12:25 **Session B | Location: Collegezaal A**
Sergey Bravyi and **David Gosset**.
Title: Polynomial-time classical simulation of quantum ferromagnets.
- 12.25 – 14.00 **Lunch break | Location: Foyer**
- Session chair** **Elizabeth Crosson**
14:00 – 14:35 **Session A | Location: Auditorium**
Miriam Backens.
Title: Quantum computing and Holant problems.
- Session chair** **Min_Hsiu Hsieh**
14:00 – 14:35 **Session B | Location: Collegezaal A**
Mario Berta, Runyao Duan, **Kun Fang**, Xin Wang and Mark M. Wilde.
Title: Efficiently computable upper bounds for quantum communication.

Session chair
14:35 – 15:10

Elizabeth Crosson
Session A | Location: Auditorium
Matthias Christandl, Péter Vrana and **Jeroen Zuiddam**.
Title: Universal points in the asymptotic spectrum of tensors.

Session chair
14:35 – 15:10

Min_Hsiu Hsieh
Session B | Location: Collegezaal A
Merge of
Christopher Chubb, Vincent Tan and Marco Tomamichel.
Title: Moderate deviation analysis for classical communication over quantum channels.
with
Hao-Chung Cheng, Min-Hsiu Hsieh and Marco Tomamichel.
Title: Moderate Deviation Analysis and Sphere-Packing Bounds for Classical-Quantum Channels

Session chair
15:10 – 15:45

Elizabeth Crosson
Session A | Location: Auditorium
Jutho Haegeman, Brian Swingle, Michael Walter, Jordan Cotler, Glen Evenbly and **Volkher Scholz**.
Title: Rigorous free fermion entanglement renormalization from wavelet theory.

Session chair
15:10 - 15:45

Min_Hsiu Hsieh
Session B | Location: Collegezaal A
Xin Wang, Kun Fang and Marco Tomamichel.
Title: On converse bounds for classical communication over quantum channels.

15.45 – 16.00

Group photo | Location: Auditorium

16.00

Free time

Friday, January 19

Session chair
09.00 – 10.00

Ronald de Wolf
Plenary talk IV | Location: Auditorium
Mark Bun, **Robin Kothari** and Justin Thaler.
Title: The Polynomial Method Strikes Back: Tight Quantum Query Bounds via Dual Polynomials.

10.00 – 10.40

Coffee break | Location: Foyer

10.00 – 10.40

Mentoring Sessions (optional: students only) |
Location: Commissiekamer 2

- Session chair**
10:40 – 11:15
- Ronald de Wolf**
Session A | Location: Auditorium
Anurag Anshu, Shalev Ben-David, Ankit Garg, Rahul Jain, Robin Kothari and Troy Lee.
Title: Separating quantum communication and approximate rank.
- Session chair**
10:40 - 11:15
- Mario Berta**
Session B | Location: Collegezaal A
Michal Studzinski, Sergii Strelchuk, Marek Mozrymas and Michal Horodecki.
Title: Optimal Port-based Teleportation in Arbitrary Dimension
- Session chair**
11:15 – 11:50
- Ronald de Wolf**
Session A | Location: Auditorium
Shalev Ben-David, Adam Bouland, Ankit Garg and Robin Kothari.
Title: Classical lower bounds from quantum upper bounds
- Session chair**
11:15 – 11:50
- Mario Berta**
Session B | Location: Collegezaal A
Ludovico Lami, Christoph Hirche, Gerardo Adesso and Andreas Winter.
Title: From log-determinant inequalities to Gaussian entanglement via recoverability theory.
- Session chair**
11:50 – 12:25
- Ronald de Wolf**
Session A | Location: Auditoriums
Andris Ambainis and Martins Kokainis.
Title: Quantum algorithm for tree size estimation, with applications to backtracking and 2-player games.
- Session chair**
11:50 – 12:25
- Mario Berta**
Session B | Location: Collegezaal A
Merge of
Anurag Anshu, Rahul Jain and Naqeeb Warsi.
Title: Building blocks for communication over noisy quantum networks.
with
Anurag Anshu, Rahul Jain and Naqeeb Warsi.
Title: Quantum compression protocols over quantum networks.
- 12.25 – 13.15
- Lunch break | Location: Foyer**
- Session chair**
13.15 – 14.00
- Barbara Terhal**
Business meeting | Location: Auditorium
- Session chair**
14:00 – 14:35
- Patrick Hayden**
Session A | Location: Auditorium
Tobias Osborne and Deniz Stiegemann.
Title: Dynamics for holographic codes.

- Session chair**
14:00 – 14:35
- Robin Kothari**
Session B | Location: Collegezaal A
Jayadev Acharya, Ibrahim Issa, Nirmal Shende and Aaron Wagner.
Title: Measuring Quantum Entropy.
- Session chair**
14:35 – 15:10
- Patrick Hayden**
Session A | Location: Auditorium
Jordan Cotler, Patrick Hayden, Grant Salton, Brian Swingle and Michael Walter.
Title: Approximate Operator Algebra Quantum Error Correction (Decoding the Hologram in AdS/CFT).
- Session chair**
14:35 – 15:10
- Robin Kothari**
Session B | Location: Collegezaal A
Costin Bădescu, Ryan O'Donnell and John Wright.
Title: Quantum state certification.
- Session chair**
15:10 – 15:45
- Patrick Hayden**
Session A | Location: Auditorium
Michael Kastoryano and Isaac Kim.
Title: Entanglement renormalization, quantum error correction, and bulk causality.
- Session chair**
15:10 – 15:45
- Robin Kothari**
Session B | Location: Collegezaal A
Yuxiang Yang, Ge Bai, Giulio Chiribella and Masahito Hayashi.
Compression for identically prepared qudit states.
- Session chair**
16:30 - 17:30
- Stephanie Wehner**
Plenary talk V | Location: Auditorium
William Slofstra and Thomas Vidick.
Title: Entanglement requirements for non-local games
- 17.30
- Closing by Stephanie Wehner**