

The 53rd Quantum Information Technology Meeting (QIT53)

Venue: NTT Atsugi R&D Center, 3-1 Morinosato Wakamiya, Atsugi, Kanagawa, 243-0198, Japan

Dates: December 2 (Tue) – December 4 (Thu), 2025

December 2 (Tue)

Opening

Time: 09:40 - 09:50

Chair: Koji Azuma (NTT)

[Invited Talk] 1

Time: 09:50 - 10:40

Chair: Go Kato (NICT)

09:50 - 10:40 [Invited Talk] Exploring Quantum Phases in Spin Systems using Quantum Information Tools

Kohtaro Kato (Nagoya U.)

AM Session 1

Time: 10:50 - 11:50

Chair: Yasuhiro Tokura (Univ. of Tsukuba)

10:50 - 11:10 Learning quantum many-body data locally -- A provably scalable framework --

Koki Chinzei, Quoc Hoan Tran, Norifumi Matsumoto, Yasuhiro Endo, Hirotaka Oshima (Fujitsu)

11:10 - 11:30 Entanglement Asymmetry and Quantum Mpemba effect for Non-Abelian Global Symmetry

Harunobu Fujimura, Soichiro Shimamori (UOsaka)

11:30 - 11:50 Ontic- or epistemic-distinguishability of identical particles by using the Aharonov-Bohm effect

Yutaka Shikano (ITF)

AM Session 2

Time: 12:00 - 13:00

Chair: Yuki Takeuchi (Mitsubishi Electric)

12:00 - 12:20 Stabilizer Renyi entropy of 3-uniform hypergraph states

Daichi Kagamihara, Shunji Tsuchiya (Chuo Univ.)

12:20 - 12:40 Measurement-Induced Phase Transitions in the Dynamics of Magic

Daiki Shimizu, Yoshihiko Hasegawa (UTokyo)

12:40 - 13:00 Analysis of T-Gate-Induced Entanglement in the Stabilizer Basis Update Framework

Yuki Watanabe, Yoshihiko Hasegawa (UTokyo)

Poster Session

Time: 14:00 - 15:30

Posters are listed at the end of the Program.

[Invited Talk] 2

Time: 15:30 - 16:20

Chair: Hiroki Takesue (NTT)

15:30 - 16:20 [Invited Talk] Toward Distributed Quantum Computing: Developing Quantum Interconnects

Inoue Ryotaro (NanoQT)

PM Session 3

Time: 16:30 - 17:30

Chair: Yoshifumi Nakata (Kyoto Univ.)

16:30 - 16:50 Measurement-based quantum computation on uniformly weighted graph states

Tomohiro Yamazaki (NTT), Yuki Takeuchi (Mitsubishi Electric)

16:50 - 17:10 Decomposing controlled gates into Clifford+T

Soichiro Yamazaki (UT), Seiseki Akibue (NTT)

17:10 - 17:30 Optimal ancilla-free Clifford+T synthesis for general single-qubit unitaries

Hayata Morisaki (UOsaka), Kaoru Sano, Seiseki Akibue (NTT)

Student Award Ceremony

Time: 17:30 - 17:45

Banquet

Time: 17:45 - 19:45

December 3 (Wed)

[Invited Talk] 3

Time: 09:30 - 10:20

Chair: Takashi Yamamoto (Univ. of Osaka)

09:30 - 10:20 [Invited Talk] Building quantum interfaces based on Rydberg excitation of neutral atoms

Shinsuke Haze (Osaka Univ.)

