

RIKEN - LBNL Workshop on Quantum Information Science

Report of Contributions

Contribution ID: 1

Type: **not specified**

Opening remarks

Tuesday, September 3, 2024 9:00 AM (15 minutes)

Jonathan Carter, Mike Witherell

Presenter: Dr CARTER, Jonathan (Lawrence Berkeley National Laboratory)

Session Classification: Quantum capabilities at RIKEN and LBNL

Contribution ID: 2

Type: **not specified**

JHPC quantum project for Quantum-supercomputer hybrid computing platform

Tuesday, September 3, 2024 9:15 AM (40 minutes)

Presenter: Dr SATO, Mitsuhsa (R-CCS, RIKEN)

Session Classification: Quantum capabilities at RIKEN and LBNL

Contribution ID: 3

Type: **not specified**

Quantum @ Berkeley Lab

Tuesday, September 3, 2024 9:55 AM (40 minutes)

Presenter: Dr DE JONG, Wibe (QSA, LBNL)

Session Classification: Quantum capabilities at RIKEN and LBNL

Contribution ID: 4

Type: **not specified**

Advancing Quantum Information Processing with Qudits

Tuesday, September 3, 2024 10:50 AM (40 minutes)

Presenter: Prof. SIDDIQI, Irfan (AQT, LBNL)

Session Classification: Quantum capabilities at RIKEN and LBNL

Contribution ID: 5

Type: **not specified**

Overview of Research Activities at RQC, and Development of Superconducting Quantum Computers

Tuesday, September 3, 2024 11:30 AM (40 minutes)

Presenter: Dr ABE, Eisuke (RQC, RIKEN)

Session Classification: Quantum capabilities at RIKEN and LBNL

Contribution ID: 6

Type: **not specified**

Tile-able design of superconducting quantum computers

Tuesday, September 3, 2024 2:00 PM (20 minutes)

Presenter: Dr TABUCHI, Yutaka (RQC, RIKEN)

Session Classification: QIS technologies session 1

Contribution ID: 7

Type: **not specified**

Beyond Binary Quantum Logic with Superconducting Circuits

Tuesday, September 3, 2024 2:20 PM (20 minutes)

Presenter: Dr NAIK, Ravi (AQT, LBNL)

Session Classification: QIS technologies session 1

Contribution ID: 8

Type: **not specified**

Charge-Induced Energy Shift of a Single Spin Qubit under a Magnetic-Field Gradient

Tuesday, September 3, 2024 2:40 PM (20 minutes)

Presenter: Dr KOBAYASHI, Takashi

Session Classification: QIS technologies session 1

Contribution ID: 9

Type: **not specified**

Quantum-limited sensors for fundamental physics

Tuesday, September 3, 2024 3:00 PM (20 minutes)

Presenter: Dr CARNEY, Dan (LBNL)

Session Classification: QIS technologies session 1

Contribution ID: **10**

Type: **not specified**

Ultracold atoms as a resource for quantum information science

Tuesday, September 3, 2024 3:40 PM (20 minutes)

Presenter: Dr STAMPER-KURN, Dan (LBNL/UCB)

Session Classification: QIS technologies session 1

Contribution ID: 11

Type: **not specified**

Quantum gas microscope for bosonic atoms in triangular optical lattices

Tuesday, September 3, 2024 4:00 PM (20 minutes)

Presenter: Dr FUKUHARA, Takeshi (RQC, RIKEN)

Session Classification: QIS technologies session 1

Contribution ID: 12

Type: **not specified**

Compiling Resource-Efficient Programs with Numerical Instantiation

Tuesday, September 3, 2024 4:20 PM (20 minutes)

Presenter: Dr YOUNIS, Ed (LBNL)

Session Classification: QIS technologies session 1

Contribution ID: 13

Type: **not specified**

Simulation of quantum computer on HPC

Tuesday, September 3, 2024 4:40 PM (20 minutes)

Presenter: Dr ITO, Nobuyasu (R-CCS, RIKEN)

Session Classification: QIS technologies session 1

Contribution ID: 14

Type: **not specified**

Opening Remarks

Wednesday, September 4, 2024 9:00 AM (10 minutes)

Session Classification: QIS technologies session 2

Contribution ID: 15

Type: **not specified**

Designer Hamiltonians for Quantum Information Science

Wednesday, September 4, 2024 9:10 AM (20 minutes)

Presenter: Dr GRIFFIN, Sinead (LBNL)

Session Classification: QIS technologies session 2

Contribution ID: 16

Type: **not specified**

Transportable optical lattice clocks for relativistic geodesy

Wednesday, September 4, 2024 9:30 AM (20 minutes)

Presenter: Prof. USHIJIMA, Ichiro (UT/RIKEN)

Session Classification: QIS technologies session 2

Contribution ID: 17

Type: **not specified**

Quantum Communication: A physics experiment or a network paradigm shift?

