AQC 2024 Conference Booklet

Monday 10th – Friday 14th June 2024

Technology and Innovation Centre (TIC Building)
University of Strathclyde, Glasgow
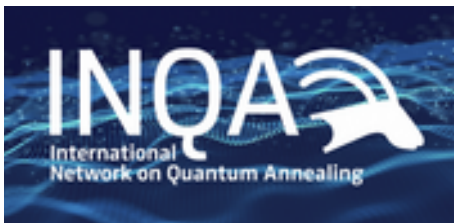
Sponsors:

IOP Institute of Physics

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National Quantum Computing Centre

GLASGOW CONVENTION BUREAU

Quantum Computing & Simulation Hub

INQA International Network on Quantum Annealing

Quantum Enhanced Verified Exascale Computing

We are grateful to our sponsors for their support of this edition of AQC!

Programme outline:

Invited talks: 40 minutes with 10 minutes for questions.
Contributed talks: 20 minutes with 5 minutes for questions.
Note that the talks are not all in numerical order, due to last minute adjustments to the schedule.

MONDAY 10th	TUESDAY 11th	WEDNESDAY 12th	THURSDAY 13th	FRIDAY 14th
9:00 - 9:30 Registration and Coffee available	9:00 - 9:30 Coffee available	9:00 - 9:30 Coffee available	9:00 - 9:30 Coffee available	9:00 - 9:30 Coffee available
Session I	**Session V**	**Session IX**	**Session XI**	**Session XV**
9:30 - 10:20 Invited talk 3	9:30 - 10:20 Invited talk 2	9:30 - 10:20 Invited talk 4	9:30 - 10:20 Invited talk 5	9:30 - 10:20 Invited talk 6 (remote)
10:20 - 10:45 Contributed talk 11	10:20 - 10:45 Contributed talk 1	10:20 - 10:45 Contributed talk 19	10:20 - 10:45 Contributed talk 23	10:20 - 10:45 Contributed talk 32
10:45 - 11:15 Coffee break	10:45 - 11:15 Coffee break	10:45 - 11:15 Coffee break	10:45 - 11:15 Coffee break	10:45 - 11:15 Coffee break
Session II	**Session VI**	**Session X**	**Session XII**	**Session XVI**
11:15 - 12:30 Contributed talks 2, 3, 4	11:15 – 12:30 (talk 12 cancelled) Contributed talks 13 and 14	11:15 - 12:30 Contributed talks 20, 21, 22	11:15 - 12:30 Contributed talks 24, 25, 26	11:15 - 12:30 Contributed talks 33, 34, 35
12:30 - 13:30 Lunch	12:30 - 13:30 Lunch	12:30 - 13:30 Lunch	12:30 - 13:30 Lunch	12:30 - 13:30 Lunch
Session III	**Session VII**	**Free afternoon** Lab tours	**Session XIII**	**Session XVII**
13:30 - 14:45 Contributed talks 5, 6, 7	13:30 - 14:20 Contributed talks 15, 16		13:30 - 14:45 Contributed talks 27, 28, 29	13:30 - 14:45 Contributed talks 36, 37, 38
	14:20 - 15:10 Contributed talks 17, 18			
14:45 - 15:30 Coffee break	15:10 - 15:40 Coffee break		14:45 - 15:30 Coffee break	14:45 - 15:30 Coffee break
Session IV	**Session VIII**		**Session XIV**	**Session XVIII**
15:30 - 16:45 Contributed talks 8, 9, 10	15:40 – 16:30 Invited talk 1 (remote)		15:30 - 16:20 Contributed talks 30, 31	15:30 - 16:30 Panel session
	16:30 - 18:00 Poster session I		16:20 - 18:00 Poster session II	
		17:45 – 18:00 *Coaches depart outside TIC Building*		conference close
18:00 – 19:30 Civic Reception at Glasgow City Chambers		19:00 – 22:15 Conference dinner Burrell Collection Pollock Country Park		

List of Talks
A separate booklet of abstracts is also available to download.