AM Session 4

Time: 10:30 - 11:30

Chair: Koji Maruyama (Univ. of Toyama)

10:30 - 10:50 Squeezing quantum noise in a microwave phase sensitive amplifier

Imran Mahboob, Satoshi Sasaki, Takaaki Takenaka (NTT BRL)

10:50 - 11:10 An Analysis of Entanglement Percolation on Quantum Complex Networks Focusing on Centrality Indices

Tasuku Hazama, Atsushi Okamoto (Hokkaido Univ.), Akihisa Tomita (NICT)

11:10 - 11:30 Anonymous quantum sensing robust against state preparation errors

Hiroto Kasai (Univ of Tsukuba/Keio Univ), Seiichiro Tani (Waseda Univ.), Yasuhiro Tokura (Univ of Tsukuba), Yuki Takeuchi (NTT/Mitsubishi Electric Corp.)

AM Session 5

Time: 11:40 - 13:00

Chair: Akihito Soeda (NII)

11:40 - 12:00 Bayesian Monotone Metric Bounds for Quantum Multiparameter Estimation

Zhang Jianchao (UEC), Yamagata Koichi (Kindai), Suzuki Jun (UEC)

12:00 - 12:20 Quantum hypothesis testing for composite alternative hypotheses

Daichi Fujiki, Fuyuhiko Tanaka (UOsaka), Tatsuya Sakashita (UTokyo)

12:20 - 12:40 Hypothesis testing and Stein's lemma in general probability theories with Euclidean Jordan algebra and its quantum realization

Kanta Sonoda (Nagoya Univ.), Hayato Arai (Tokyo Univ.), Masahito Hayashi (CUHK)

12:40 - 13:00 The utility of quantum channels

Michele Dall'Arno (Toyohashi U.), S. Brandsen (Duke U.), Francesco Buscemi (Nagoya U.)

[Invited Talk] 4

Time: 14:00 - 14:50

Chair: Takuya Hatomura (NTT)

14:00 - 14:50 [Invited Talk] Exploring quantum state space via Krylov subspace methods

Kazutaka Takahashi (Mie Univ)

PM Session 6

Time: 15:00 - 16:00

Chair: Kazutaka Takahashi (Mie Univ.)

15:00 - 15:20 Equilibration of Non-interacting Photons and Quantum Signatures of Chaos -- Out-of-time-order Correlates (OTOCs) and complexity of Boson sampling --

Victor M. Bastidas (NTT)

15:20 - 15:40 Symmetry respected fast-forward scaling theory

Yuji Ando (Tohoku Univ.)

15:40 - 16:00 Quasi-adiabatic thermal ensemble preparation

Tatsuhiko Shirai (Waseda Univ.)

PM Session 7

Time: 16:10 – 17:30

Chair: Hayato Goto (Toshiba Corp.)

16:10 – 16:30 Asymptotic Magic State Distillation with Almost Linear Rate

Koki Ehara, Ryuji Takagi (Utokyo)

16:30 – 16:50 Quantum error correction via multi-particle discrete-time quantum walk

Ryo Asaka (TUS), Ryusei Minamikawa (AIST)

16:50 – 17:10 Reducing measurements in quantum erasure correction by quantum local recovery

Ryutaroh Matsumoto (Science Tokyo)

17:10 – 17:30 Dense packing of the surface code: code deformation procedures and hook-error-avoiding gate scheduling

Kohei Fujiu, Shota Nagayama (Keio Univ.), Shin Nishio (Keio Univ./UCL), Hideaki Kawaguchi, Takahiko Satoh (Keio Univ.)

December 4 (Thu)

[Invited Talk] 5

Time: 09:50 - 10:40

Chair: Seiichiro Tani (Waseda Univ.)

09:50 - 10:40 [Invited Talk] Cryptography with Certified Deletion and Secure Key Leasing

Ryo Nishimaki (NTT)

AM Session 8

Time: 10:50 - 11:50

Chair: Ryo Nishimaki (NTT)

10:50 - 11:10 Computational Certified Deletion Property of Magic Square Game and its Application to Classical Secure Key Leasing

Yuki Takeuchi (Mitsubishi Electric Corp), Duo XU (Nagoya Univ.)

