



CONFERENCE ON RECENT ADVANCES IN QUANTUM COMPUTING AND TECHNOLOGY

PROGRAM 2024

JUNE 19-20 | 2024

VENUE: BOSCH BUDAPEST INNOVATION CAMPUS
HUNGARY, 1103 BUDAPEST, ROBERT BOSCH STREET 14.

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June 19, Wednesday

8:00 – 8:45	Registration	1103, Budapest, Robert Bosch street 14.
9:00 – 9:20	Opening	Auditorium, Bp201, 1st floor
9:20 – 10:30	Plenary session 1 Session Chair: Ákos Csilling	Auditorium
9:20 – 10:00	Frank Wilhelm-Mauch Forschungszentrum Jülich Shortcuts to quantum advantage and their relationship to the superconducting platform	PLS1.1
10:00 – 10:30	Ádám Gali HUN-REN Wigner Research Centre for Physics Materials challenges in quantum sensing with diamond nitrogen-vacancy center	PLS1.2
10:30 – 11:00	Coffee Break	Aula
11:00 – 12:20	Plenary Session 2 Session Chair: Florentin Reiter	Auditorium
11:00 – 11:20	Jorge Echavarria Leibniz Supercomputing Centre Munich Quantum Software Stack: Seamlessly Integrating Quantum Computing into HPC	PLS2.1
11:20 – 11:40	Eelis Takala IQM Quantum Computers Ltd. Recent developments in open-source design tools and QPUs	PLS2.2
11:40 – 12:00	Julian Schuhmacher IBM Quantum Hybrid Tree Tensor Networks for Quantum Simulation	PLS2.3
12:00 – 12:20	Nick Blunt Riverlane, Cambridge Statistical phase estimation and error mitigation on a superconducting quantum processor	PLS2.4
12:20 – 13:20	Lunch Break	Aula
13:20 – 14:20	Poster Session 1	Aula
Szabolcs Jóczik	A Cost-Efficient Approach Towards Computational Fluid Dynamics Simulations on Quantum Devices	POS1.1
Oliver Sagi	A gate tunable transmon qubit in planar Ge	POS1.2
Henrik Zoltán Varga	Adaptive circuit compression in photonic gate synthesis	POS1.3
Abdulbasit Sabaawi, Mohammed Almasaoodi and Sándor Imre	Advancing Quantum Communications: Q-OFDM with Quantum Fourier Transforms for Enhanced Signal Integrity	POS1.4
Ruben Ibarrondo	Characterizing convergence speed of dissipative ground state preparation algorithms	POS1.5
Ákos Budai	Cost-efficient readout error mitigation	POS1.6
Judith de Vries	Fabrication of Solid Immersion Lenses for the cryogenic Investigation of the NV center	POS1.7
Ágoston Kaposi	Generalized group designs: overcoming the 4-design-barrier and constructing novel unitary 2-designs in arbitrary dimensions	POS1.8
Gergő Pintér	Geometrical view on stabilizer codes in quantum error correction	POS1.9
Daniel Nagy	Hybrid Quantum-Classical Reinforcement Learning in Latent Observation Spaces	POS1.10
Bálint Domokos	Investigation of lattice-surgery based protocols between surface code patches	POS1.11

