

PROGRAM

Tutorials

August 20, 2014 (Wed.)

9:00 - 12:15 [Morning session] (Session Chair: Andreas Winter)

9:00 - 10:15 *Efficiently simulating Hamiltonian evolution*

Richard Cleve (University of Waterloo and Canadian Institute for Advanced Research)

[Break]

10:45 - 12:15 *Cryptography in a Quantum World*

Gilles Brassard (Université de Montréal and ETH Zürich)

[Lunch on your own]

14:00 - 17:30 [Afternoon session] (Session Chair: Kazuo Iwama)

14:00 - 15:30 *Fault-tolerant quantum computation*

Daniel Gottesman (Perimeter Institute and CIFAR Quantum Information Science Program)

[Break]

16:00 - 17:30 *The quantum PCP conjecture*

Thomas Vidick (California Institute of Technology and CQT, National University of Singapore)

Oral Presentations

August 21, 2014 (Thu.)

8:45 - 9:00 [Opening]

9:00 - 12:30 [Plenary session]

(Session Chair: Andreas Winter)

9:00 - 9:45 [Invited Talk] *Superconducting qubits poised for fault-tolerant quantum computation*

John Martinis (UC Santa Barbara)

9:45 - 10:30 [Invited Talk] *Why complex probabilities make sense: New insights into the relations between weak measurements, paradoxical correlations, and causality in quantum systems*

Holger F. Hofmann (Hiroshima University and JST-CREST)

[Break]

(Session Chair: Ray-Kuang Lee)

11:00 - 11:30 *Identical particles as a resource for quantum information*

Nathan Killoran (Ulm University), Marcus Cramer (Ulm University), and Martin B. Plenio (Ulm University)

11:30 - 12:00 *Equivalence of wave-particle duality to entropic uncertainty*

Patrick Coles (National University of Singapore), Jedrek Kaniewski (National University of Singapore), and Stephanie Wehner (National University of Singapore)

12:00 - 12:30 *Highly efficient entanglement swapping at telecom wavelength*

Rui-Bo Jin (NICT), Masahiro Takeoka (NICT), Utako Takagi (NICT, Tokyo University of Science), Ryosuke Shimizu (University of Electro-Communications), and Masahide Sasaki (NICT)

[Lunch on your own]

14:30 - 15:50 [Parallel session A] Quantum physics (Session Chair: Harumichi Nishimura)

14:30 - 14:50 *Measurement-based quantum computation protected by a long-range order induced by a thermal phase transition*

Yoshifumi Nakata (Leibniz University Hannover), Keisuke Fujii (Kyoto University), Masayuki Ohzeki (Kyoto University), and Mio Muraio (University of Tokyo)

14:50 - 15:10 *BDD Representations for Quantum Graph State and Ising model*

Hidefumi Hiraishi (The University of Tokyo), Hiroshi Imai (The University of Tokyo), Yoichi Iwata (The University of Tokyo), and Bingkai Lin (The University of Tokyo)

15:10 - 15:30 *Improving the coherence time of a quantum system via a coupling to a short-lived system*

Y. Matsuzaki (NTT BRL), K. Kakuyanagi (NTT BRL), H. Toida (NTT BRL), T. Shimooka (Osaka University), N. Mizuochi (Osaka University), X. Zhu (NTT BRL), K. Nemoto (NII), W. J. Munro (NTT BRL), K. Semba (NII), H. Yamaguchi (NTT BRL), and S. Saito (NTT BRL)

15:30 - 15:50 *Observation of localization and quasiperiodic dynamics in a one dimensional photonic quantum walk*

Peng Xue (Southeast University), Hao Qin (Southeast University), Bao Tang (Southeast University), Rong Zhang (Southeast University), and Barry C. Sanders (University of Science and Technology of China and University of Calgary)

14:30 - 16:10 [Parallel session B] Non-locality and Entanglement (Session Chair: Mio Murao)

14:30 - 14:50 *Two characterizations of nonlocal games with perfect maximally entangled strategies*

Laura Mančinska (Centre for Quantum Technologies, National University of Singapore), David E. Robertson (Nanyang Technological University), and **Antonios Varvitsiotis** (Centre for Quantum Technologies, National University of Singapore and Nanyang Technological University)

14:50 - 15:10 *Compact Bell inequalities for multipartite experiments*

Yu-Chun Wu (USTC, China), Marek Żukowski (Gdansk University), Jing-Ling Chen (Nankai University) and Guang-Can Guo (USTC, China)

15:10 - 15:30 *Local PT Symmetry Violates the No-Signaling Principle*

Yi-Chan Lee (National Tsing-Hua University), Min-Hsiu Hsieh (University of Technology, Sydney), Steven T. Flammia (University of Sydney), and Ray-Kuang Lee (National Tsing-Hua University)

15:30 - 15:50 *Globalness of separable maps in terms of classical temporal correlations and quantum spatial correlations*

Seiseki Akibue (The University of Tokyo), Masaki Owari (NTT corporation), Go Kato (NTT corporation), and Mio Murao (The University of Tokyo)

15:50 - 16:10 *Permutationally Invariant Part of a Density Matrix and Nonseparability of N -Qubit States*

Ting Gao (Hebei Normal University), Fengli Yan (Hebei Normal University), and Steven J van Enk (University of Oregon)

16:10 - 18:30 [Poster session 1]

[Reception]

August 22, 2014 (Fri.)