11:10 - 11:30 Quantum Cryptography and Hardness of Non-Collapsing Measurements

Tomoyuki Morimae, Yuki Shirakawa (Kyoto Univ.), Takashi Yamakawa (NTT)

11:30 - 11:50 Proofs of Quantum Memory

Minki Hhan (UT Austin), Tomoyuki Morimae, Yasuaki Okinaka (Kyoto Univ), Takashi Yamakawa (NTT)

AM Session 9

Time: 12:00 - 13:00

Chair: Toyohiro Tsurumaru (Mitsubishi Electric)

12:00 - 12:20 Security of the BB84 protocol with receiver's passive biased basis choice

Shun Kawakami, Atsushi Taniguchi, Yoshihide Tonomura, Koichi Takasugi, Koji Azuma (NTT)

12:20 - 12:40 C-band Discrete-Variable QKD Coexistence with 33.4 Tb/s High-Capacity O-Band Data Signal

Shohei Beppu, Elson Daniel (KDDI Research), Shinya Murai, Akira Murakami (Toshiba Digital Solutions), Hiroki Yamamuro, Yuta Wakayama, Noboru Yoshikane, Takehiro Tsuritani (KDDI Research)

12:40 - 13:00 Observation of physical delocalization of single photon in an interferometer

Ryuya Fukuda, Masataka Iinuma, Yuto Matsumoto, Holger F. Hofmann (Hiroshima Univ)

[Invited Talk] 6

Time: 14:00 - 14:50

Chair: Seiseki Akibue (NTT)

14:00 - 14:50 [Invited Talk] Quantum computing for/with machine learning

Kosuke Mitarai (UOsaka)

PM Session 10

Time: 15:00 - 16:00

Chair: Kosuke Mitarai (Univ. of Osaka)

15:00 - 15:20 Structured quantum learning via em algorithm for Boltzmann machines

Takeshi Kimura, Kohtaro Kato (Nagoya Univ.), Masahito Hayashi (CUHK-Shenzhen/Nagoya Univ.)

15:20 - 15:40 Lower Bounds on Quantum Query Complexity Using Multi-Symmetric Polynomials and their Application to Claw Finding

Seiichiro Tani (Waseda)

15:40 - 16:00 Computational complexity of Berry phase estimation in topological phases of matter

Kazuki Sakamoto, Chusei Kiumi (UOsaka), Ryu Hayakawa (Kyoto Univ.)

PM Session 11

Time: 16:10 - 17:30

Chair: Yutaka Shikano (Univ. of Tsukuba)

16:10 - 16:30 Quantum algorithms for Uhlmann transformation

Takeru Utsumi (UT), Yoshifumi Nakata (KU), Qisheng Wang (UoE), Ryuji Takagi (UT)

16:30 - 16:50 Efficient implementation of sequential quantum processes with group symmetry

Dmitry Grinko (Univ. Amsterdam), Satoshi Yoshida, Mio Murao (Univ. Tokyo), Maris Ozols (Univ. Amsterdam)

16:50 - 17:10 Characterizing Space-Constrained Implementability of Quantum Instruments via Signaling Conditions

Kosuke Matsui (UTokyo/HHRI), Jun-Yi Wu (HHRI/TKU), Hayata Yamasaki (UTokyo), Min-Hsiu Hsieh (HHRI), Mio Murao (UTokyo)

17:10 - 17:30 Bayesian inversion of quantum measurements and retrodictive entropic uncertainty relations

Jiaxi Kuang, Kensei Torii, Buscemi Francesco (Nagoya Univ.)

Closing

Time: 17:30 - 17:40

Poster Session

Date: 2nd December

Time: 14:00 - 15:30

14:00 - 15:30 [Poster Presentation] Fidelity and Phase Transition of the Toric Code under Local Noise

Kyo Tachizawa, Daichi Kagamihara, Shunji Tsuchiya (Chuo Univ.)