Invited Talks

1. Daniel Lidar (USC,USA) *"Scaling Advantage in Approximate Optimization with Quantum Annealing"*

2. Alexander Whitecar (D-wave Systems inc) *"Coherence advancements for next-generation quantum technologies"*

3. Natalie Pearson (PASQAL, France) *"Rydberg Blockade Revisited"*

4. Pol Forn-Díaz (IFAE, spain) *"AVaQus project progress"*

5. Sarah Muschinske (MIT, USA) *"Quantum Simulation on a 3x3 Superconducting Qudit Lattice"*

6. Naoki Takeuchi (AIST, Japan) *"Adiabatic Superconductor Logic: Recent Progress Toward Qubit Controllers"*

Contributed Talks

1. **Jack Raymond** : "Quantum error mitigation in quantum annealing "
2. **Sebastian Leontica** : "Entanglement growth from squeezing on the MPS manifold "
3. **Roopayan Ghosh** : "n-local catalysts to speed up quantum annealing "
4. **Anna Maria Dziubyna** : "Approximate tensor network contractions for large unit-cells quantum annealers "
5. **Christopher Baldwin** : "Classical outperforms quantum reverse annealing in ferromagnetic mean-field models "
6. **Luca Armando Nutricati** : "Using multiple XX-catalysts in quantum annealing to efficiently solve MWIS problems "
7. **Sudeera Hasaranga Gunathilaka Mastiyage Don** : "Coherent Compressed Sensor for L0- Regularised Compressed Sensing "
8. **Natasha Feinstein** : "Escaping local optima in quantum annealing with XX-couplings "
9. **Dyon van Vreumingen** : "Gate-based counterdiabatic driving with complexity guarantees "
10. **Joseph Cunningham** : "Eigenpath traversal by Poisson-distributed phase randomisation "
11. **Andrew King**: "Computational supremacy in quantum simulation "
12. ~~**Ryoji Miyazaki** : "Three- and four-body switchable coupler for superconducting qubits to implement the parity encoding scheme "~~

13. **Takashi Imoto** : "Universal quantum computation using quantum annealing with the transverse-field Ising Hamiltonian "
14. **Arthur Braida** : "Tight Lieb-Robinson Bound for approximation ratio in Quantum Annealing "
15. **David López-núñez** : "Coherent Flux Qubits for Quantum Annealing "
16. **Ana Palacios** : "A scalable 2-local architecture for quantum annealing of all-to-all Ising models "
17. **Matthias Werner** : "Quantum simulation of 1D-fermionic systems with Ising Hamiltonians "
18. **Seiya Miyamoto** : "Efficient sampling in a glassy phase using a machine-learning-assisted Markov Chain Monte Carlo Method "
19. **Joseph Vovorsh** : "Amorphous quantum magnets in a two- dimensional Rydberg atom array "
20. **Jonathan Pritchard** : "Demonstration of weighted graph optimisation on a Rydberg atom array using local light-shifts "
21. **Tomohiro Yamaji** : "Parametric dependence of effective local fields of Kerr parametric oscillators "
22. **Kunal Prakash Vyas** : "Investigating scaling properties for quantum annealing to solve the Fermi-Hubbard model using the kinetic energy part as the driving Hamiltonian "
23. **Robert Banks** : "Motivating continuous-time quantum optimisation without recourse to the adiabatic theorem "
24. **Nick Chancellor** : "A thermodynamic approach to optimization in complex quantum systems "
25. **Gregor Humar** : "Implementing a cooling protocol on a programmable quantum annealer "
26. **Shuta Kikuchi** : "Evaluation and analysis of hybrid method using quantum annealing machine and non-quantum type Ising machine "
27. **Asa Hopkins** : "Finding Spin Glass Ground States Using Multi- stage Quantum Walks "
28. **Lasse Gerblich** : "Advantage of multi-stage quantum walks over QAOA as approximations of quantum annealing "
29. **Yusuke Sugita** : "Parameter-range setting of annealing optimization based on local optimal solutions "
30. **Takuya Okuyama** : "Relaxed Momentum Annealing Theory and Applications "
31. **Tatsuhiko Shirai** : "Compressed space engineering for constrained combinatorial optimization "
32. **Mayumi Nakano** : "Building a Model Learning Method by Reducing the Number of Training Data for Factorization Machine with Annealing "
33. **Mārtiņš Kālis** : "A hybrid quantum-classical approach for inference on restricted Boltzmann machines "
34. **Renichiro Haba** : "Diverse solutions via quantum annealing leads to the discovery of diverse material compositions "