9:00 - 12:30 [Plenary session]

(Session Chair: Peng Xue)

9:00 - 9:45 [Invited Talk] *A communication-efficient entanglement test and a counterexample to the generalized area law*

Aram W. Harrow (MIT)

9:45 - 10:30 [Invited Talk] *Parallel repetition of entangled games via the superposed information cost*

André Chailloux (Inria, Paris Rocquencourt)

[Break]

(Session Chair: Hiroshi Imai)

11:00 - 11:30 *Generating a state design by diagonal quantum circuits*

Yoshifumi Nakata (Leibniz University Hannover), Masato Koashi (University of Tokyo), and Mio Murao (University of Tokyo)

11:30 - 12:00 *Quantum arithmetic and numerical analysis using Repeat-Until-Success circuits*

Nathan Wiebe (Microsoft Research) and Martin Roetteler (Microsoft Research)

12:00 - 12:30 *Tensor network non-zero testing*

Sevag Gharibian (Simons Institute and UC Berkeley), Zeph Landau (Simons Institute and UC Berkeley), **Seung Woo Shin** (UC Berkeley), and Guoming Wang (UC Berkeley)

[Lunch on your own]

14:30 - 16:10 [Parallel session A] Quantum Computing (Session Chair: Shigeru Yamashita)

14:30 - 14:50 *Low-distance Surface Codes under Realistic Quantum Noise*

Yu Tomita (Georgia Tech) and **Krysta M. Svore** (Microsoft Research)

14:50 - 15:10 *LIQUi): A Software Design Architecture and Domain-Specific Language for Quantum Computing*

Dave Wecker (Microsoft Research) and **Krysta M. Svore** (Microsoft Research)

15:10 - 15:30 *Optimal simulation of Toffoli Gate, Deutsch Gates and Fredkin Gate*

Nengkun Yu (University of Waterloo and University of Guelph), **Runyao Duan** (University of Technology, Sydney and Tsinghua University), and Mingsheng Ying (University of Technology, Sydney and Tsinghua University)

15:30 - 15:50 *Parallelized adiabatic gate teleportation*

Kosuke Nakago (University of Tokyo), Michal Hajdusek (Singapore University of Technology and Design), Shojun Nakayama (University of Tokyo), and Mio Murao (University of Tokyo)

15:50 - 16:10 *Universality of Sequential Quantum Measurements*

Teiko Heinosaari (University of Turku) and Takayuki Miyadera (Kyoto University)

14:30 - 15:50 [Parallel session B] Device Independence (Session Chair: Nobu Imoto)

14:30 - 14:50 *Device-independent uncertainty for binary observables*

Jedrzej Kaniewski (Centre for Quantum Technologies, NUS), Marco Tomamichel (Centre for Quantum Technologies, NUS), and Stephanie Wehner (Centre for Quantum Technologies, NUS)

14:50 - 15:10 *Robust and versatile black-box certification of quantum devices*

Tzyh Haur Yang (Centre for Quantum Technologies), Tamás Vértesi (Institute for Nuclear Research), **Jean-Daniel Bancal** (Centre for Quantum Technologies), Valerio Scarani (Centre for Quantum Technologies, National University of Singapore), and Miguel Navascués (University of Bristol)

15:10 - 15:30 *Theory-independent limits on correlations from generalised Bayesian networks*

Joe Henson (Imperial College London), **Raymond Lal** (University of Oxford), and Matthew F. Pusey (Perimeter Institute)

15:30 - 15:50 *Dimension of physical systems, information processing, and thermodynamics*

Nicolas Brunner (Université de Genève), **Marc Kaplan** (Telecom ParisTech), Anthony Leverrier (Inria, EPI SECRET), and Paul Skrzypczyk (ICFO)

16:10 - 18:30 [Poster session 2]

[Banquet]

August 23, 2014 (Sat.)

9:00 - 12:30 [Plenary session]

(Session Chair: Akihisa Tomita)

9:00 - 9:45 [Invited Talk] *Universally valid error-disturbance relations for general quantum measurements*

Masanao Ozawa (Nagoya University)

9:45 - 10:30 [Invited Talk] *Device-independent certification of quantum devices*

Valerio Scarani (National University of Singapore)

[Break]

(Session Chair: Wonmin Son)

11:00 - 11:30 *No psi-epistemic model can fully explain the indistinguishability of quantum states*

Jon Barrett (University of Oxford), **Eric G. Cavalcanti** (University of Sydney), Raymond Lal (University of Oxford), and Owen J. E. Maroney (University of Oxford)

11:30 - 12:00 *Joint measurability, EPR steering, and Bell nonlocality*

Marco Túlio Quintino (Université de Genève), Tamas Vértesi (Hungarian Academy of Sciences), and Nicolas Brunner (Université de Genève)

12:00 - 12:30 *Quantum bidding in Bridge*

Sadiq Muhammad (Stockholm University), Armin Tavakoli (Stockholm University), Maciej Kuran (ETH Zurich), **Marcin Pawłowski** (University of Gdansk), Marek Zukowski (University of Gdansk), and Mohamed Bourennane (Stockholm University)

[Excursion]

August 24, 2014 (Sun.)