14:00 - 15:30 [Poster Presentation] Fault-tolerant quantum computing with a $[[30,6,5]]$ symplectic double code

Naoyuki Kanomata, Hayato Goto (RIKEN)

14:00 - 15:30 [Poster Presentation] Measurement-Based FTQC: A Resource-Efficient Fault-Tolerant Quantum Computing Architecture for High-Connectivity Devices

Yohei Ibe (QunaSys), Yutaka Hirano (UOsaka), Yasuo Ozu, Toru Kawakubo (QunaSys), Keisuke Fujii (UOsaka)

14:00 - 15:30 [Poster Presentation] Joint spectral intensity measurements with varying pump pulse widths

Hsin-Pin Lo, Hiroki Takesue (NTT)

14:00 - 15:30 [Poster Presentation] Security Evaluation of Quantum Key Distribution in Non-Markovian Environments

Maina Sano, Akira Ishikawa (Univ. of Yamanashi)

14:00 - 15:30 [Poster Presentation] Optimal Superposition of the Orders of Probing for Quantum Metrology

Kohei Akita, Kazuya Yuasa (Waseda Univ.)

14:00 - 15:30 [Poster Presentation] Quantum Channel Resolvability Using Matrix Multiplicative Weight Update Algorithm

Koki Takahashi, Shun Watanabe (TUAT)

14:00 - 15:30 [Poster Presentation] Fixed-Angle Approach and Its Applications in Constrained Quantum Approximate Optimization Algorithms

Shin Kawamoto (UOsaka), Kazuhide Ichikawa, Genta Hayashi, Tomoyasu Yokoyama, Akira Ouchi (Panasonic), Ken N. Okada (UOsaka), Keisuke Fujii (UOsaka/RIKEN)

14:00 - 15:30 [Poster Presentation] Collective Scattering of Light from a Single Atomic Layer

Jessica Szwandt (Univ. of Bath), Lewis Ruks (NTT BRL)

14:00 - 15:30 [Poster Presentation] Hamiltonian Identification of Quantum Dynamics based on Sparsity

Yusei Tateyama, Yuzuru Kato (FUN)

14:00 - 15:30 [Poster Presentation] Analysis of the Pulsed and the Continuous Quantum Zeno Effects

You dai Uchiki, Kazuya Yuasa (Waseda Univ.)

14:00 - 15:30 [Poster Presentation] dQMA(k): Multiple verifiers meet multiple provers

Alex Della Schiava, Atsuya Hasegawa, François Le Gall, Harumichi Nishimura (Nagoya University)

14:00 - 15:30 [Poster Presentation] Bell's inequality violation for relativistic spin 1/2 particles

Takehiro Tsurumi, Jun Suzuki (UEC)

14:00 - 15:30 [Poster Presentation] Benchmarking Quantum Entanglement Networks with System-Size-Independent Measurements

Shih-Hsuan Chen, Shun-Cheng Yeh, Tse-Kai Hsu, Che-Ming Li (NCKU)

14:00 - 15:30 [Poster Presentation] Development of a Spectrally Pure Entangled Photon Pair Source toward Frequency Multiplexed Quantum Communications

Daiki Ichii (Keio Univ.), Yoshiaki Tsujimoto, Kentaro Wakui, Mikio Fujiwara (NICT), Masahiro Takeoka (Keio Univ.), Go Kato (NICT)

14:00 - 15:30 [Poster Presentation] A Study on Local Modification Methods for Parity-Check Matrices in LDPC-CSS Codes

Koki Okada, Kenta Kasai (Science Tokyo)

14:00 - 15:30 [Poster Presentation] Readout Error Mitigation for Bosonic Quantum Computing

Ryuta Sasaki, Shintaro Sato, Suguru Endo (NTT)

14:00 - 15:30 [Poster Presentation] Theoretical proposal for a new feedback-control scheme in superconducting circuits

Michiya Chazono, Kosuke Kakuyanagi (NTT)

14:00 - 15:30 [Poster Presentation] Acceleration of adiabatic quantum gate operations via degeneracy

Asuka Koura (Chuo Univ.), Takashi Imoto (RQC)

14:00 - 15:30 [Poster Presentation] Optimization of Dump-Truck Scheduling Using Ising Machines

Kazuki Ikeuchi, Shuta Kikuchi, Ryo Ogawa (Keio Univ.), Kazuhiro Amano, Osamu Imazeki (Kajima Corp.), Shu Tanaka (Keio Univ.)