35. **Dario De Santis** : "Optimized QUBO formulation methods for quantum computing "
36. **Omer Rathore** : "Load balancing for high performance computing using quantum annealing "
37. **Puya Mirkarimi** : "Quantum optimization with linear Ising penalties for customer data science "
38. **Narendra Hegade** : "Digitized Counterdiabatic Quantum Computing "

List of Posters

Please place your poster on the board corresponding to your allocated number. Odd numbers present on Tuesday afternoon, poster session 1. Even numbers present on Thursday afternoon, poster session 2. All posters can be on display in the coffee/lunch area all week.

1. ***Naoki Yamane*** *A Cluster-First Route-Second Framework Using Quantum Annealing for Multi-Vehicle Bike Sharing System Routing Problem*
2. ***Akane Amino*** *A Hybrid Method of Ising Machine and Simulated Annealing for Constrained Combinatorial Optimization Problems*
3. ***Tim Bode*** *Adiabatic Bottlenecks in Quantum Annealing and Nonequilibrium Dynamics of Paramagnons*
4. ***Ryuki Ito*** *Analysis of phase transition points in a permutation model on hierarchical lattice by real-space renormalization*
5. ***Yifei Chen*** *Annealing with a Single Gap-Tunable Flux Qubit*
6. ***Hiroshi Kanai*** *Annealing-Assisted Column Generation Method for the Combinatorial Optimization Problems with Inequality Constraints*
7. ***Tokiya Fukuda*** *Application of Ising machines with multiple-model learning for multi- objective black-box discrete optimization problems*
8. ***Sudeera Mastiyage Don, Hasaranga Gunathilaka*** *Coherent Ising Machines with Artificial Zeeman terms*
9. ***Yasushi Hasegawa*** *Comparison between reverse annealing and simulation*
10. ***Hamid Tebyanian*** *Deep-learning-based Randomness assessment of Quantum Random Number Generators*
11. ***Sota Hirama*** *Development of Exact Solution Method forBinary Quadratic Programming Problems Using Quantum Annealing and Dantzig-Wolfe Decomposition*
12. ***Tomohiro Hattori*** *Diagonal catalyst in finite-time quantum annealing*
13. ***Keita Takahashi*** *Effectiveness of Quench on the Feasible Solution Acquisition in Quantum Annealing*
14. ***Takuya Hatomura*** *Energy costs of fast-forward scaling*
15. ***Kento Kodama*** *Ensemble learning using quantum annealing: a comparative study of QBoost and black-box optimization*
16. ***Mikiya Doi,*** *Exploration of new chemical materials using black-box optimization with the D-wave quantum annealer*
17. ***Yuya Seki*** *Factorization machine with annealing with data sampling from multiple distributions*
18. ***Keisuke Morita*** *Fast algorithm for Bayesian optimization of highdimensional combinatorial problems*