Tamás Kalmár	Investigation of WSi-based superconducting resonators and fluxonium qubits	POS1.12
Patrik Penc	Loss-induced quantum information jet in an infinite temperature Hubbard chain	POS1.13
Róbert Németh	Readout of semiconductor quantum bits with a quantum point contact	POS1.14
Zoltán Scherübl	Measuring the current-phase relation in InAs 2DEG Josephson junction using epitaxial Al resonators	POS1.15
Gergely Kobán	Modelling the Effects of Space Weather on Satellite Quantum Communications	POS1.16
Áron Rozgonyi	N-qubit GHZ state distillation via alternating local operations	POS1.17
Tamás Kriváchy	Neural network-assisted exploration of quantum correlations on networks	POS1.18
Rupayan Bhattacharjee	Nonlinear dynamics of bipartite states by an iterated measurement-based quantum protocol	POS1.19
Aritra Sen	Operational sweet spots for semiconductor spin qubits: magic magnetic-field directions for double quantum dots	POS1.20
Aron Marton	Optimal number of stabilizer measurement rounds in an idling surface code patch	POS1.21
Jozsef Zsolt Bernad	Optimal photon absorption into inhomogeneous spin memories	POS1.22
Karolina Schüle	Optimizing nitrogen-vacancy center formation during CVD diamond growth for quantum technologies	POS1.23
Daniel Varjas	Pymablock: an algorithm and a package for quasi-degenerate perturbation theory	POS1.24
Attila Portik	Robustness of chaotic behavior in iterated quantum protocols	POS1.25
Hamid Tebyanian	Semi-self-testing Quantum Random Number Generator with CMOS Sensors	POS1.26
Baksa Kolok	Shuttling-based holonomic quantum gates for semiconductor spin qubits	POS1.27
Dominik Szombathy	Spectral Properties of Random Clifford Circuits	POS1.28
Ferenc Simon	Spectroscopy and terahertz maser effect in diamond with ultra-dense NV concentration	POS1.29
Francesco Preti	Statistical evaluation and optimization of entanglement purification protocols	POS1.30
Martin Berke	Switching dynamics in Al/InAs nanowire-based gate-controlled superconducting transistor	POS1.31
Robin Kucsera	Theory and experiment of unconventional magnetic resonance experiments in diamond NV centers	POS1.32
Sára Szatmáry	User experiences in quantum programming environments	POS1.33
Péter Naszvadi	Implementing no-signaling correlations as a service	POS1.34
14:20 – 15:30	Plenary Session 3 Session Chair: Jan Krzywda	Auditorium
14:20 – 14:50	Anton Frisk Kockum Chalmers University of Technology Architecture considerations for superconducting quantum processors	PS3.2
14:50 – 15:30	Thomas Strohm Robert Bosch GmbH Materials science with quantum computers: use cases and technical work	PS3.1
15:30 – 16:00	Coffee Break	Aula
16:00 – 17:20	Parallel session 1A: Quantum Sensing Session Chair: Ádám Gali	Cello
16:00 – 16:20	Gergo Thiering – Ab-initio theory of nuclear spin flip processes within NV center of diamond via orbital degrees of freedom	PAS1.1
16:20 – 16:40	Robert Trenyi – Activation of metrologically useful genuine multipartite entanglement	PAS1.2
16:40 – 17:00	Domonkos Svastits –	PAS1.3

	Theory of charge-sensing-based noisy qubit readout of semiconductor qubits		
17:00 – 17:20	Peter Boross – Symphony: a python package to simulate point-defect spin dynamics		PAS1.4
16:00 – 17:20	Parallel 1B: Quantum HW: Semiconductors Session Chair: Gábor Széchenyi	Operetta	
16:00 – 16:20	Jaime Saez-Mollejo – Exchange-driven two-hole spin qubit in Germanium		PAS2.1
16:20 – 16:40	Zoltán György – Bichromatic Rabi control of semiconductor qubits		PAS2.2
16:40 – 17:00	Marián Janík – In situ Resistance Control of Granular Aluminium Superinductors for Hybrid Circuit Quantum Electrodynamics		PAS2.3
17:00 – 17:20	Fabrizio Berritta – Real-time two-axis control of spin qubits		PAS2.4
16:00 – 17:20	Parallel 1C: Quantum HW: Superconductors Session Chair: Dávid Pataki	Auditorium	
16:00 – 16:20	Alex Kreuzer – Superconducting flux qubits with stacked Josephson junctions		PAS3.1
16:20 – 16:40	Pablo Garcia Azorin – Resilient multi-mode superconducting qubit designed with evolutionary algorithms		PAS3.2
16:40 – 17:00	Andras Di Giovanni – Readout error mitigation on a superconducting qubit		PAS3.3
17:00 – 17:20	Peter Makk – Measuring the current-phase relation in Josephson junction using superconducting resonators		PAS3.4
16:00 – 17:20	Parallel 1D: Quantum Algorithms & Informatics 1 Session Chair: Angelo Valli	Trumpet	
16:00 – 16:20	Alexandra Ramôa – Bayesian amplitude estimation		PAS4.1
16:20 – 16:40	Pablo Rodríguez – Quantum approximated cloning-assisted density matrix exponentiation		PAS4.2
16:40 – 17:00	Maxime Remaud – Optimizing T and CNOT Gates in Quantum Ripple-Carry Adders and Comparators		PAS4.3
17:00 – 17:20	Mikel Garcia de Andoin – Extensions of Digital-Analog Quantum Computation		PAS4.4
16:00 – 17:20	Parallel 1E: Quantum SW Engineering 1 Session Chair: György Gehér	Cornets	
16:00 – 16:20	Michal Baczyk, Ricardo Pérez-Castillo and Mario Piattini – Patterns for Quantum Software Engineering		PAS5.1
16:20 – 16:40	Valentina Gualtieri – QDsim: A user-friendly toolbox for simulating large-scale quantum dot devices		PAS5.2
16:40 – 17:00	Zoltán Kolarovszki – Piquasso: A Photonic Quantum Computer Simulation Software Platform		PAS5.3
17:00 – 17:20	Rubén Peña Guzmán – Benchmarking Quantum Computers: Towards a Standard Performance Evaluation Approach		PAS5.4