14:00 - 15:30 [Poster Presentation] Quantum metrology enhanced by level anticrossing structure in two level system

Ryo Tatsumi, Le Bin Ho, Hiroaki Matsueda (Tohoku Univ.)

14:00 - 15:30 [Poster Presentation] Shuttling for Quantum-Charge-Coupled Device incorporating Quantum Teleportation

Jion Tamamoto, Shigeru Yamashita (Ritsumeikan Univ.)

14:00 - 15:30 [Poster Presentation] Development of a Cloud-Connected Ion Trap Quantum Computing System

Koichiro Miyanishi, Kota Kashiwara, Yuma Fujita, Toshio Mori, Satoyuki Tsukano, Takafumi Miyana, Takefumi Miyoshi, Makoto Negoro, Kenji Toyoda (UOsaka)

14:00 - 15:30 [Poster Presentation] Application of Ising Machines to Evacuation Route Optimization with Capacity Constraints

Ryo Ogawa, Shuta Kikuchi, Kazuki Ikeuchi, Takuro Ito, Kanta Hino (Keio Univ.), Kazuhiro Amano, Osamu Imazeki (Kajima Corp.), Shu Tanaka (Keio Univ.)

14:00 - 15:30 [Poster Presentation] Quantum metrology in a minimally frustrated Ising triangle model

Nozomu Takahashi, Le Bin Ho, Hiroaki Matsueda (Tohoku Univ.)

14:00 - 15:30 [Poster Presentation] Measurement-Based Quantum Computation using Spin-1 XXZ chain

Hiroki Ohta (Chuo Univ.), Aaron Mueller (ETH Zurich), Shunji Tsuchiya (Chuo Univ.)

14:00 - 15:30 [Poster Presentation] [Poster Presentation] A resource theory of GPTs: the efficiency of GPTs and its computational complexity

Shuriku Kai, Michele Dall'Arno (TUT)

14:00 - 15:30 [Poster Presentation] A Scalable Parity-Check Matrix Design Method for Large-Scale LDPC-CSS Codes Based on Nonbinary LDPC Codes

Yoji Uchiyama, Kenta Kasai (Science Tokyo)

14:00 - 15:30 [Poster Presentation] Optimal Estimation Strategy for Arbitrary Qubit Model in Quantum Bayesian Framework

Ke-Han Zhao (UEC), Koichi Yamagata (Kindai), Jun Suzuki (UEC)

14:00 - 15:30 [Poster Presentation] Performance of a concatenated code spanning two distributed modules

Kanta Watanabe (UOsaka), Rui Asaoka (NTT)

14:00 - 15:30 [Poster Presentation] GPU-Based State Vector Simulator -- Memory Sharing Approach, Circuit Parser Integration, and Web Demonstration --

Naoto Aoki (Riken)

14:00 - 15:30 [Poster Presentation] A Study on the Implementation of Joint BP Decoders for CSS Codes Based on Non-Binary LDPC Codes Using GPUs

Ryosuke Nagamatsu, Kenta Kasai (Science Tokyo)

14:00 - 15:30 [Poster Presentation] Efficient quantum algorithm for linear distributed delay differential equations

Wataru Setoyama, Keisuke Fujii (RIKEN)

14:00 - 15:30 [Poster Presentation] Revisiting the Time-Energy relation via Gaussian POVMs and the Lee-Tsutsui Formalism

Kin-ya Oda, Naoya Ogawa (TWCU)