19. **Kiyotaka Murashima** *Fast Simulated Annealing inspired by Quantum Monte Carlo*
20. **Makoto Otsuka** *Human health examination scheduling: flexible formulation and its optimization based on quantum annealing*
21. **Luca Brodoloni** *Neural Monte Carlo simulations of quantum spin glasses*
22. **Kazue Kudo** *Observation of localization based on quantum dynamics*
23. **Roya Radgohar** *Optimal noisy quantum transport on complex networks*
24. **Taisei Takabayashi** *Optimization of connection patterns to base stations with Quantum Annealing*
25. **Yuko Kamishima** *Partitioning Problems with Two Way-OH by Clustering QUBO Variables*
26. **Masoud Gharahi** *Persistent Tensors and Multiqudit Entanglement Transformation*
27. **Kanta Hino** *Physical Properties of Error Reduction Algorithms for Ising machines*
28. **Alexandre Zagoskin**   *Quantum analogues of dissipative circuit elements*
29. **Nick Chancellor** *Quantum Annealing for Aircraft Logistics*
30. **Sanchari Deb** *Quantum Computing in Power and Energy System Applications*
31. **Ir. Benoît Dubus,** *Random compilers for Hamiltonian simulation via Markov chains*
32. **Makoto Otsuka** *Removal of mislabeled training instances using black-box optimization and quantum annealing*
33. **Ryo Sakai** *Similarity and transferability in linearized QAOA parameters*
34. **Pim van den Heuvel** *Solving constrained combinatorial optimization problems on quantum devices with linear penalty terms*
35. **Toru Fujii** *Solving Scheduling Problems Using Finite Temperature Quantum Annealing*
36. **Alexandre Guillaume** *Stochastic parameterization of an atmospheric model assisted by quantum annealing*
37. **Tetsuro Abe** *Temperature-quantum hybrid annealing based on quantum-classical correspondence theory*
38. **Emanuele Costa** *Time Dependent Density Functional Theory in Ising Models via Deep Learning Functionals*
39. **Jan Střeleček** *Approximating the state manifold geometry*
40. **Craig McNeile** *Investigating solving QUBO problems on a circuit based quantum computer*
41. **Steph Foulds** *Generalising concentratable entanglement for practical applications: mixed, qudit, and optical states*
42. **Sridevi Kuriyattil** *Onset of scrambling as a dynamical transition in tunable-range quantum circuits*
43. **Andras Grabaritis**   *Annealing Dynamics of Regular Rotor Networks: Universality and Its Breakdown*
44. **Pablo Poggi**   *Universally Robust Quantum Control*
45. **Gerard Pelegri**   *Optimisation of weighted graph preparation in neutral atom arrays*
46. **Vrinda Mehta**   *Quantum annealing: Sampling efficiency for 2-SAT problems with multiple solutions*

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Civic Reception Information

The civic reception will be hosted at Glasgow City Chambers on Monday 10th of June at 6 pm following on from the conference opening day.

The city chambers is a 6 minute walk from the conference location. Please enter through the main entrance which is located at George Square.

Conference Dinner Information

The conference dinner will be at the Burrell collection, located at the heart of Pollock Country Park in the south side of Glasgow, on Wednesday 12th of June, from 7pm until 10:15pm. You will be able to look around parts of this remarkable collection of art and artifacts in the hour before the meal is served.
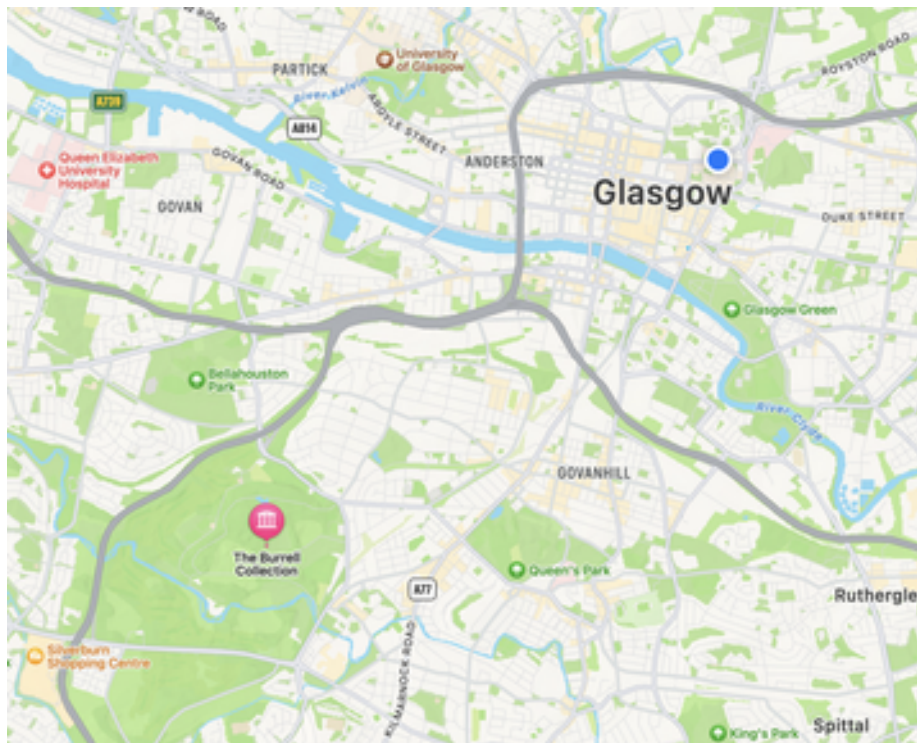
The Burrell collection can be readily accessed via public transport from the city centre. We are providing coach transport for all delegates, departing at 6pm from the TIC building. If you prefer to make your own way there, instructions for public transport are available from the registration desk.