19:00 -	Conference dinner	Hemingway restaurant 1113, Budapest, Kosztolányi Dezső tér 2.
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June 20, Thursday

8:00 – 9:45	Tutorial session Session Chair: János Asbóth	Auditorium
8:00 – 9:45	James Wootton IBM Quantum Introduction to Quantum Error Correction	WT1.1
9:45 – 10:00	Break	Aula
10:00 – 11:10	Plenary Session 4 Session Chair: Eszter Udvary	Auditorium
10:00 – 10:40	Natalia Ares University of Oxford Fully autonomous control and characterisation of quantum devices	PS4.1
10:40 – 11:10	Szabolcs Csonka Budapest University of Technology and Economics Realization of basic types of Andreev-molecules	PS4.2
11:10 – 11:30	Coffee Break	Aula
11:30 – 13:00	Plenary Session 5 Session Chair: Natalia Ares	Auditorium
11:30 – 12:00	James Wootton IBM Quantum Proof-of-principle experiments for quantum error correction	PS5.1
12:00 – 12:30	Matteo Rossi Algorithmiq Ltd Informationally Complete Measurements and Tensor-Network Methods for Near-Term Quantum Computing	PS5.2
12:30 – 13:00	Bálint Koczor University of Oxford Theory to Enable Practical Quantum Advantage	PS5.3
13:00 – 14:00	Lunch break	Aula
14:00 – 14:40	Plenary Session 6 Session Chair: Zoltán Zimborás	Auditorium
14:00 – 14:20	Sascha Heußen Institute for Quantum Information Measurement-free fault-tolerant quantum error correction in near-term devices	PS6.1
14:20 – 14:40	Anurag Saha Roy Qruise GmbH Improving flux-based gates in superconducting QPUs through model learning of qubit and control stack parameters	PS6.2
14:40 – 14:45	Closing address	
14:45 – 14:50	Break	Aula
14:50 – 15:50	Parallel 2A: Quantum Error Correction	Auditorium