Wednesday, September 4, 2024 9:50 AM (20 minutes)

Presenter: Dr MONGA, Inder (QuantNet, LBNL)

Session Classification: QIS technologies session 2

Contribution ID: **18**

Type: **not specified**

Monitoring-induced quantum information processing

Wednesday, September 4, 2024 10:10 AM (20 minutes)

Presenter: Dr GNEITING, Clemens (CPR, RIKEN)

Session Classification: QIS technologies session 2

Contribution ID: 19

Type: **not specified**

Optical Quantum Computer using two-dimensional continuous-variable cluster states

Wednesday, September 4, 2024 10:50 AM (20 minutes)

Presenter: Dr YONEZAWA, Hidehiro (RQC, RIKEN)

Session Classification: QIS technologies session 2

Contribution ID: 20

Type: **not specified**

Defect-engineered photonic and superconducting quantum circuits

Wednesday, September 4, 2024 11:10 AM (20 minutes)

Presenter: Prof. SIPAHIGIL, Alp (LBNL/UCB)

Session Classification: QIS technologies session 2

Contribution ID: 21

Type: **not specified**

Coupling floating electrons to resonators

Wednesday, September 4, 2024 11:30 AM (20 minutes)

Presenter: Dr KAWAKAMI, Erika (RQC, RIKEN)

Session Classification: QIS technologies session 2

Contribution ID: 22

Type: **not specified**

3D-Printed Micro Ion Trap Technology for Scalable Quantum Information Processing

Wednesday, September 4, 2024 11:50 AM (20 minutes)

Presenter: Dr HAEFNER, Harmut (LBNL/UCB)

Session Classification: QIS technologies session 2

Contribution ID: 23

Type: **not specified**

Tour of AQT

Wednesday, September 4, 2024 2:00 PM (1 hour)

Session Classification: Tour of quantum activities & Poster Session

Contribution ID: 24

Type: **not specified**

**Parallel breakout discussion sessions: 3104 -
quantum computing and networking; 4022 -
quantum sensing and materials**

Wednesday, September 4, 2024 3:30 PM (1h 30m)

3104 - quantum computing and networking

4022 - quantum sensing and materials

Session Classification: Parallel discussion sessions

Contribution ID: 25

Type: **not specified**

Opening Remarks

Thursday, September 5, 2024 9:00 AM (15 minutes)

Presenter: Dr DOSANJH, Sudip (NERSC, LBNL)

Session Classification: HPC + Quantum (NERSC) day: Morning session

Contribution ID: 26

Type: **not specified**

The future of quantum computing technologies at NERSC

Thursday, September 5, 2024 9:15 AM (40 minutes)

Presenter: Dr WRIGHT, Nick

Session Classification: HPC + Quantum (NERSC) day: Morning session

Contribution ID: 27

Type: **not specified**

Quantum HPC Hybrid Software Environment

Thursday, September 5, 2024 9:55 AM (40 minutes)

Presenter: Dr TSUJI, Miwako (R-CCS, RIKEN)

Session Classification: HPC + Quantum (NERSC) day: Morning session

Contribution ID: 28

Type: **not specified**

Hybrid Technologies with Superconducting Circuits

Thursday, September 5, 2024 10:50 AM (40 minutes)

Presenter: Dr NOGUCHI, Atsushi (RQC, RIKEN)

Session Classification: HPC + Quantum (NERSC) day: Morning session

Contribution ID: 29

Type: **not specified**

Control System Co-Design for Optimal Quantum Computing

Thursday, September 5, 2024 11:30 AM (20 minutes)

Primary author: Dr NOWROUZI, Kasra (AQT, LBNL)

Presenter: Dr NOWROUZI, Kasra (AQT, LBNL)

Session Classification: HPC + Quantum (NERSC) day: Morning session

Contribution ID: **30**

Type: **not specified**

NERSC Tour

Thursday, September 5, 2024 2:00 PM (1 hour)

Session Classification: NERSC Tour

Contribution ID: 31

Type: **not specified**

Parallel breakout discussion sessions: 3101 - quantum software; 4101 - challenges in HPC and QPU integration; 4102 - needs for hybrid + distributed computing

Thursday, September 5, 2024 3:30 PM (1h 30m)

3101 - quantum software

4101 - challenges in HPC and QPU integration

4102 - needs for hybrid + distributed computing

Session Classification: Parallel discussion sessions

Contribution ID: 32

Type: **not specified**

Early Fault-tolerant Quantum Computation

Friday, September 6, 2024 9:00 AM (20 minutes)

Presenter: Dr YOSHIOKA, Nobuyuki (UT/RIKEN)

Session Classification: Quantum Algorithms and Applications in Physics and Chemistry:
Morning session

Contribution ID: 33

Type: **not specified**

Ground state preparation via Lindbladians

Friday, September 6, 2024 9:20 AM (20 minutes)

Presenter: Prof. LIN, Lin (LBNL/UCB)

Session Classification: Quantum Algorithms and Applications in Physics and Chemistry:
Morning session

Contribution ID: 34

Type: **not specified**

Applications to quantum computation and tensor networks in lattice gauge theories