9:00 - 9:45 [Plenary session]

(Session Chair: Jaw-Shen Tsai)

9:00 - 9:45 [Invited Talk] *The multimode quantum Gaussian optimizers problem*

A. S. Holevo (Steklov Mathematical Institute and National Research University Higher School of Economics (HSE))

[Break]

10:15 - 11:55 [Parallel session A] Quantum Shannon Theory (Session Chair: Richard Jozsa)

10:15 - 10:35 *Continuous-variable quantum communication over fluctuating channels*

Vladyslav C. Usenko (Palacky University and National Academy of Sciences of Ukraine) and Radim Filip (Palacky University)

10:35 - 10:55 *Obtain W -state from GHZ-state on rate 1*

Nengkun Yu (University of Waterloo and University of Guelph), Cheng Guo (University of Technology, Sydney), and **Runyao Duan** (University of Technology, Sydney and Tsinghua University)

10:55 - 11:15 *Asymptotic Entanglement Preservability of LOCC Conversions*

Kosuke Ito (Nagoya University), Wataru Kumagai (Kanagawa University), and Masahito Hayashi (Nagoya University and National University of Singapore)

11:15 - 11:35 *Asymptotic Compressibility of Entanglement and Classical Communication in Distributed Quantum Computation*

Eyuri Wakakuwa (The University of Tokyo) and Mio Muraio (The University of Tokyo)

11:35 - 11:55 *Game-theoretic characterization of antidegradable channels*

Francesco Buscemi (Nagoya University), Nilanjana Datta (University of Cambridge), and Sergii Strelchuk (University of Cambridge)

10:15 - 11:55 [Parallel session B] QKD and Complexity (Session Chair: Francois Le Gall)

10:15 - 10:35 *Complexity of gapped ground states in general k -local Hamiltonians*

Tomotaka Kuwahara (Tokyo University), Itai Arad (National University of Singapore), Luigi Amico (Catania University and National University of Singapore), and Vlatko Vedral (Oxford University and National University of Singapore)

10:35 - 10:55 *Identifying generalized Reed-Muller codewords by quantum queries*

Stefan Arnold (Universität Ulm)

10:55 - 11:15 *Reverse Reconciliation Continuous Variable Quantum Key Distribution Based on the Uncertainty Principle*

Fabian Furrer (University of Tokyo)

11:15 - 11:35 *High Bit Rate Continuous-Variable Quantum Key Distribution*

Paul Jouguet (SeQureNet), **David Elkouss** (Universidad Complutense de Madrid), and Sébastien Kunz-Jacques (SeQureNet)

11:35 - 11:55 *Long distance quantum key distribution with room temperature single-photon detectors*

L. C. Comandar (Cambridge University and Toshiba Research Europe), B. Fröhlich (Toshiba Research Europe), M. Lucamarini (Toshiba Research Europe), K. A. Patel (Cambridge University and Toshiba Research Europe), A. W. Sharpe (Toshiba Research Europe), J. F. Dynes (Toshiba Research Europe), Z. L. Yuan (Toshiba Research Europe), R. V. Pentyl (Cambridge University), and A. J. Shields (Toshiba Research Europe)

[Lunch on your own]

14:00 - 16:45 [Plenary session]

(Session Chair: Beth Ruskai)

14:00 - 14:30 *Unbounded number of channel uses are required to see quantum capacity*

Toby Cubitt (University of Cambridge), **David Elkouss** (Universidad Complutense de Madrid), Will Matthews (University of Cambridge), Maris Ozols (University of Cambridge), David Pérez-García (Universidad Complutense de Madrid), and Sergii Strelchuk (University of Cambridge)

14:30 - 15:00 *Quantum Renyi divergences: operational interpretations and applications to composite coding problems*

Milan Mosonyi (Universitat Autònoma de Barcelona) and Tomohiro Ogawa (University of Electro-Communications)

15:00 - 15:30 *Symmetric polynomials in information theory: entropy and subentropy*

Richard Jozsa (University of Cambridge) and Graeme Mitchison (University of Cambridge)

[Break]

(Session Chair: Jaewan Kim)

16:00 - 16:45 [Invited Talk] *Coherent Ising Machine based on OPO Phase Transition*

Yoshihisa Yamamoto (RIKEN, NII, and Stanford University)

16:45 - 17:00 [Closing ceremony with best student poster awards]