	Session Chair: James Wootton		
14:50 – 15:10	David Pataki – Coherent errors in stabilizer codes caused by quasistatic phase damping		PAS6.1
15:10 – 15:30	Gyorgy Pal Geher – Leakage mobility in superconducting qubits as a leakage reduction unit		PAS6.2
15:30 – 15:50	Anette Messinger – Fault-tolerant quantum computing with the parity code and noise-biased qubits		PAS6.3
14:50 – 15:50	Parallel 2B: Quantum Machine Learning Session Chair: Miklós Kozlovsky		Operetta
14:50 – 15:10	Alona Sakhnenko – Building Continuous Quantum-Classical Bayesian Neural Networks for a Classical Clinical Dataset		PAS7.1
15:10 – 15:30	Vlastimil Hudeček – Comparison of gradient and derivative-free learning methods for quantum circuit Born machine		PAS7.2
15:30 – 15:50	Bence Bakó – Problem-informed Graphical Quantum Generative Learning		PAS7.3
14:50 – 15:50	Parallel 2C: Optimization Session Chair: Orsolya Kálmán		Cello
14:50 – 15:10	Csaba Czabán, Zoltán Kolarovszki, Márton Karácsony and Zoltán Zimborás – Suppressing photon detection errors in nondeterministic state preparation		PAS8.1
15:10 – 15:30	Jan Adrian Krzywda – Reinforcement Learning in Bayesian Hamiltonian Tracking for Noise-Driven Coherent Rotation of a Spin Qubit		PAS8.2
15:30 – 15:50	Hamid Tebyanian – Homodyne versus Heterodyne for Quantum Measurement		PAS8.3
14:50 – 15:50	Parallel 2D: Quantum Algorithms & Informatics 2 Session Chair: Bálint Koczor		Trumpet
14:50 – 15:10	Roberto Gargiulo, Matteo Rizzi and Robert Zeier – Computing Classical Partition Functions: From Onsager and Kaufman to Quantum Algorithms		PAS9.1
15:10 – 15:30	Angelo Valli – Cumulant evolution and full counting statistics in infinite temperature quantum spin chains		PAS9.2
15:30 – 15:50	Javier González Conde – An overview on quantum algorithms for amplitude encoding of classical data into quantum computers		PAS9.3
14:50 – 15:50	Parallel 2E: Quantum SW engineering 2 Session Chair: Tamás Máray		Cornets
14:50 – 15:10	Karthikeyan Sabari Ganesan and Vishal Saraswat – Quantum-Resilient Security Controls		PAS10.1
15:10 – 15:30	Asimakis Kydros, Konstantinos Prousalis and Nikos Konofaos – QuaCiDe: A General Purpose Quantum Circuit Design and Simulation Interface		PAS10.2
15:30 – 15:50	Zeki Can Seskir – Recent Advances in Responsible Quantum Computing and Technologies		PAS10.3
15:50 – 16:10	Coffee Break		Aula
16:10 – 17:30	Special Poster Session: Quantum Information National Laboratory Hungary		Aula
Péter Vrana		Asymptotic transformations of multipartite entangled states	POS2.1
Milan Mosonyi		Multi-variate Rényi divergences and their applications	POS2.2