If you arrive earlier at Pollock Country Park, the nearest bars are

Eala Bhán   **The Old Stag Inn**
Address : 1534 Pollokshaws Road   Address: 12 Greenview St

about a 20 minute walk from the Burrell Collection Building.

Useful Information

Please find below a collection of information to make your visit to Glasgow as convenient and smooth as possible. For further advice, please ask at the registration desk, or email the conference email: `aqc2024-info@phys.strath.ac.uk`

Taxi services

There are a number of available taxi services which can be used to travel around Glasgow and for transport to airports.

Glasgow Taxis
Telephone : 0141 429 7070

GlasGo Cabs (private hire)
Telephone : 0141 332 5050 / 0141 774 3000

Saltire Private Hire
Telephone : 0141 319 5344

Services such as Uber are also available.

Delegate offers

Glasgow city council offers a series of discounts available to attendees of the conference. To redeem these discounts, simply show your conference badge. Note that discounts are subject to availability and opening hours.

Link to available discounts can be found by scanning the QR code above.

Local Restaurants

There are many good places to eat in Glasgow, the following are near the conference venue and tried and tested by the organisers.

Italian Kitchen
Italian food located close to the conference venue
Address : 64 Ingram St

Paesano Pizza
Neapolitan style pizza, with a fast service
Address : 94 Miller St

Sugo Pasta
Selection of pasta dishes, located close to Glasgow Central Station
Address : 70 Mitchell St

Bread Meats Bread
Burgers restaurant. They offer all dishes as gluten free also if requested
Address : 65 St Vincent St

Dim Sum
Casual place offering an array of dim sum favorites, and classic Chinese entrees
Address : 69 West Nile St

Santa Lucia
Authentic Italian cuisine located close to conference venue
Address : 68 Ingram St

Turkiye Efes
Turkish food with excellent grilled meats
Address : 97-99 Candleriggs

Dhakin
South Indian cuisine. Every dish at Dakhin is prepared without gluten, nuts, peanuts, sesame, celery, lupin, molluscs and sulphites.
Address : 89 Candleriggs

Elia Greek restaurant
Selection of Greek food located in the centre of Glasgow
Address : 24 George Sq

Local Pubs/Bars

Babbity Bowster
Small family run pub with outdoor benches. A favorite around Glasgow.
Address : 18 Blackfriars St

The Ark
Located just off George Square, large space with outdoor garden space. Live sports also shown.
Address : 42-46 North Frederick Street

Brewdog
Brewdog beer served, also in centre of Glasgow. Burgers also served
Address : 99 Hutcheson St

West Brewery
Brewery serving own beer located in Glasgow Green park. Food also served. Outside seating also available
Address : 15 Binnie Pl, Calton

Drygate
Brewery serving own food. Food also served. Large tables inside for groups
Address : 85 Drygate

Waxy O'Connors
Famous Irish pub near George Square
Address : 44 West George St

Many many more to explore … (remember the delegate offers !)

Glasgow city map

See below for a map of the wider Glasgow city and local tourist attractions.