Friday, September 6, 2024 9:40 AM (20 minutes)

Presenter: Dr ITOU, Etsuko (YITP/RIKEN)

Session Classification: Quantum Algorithms and Applications in Physics and Chemistry:
Morning session

Contribution ID: 36

Type: **not specified**

Hamiltonian Aware Fermion-to-Qubit Mapping Optimization

Friday, September 6, 2024 10:40 AM (20 minutes)

Presenter: Dr RRAPAJ, Ermal (LBNL)

Session Classification: Quantum Algorithms and Applications in Physics and Chemistry:
Morning session

Contribution ID: 37

Type: **not specified**

Quantum many-body dynamics in digital quantum computers

Friday, September 6, 2024 11:00 AM (20 minutes)

Presenter: Dr YUNOKI, Seiji (RQC, RIKEN)

Session Classification: Quantum Algorithms and Applications in Physics and Chemistry:
Morning session

Contribution ID: 38

Type: **not specified**

Efficient Quantum Circuits for Block Encodings of Sparse Matrices

Friday, September 6, 2024 11:20 AM (20 minutes)

Presenter: Dr YANG, Chao (LBNL)

Session Classification: Quantum Algorithms and Applications in Physics and Chemistry:
Morning session

Contribution ID: 39

Type: **not specified**

Efficiency enhancement of k-RDM estimation based on fermionic shadow tomography

Friday, September 6, 2024 11:40 AM (20 minutes)

Presenter: Dr TAKEMORI, Nayuta (Osaka, RIKEN)

Session Classification: Quantum Algorithms and Applications in Physics and Chemistry:
Morning session

Contribution ID: 40

Type: **not specified**

Quantum simulation in high energy physics

Friday, September 6, 2024 1:40 PM (20 minutes)

Presenter: Dr MATSUURA, Shunji (iTHEMS, RIKEN)

Session Classification: Quantum Algorithms and Applications in Physics and Chemistry:
Afternoon session

Contribution ID: 41

Type: **not specified**

Quantum data analysis through efficient quantum data encoding methods

Friday, September 6, 2024 2:00 PM (20 minutes)

Presenter: Dr PERCIANO, Talita (LBNL)

Session Classification: Quantum Algorithms and Applications in Physics and Chemistry:
Afternoon session

Contribution ID: 42

Type: **not specified**

Towards Quantum Computation of Nuclear Many-body Problems

Friday, September 6, 2024 2:20 PM (20 minutes)

Presenter: Dr YOSHIDA, Sota (Utsunomiya/RIKEN)

Session Classification: Quantum Algorithms and Applications in Physics and Chemistry:
Afternoon session

Contribution ID: 43

Type: **not specified**

From qubits to qutrits: entanglement of astrophysical neutrinos

Friday, September 6, 2024 2:40 PM (20 minutes)

Presenter: Prof. BALANTEKIN, Baha (N3AS UC Berkeley, U. Wisconsin-Madison)

Session Classification: Quantum Algorithms and Applications in Physics and Chemistry:
Afternoon session

Contribution ID: 44

Type: **not specified**

**Parallel discussions along different application areas:
4101 - algorithms for physical sciences; 4102 -
algorithms for mathematics + machine learning
applications**

Friday, September 6, 2024 3:30 PM (1 hour)

Session Classification: Quantum Algorithms and Applications in Physics and Chemistry:
Afternoon session

Contribution ID: 45

Type: **not specified**

Summary and Conclusion

Session Classification: Quantum Algorithms and Applications in Physics and Chemistry:
Morning session

Contribution ID: 46

Type: **not specified**

Poster Session

Wednesday, September 4, 2024 2:00 PM (1 hour)

Poster Titles:

Emori: Disturbance Evaluation Circuit for Quantum Measurements and Its Experimental Demonstration on a Quantum Computer

Taniguchi: Optimal anharmonicity suppression in Paul traps for laser-free single-spin measurements

Shirai: TBD

Ozawa: TBD

Presenters: Mr EMORI, Hakuri (Hokkaido U. / RIKEN); Mr TANIGUSHI, Kento (Tokyo U./ RIKEN); Mr OZAWA, Masanao (Chubu U. / RIKEN); Dr SHIRAI, Shotaro (RIKEN)

Session Classification: Tour of quantum activities & Poster Session

Contribution ID: 47

Type: **not specified**

Exploring (Non) Clifford Measurement Reduction Techniques for Computing Expectation Value

Friday, September 6, 2024 10:00 AM (20 minutes)

Presenter: Dr CAMPS, Daan (NERSC, Lawrence Berkeley National Laboratory)

Session Classification: Quantum Algorithms and Applications in Physics and Chemistry:
Morning session

Contribution ID: 48

Type: **not specified**

NERSC partnership with Quera

Thursday, September 5, 2024 11:50 AM (20 minutes)

Presenter: Dr KLYMKO, Katie (NERSC, Lawrence Berkeley National Laboratory)

Session Classification: HPC + Quantum (NERSC) day: Morning session