András Mihály	Developing fast routing algorithms for entanglement-based satellite networks	POS2.3
Boglárka Tóth	THz spin-wave excitations in the transverse conical phase of BiFeO ₃	POS2.4
Ferenc Simon	Spectroscopy and terahertz maser effect in diamond with ultra-dense NV concentration	POS2.5
Adrian Solymos	Extendibility of Brauer states	POS2.6
Robin Kucsera	Theory and experiment of unconventional magnetic resonance experiments in diamond NV centers	POS2.7
Sándor Kollarics	Controlled arrays of NV centers in diamond by proton implantation	POS2.8
Zoltán Scherübl	Measuring the current-phase relation in InAs 2DEG Josephson junction using epitaxial Al resonators	POS2.9
Tamás Kalmár	Investigation of WSi-based superconducting resonators and fluxonium qubits	POS2.10
Kitti Oláh	Quantum memories for satellite-based systems	POS2.11
Dominik Szombathy	Spectral Properties of Random Clifford Circuits	POS2.12
Levente Rózsa	Magnon squeezing in spin spirals	POS2.13
Andor Kormányos	Crossed Andreev reflection dominated transport through Andreev bound states	POS2.14
Gabor Vattay	Cluster Mean-field Annealing Solution at the Airbus-BMW Quantum Computing Challenge	POS2.15
Martin Berke	Switching dynamics in Al/InAs nanowire-based gate-controlled superconducting transistor	POS2.16
Bálint Domokos	Investigation of lattice-surgery based protocols between surface code patches	POS2.17
Áron Márton	Optimal number of stabilizer measurement rounds in an idling surface code patch	POS2.18
Dávid Pataki	Coherent errors in stabilizer codes caused by quasistatic phase damping	POS2.19
Ákos Budai	Cost-efficient readout error mitigation	POS2.20
Aritra Sen	Operational sweet spots for semiconductor spin qubits: magic magnetic-field directions for double quantum dots	POS2.21
Baksa Kolok	Shuttling-based holonomic quantum gates for semiconductor spin qubits	POS2.22
György Frank	Catastrophes in Weyl Josephson circuits	POS2.23
Gergő Pintér	Geometrical view on stabilizer codes in quantum error correction	POS2.24
Angelo Valli	Kardar-Parisi-Zhang scaling in the Hubbard model	POS2.25
Nima Ghafari Cherati	Investigation of sulfur doping in diamond by means of ab initio calculations	POS2.26
András Tárkányi	Decoherence of the VB(-) center in hexagonal boron nitride	POS2.27
Bendegúz Nyári	Shiba bands and Majorana Zero Modes in magnetic chains on superconductors	POS2.28
Roland Weismüller	Investigation and development of a polarisation protocol for interacting nuclei spins	POS2.29
Nikoletta Jegenyés	Two-photon excitation of diamond nanoparticles	POS2.30
Domonkos Svastits	Theory of charge-sensing-based noisy qubit readout of semiconductor qubits	POS2.31
Zsolt Kis	Developing Rare Earth Doped Nanocrystals for Single Photon Emission	POS2.32
Zoltán Udvarnoki	Time series from quantum spin chains	POS2.33
Szilárd Szalay	Multipartite entanglement and correlation and the chemical bond	POS2.34
Örs Legeza	Towards exascale tensor network methods	POS2.35
Gergely Barcza	Symmetric carbon tetramers forming spin qubits in hexagonal boron nitride	POS2.36
Sarah Morais Bezerra	Synthesis of SiC nanocrystals with different colour centres	POS2.37
Bence Gábor	Ground-state bistability of cold atoms in a cavity	POS2.38
Daniel Varga	Microwave-to-Optical conversion by cold atoms	POS2.39

Árpád Curko	How is photon-blockade breakdown different from optical bistability? A neoclassical story	POS2.40
Anett Simon-Zsók	Feasibility of quantum reservoir computing on natural atom quantum annealers	POS2.41
András Horváth	Horváth András Máté Geometry-dependent fluctuations in memristive devices: a comparative noise analysis of area-dependent and filamentary resistive switching systems	POS2.42
János Volk	Time series prediction by dynamical operation of non-volatile memristors	POS2.43
Peter Makk	Talk: Measuring the current-phase relation in Josephson junction using superconducting resonators	POS2.44
Tímea Nóra Török	Quantum Transport Properties of Nanosized Ta2O5 Resistive Switches: Variable Transmission Atomic Synapses for Neuromorphic Electronics	POS2.45
Daniel Varjas	Pymablock: an algorithm and a package for quasi-degenerate perturbation theory	POS2.46
Peter Rakyta	SQUANDER: a classical technique to train quantum circuits	POS2.47
Mátyás Koniorczyk	Implementing no-signaling correlations as a service	POS2.48
Péter Ádám	Decreasing multiphoton noise in multiplexed single-photon sources	POS2.49
Gergely Czehlár	Optically detected magnetic resonance studies of nitrogen-vacancy centers in diamond	POS2.50
Vladimir Verkhovlyuk	Strong dependence of Ramsey fringes decay on the low magnetic field for a shallow single NV- center in diamond	POS2.51
Gergo Roosz	Two point entanglement in the Hubbard model	POS2.52
Róbert Juhász	Kibble-Zurek process in disordered Ising models	POS2.53
Eszter Udvary	The Challenge of Background Noise in Free Space Quantum Communication Systems	POS2.54
Guodong Bian	Theoretical investigation of spin-photon interface for divacancy and nitrogen-vacancy in 4H-silicon carbide	POS2.55
Ottó Hanyecz	Constant time implementation of SQIsign	POS2.56