

OLIVIA DI MATTEO

PERSONAL DATA

Current: Assistant Professor, Dept. of Electrical and Computer Engineering, UBC.

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Web: glassnotes.github.io | github.com/glassnotes

Languages: English (native), French (fluent), Japanese (JLPT N3 certification)

EDUCATION

Sep. 2015 - Dec. 2018	PhD Physics (Quantum Information) University of Waterloo / IQC, Canada Thesis: <i>Methods for parallel quantum circuit synthesis, fault-tolerant quantum RAM, and quantum state tomography</i> Supervisor: Michele Mosca
Sep. 2013 - May 2015	MSc Physics (Quantum Information) University of Waterloo / IQC, Canada Thesis: <i>Parallelizing quantum circuit synthesis</i> Supervisor: Michele Mosca
2010	ARCT Piano Performance Royal Conservatory of Music, Toronto, Canada
Sep. 2009 - May 2013	HBSc Mathematical Physics Lakehead University, Canada Thesis: <i>Mutually unbiased bases and mutually orthogonal Latin squares</i> Supervisor: Hubert de Guise

Interests: Quantum circuits and compilation; quantum tomography and characterization; application of quantum algorithms to physical problems; open source quantum software; education.

JOURNAL PUBLICATIONS

- 2023 C. Sarma, O. Di Matteo, A. Abhishek, and P. C. Srivastava. *Prediction of the neutron drip line in oxygen isotopes using quantum computation*. Phys. Rev. C **108** 064305.
- 2023 O. Di Matteo, J. Izaac, T. Bromley, A. Hayes, C. Lee, M. Schuld, A. Száva, C. Roberts, and N. Killoran. *Quantum computing with differentiable quantum transforms*. ACM Transactions on Quantum Computing **4**(3) 1-20.
- 2022 O. Di Matteo and R. M. Woloshyn. *Quantum computing fidelity susceptibility using automatic differentiation..* Phys. Rev. A **106** 052429.
- 2022 J. M. Arrazola, O. Di Matteo, N. Quesada, S. Jahangiri, A. Delgado, N. Killoran. *Universal quantum circuits for quantum chemistry*. Quantum **6** 742.

- 2021 O. Di Matteo, A. McCoy, P. Gysbers, T. Miyagi, R. M. Woloshyn, P. Navrátil. *Improving Hamiltonian encodings with the Gray code*. Phys. Rev. A **103** 042405.
- 2020 O. Di Matteo, J. Gamble, C. Granade, K. Rudinger, and N. Wiebe. *Operational, gauge-free quantum tomography*. Quantum **4** 364.
- 2020 O. Di Matteo, V. Gheorghiu and M. Mosca. *Fault-Tolerant Resource Estimation of Quantum Random-Access Memories*. IEEE Transactions on Quantum Engineering, vol. 1, pp. 1-13, Art no. 4500213.
- 2018 H. de Guise, O. Di Matteo, and L. L. Sánchez-Soto. *Simple factorization of unitary transformations*. Phys. Rev. A **97** 022328.
- 2017 O. Di Matteo, L. L. Sánchez-Soto, G. Leuchs and M. Grassl. *Coarse graining the phase space of N qubits*. Phys. Rev. A **95** 022340.
- 2016 O. Di Matteo, M. Mosca *Parallelizing quantum circuit synthesis*. Quantum Science and Technology **1** (1).
- 2015 O. Di Matteo, D. Z. Djokovic, and I.S. Kotsireas. *Symmetric Hadamard matrices of order 116 and 172 exist*. Special Matrices **3** (1), ISSN (Online) 2300-7451
- 2014 M. Gaeta, O. Di Matteo, A. B. Klimov, and H. de Guise. *Discrete phase space approach to mutually orthogonal Latin squares*. J. Phys. A: Math. Theor. **47** 435303.
- 2012 A. Darbandi, E. Devoie, O. Di Matteo, and O. Rubel. *Modeling the radiation ionization energy and energy resolution of trigonal and amorphous Selenium from first principles*. J. Phys.: Condens. Matter **24** 455502.

CONFERENCE PROCEEDINGS

- 2024 O. Di Matteo. *On the need for effective tools for debugging quantum programs*. 5th International Workshop on Quantum Software Engineering (Q-SE 2024).
- 2023 G. Bottrill, M. Pandey, and O. Di Matteo. *Exploring the Potential of Qutrits for Quantum Optimization of Graph Coloring*. IEEE Quantum Week (QCE 23).
- 2022 G. Uchihara, T. M. Aamodt, and O. Di Matteo. *Rotation-inspired circuit cut optimization*. 2022 IEEE/ACM Third International Workshop on Quantum Computing Software (QCS), 50-56.
- 2017 Amy M., O. Di Matteo, Gheorghiu V., Mosca M., Parent A., Schanck J. *Estimating the Cost of Generic Quantum Pre-image Attacks on SHA-2 and SHA-3*. In: Avanzi R., Heys H. (eds) Selected Areas in Cryptography – SAC 2016. SAC 2016. Lecture Notes in Computer Science, vol 10532. Springer, Cham.

PREPRINTS

- 2021 J. M. Arrazola, S. Jahangiri, A. Delgado, J. Ceroni, J. Izaac, A. Száva, U. Azad, R. A. Lang, Z. Niu, O. Di Matteo, R. Moyard, J. Soni, M. Schuld, R. A. Vargas-Hernandez, T. Tamayo-Mendoza, A. Aspuru-Guzik, N. Killoran. *Differentiable quantum computational chemistry with PennyLane*. arXiv:2111.09967 (quant-ph).
- 2020 B. Dury and O. Di Matteo. *A QUBO formulation for qubit allocation*. arXiv:2009.00140 (quant-ph).

CONFERENCE PRESENTATIONS (INVITED)

- 2023 *Challenges and opportunities in quantum software for physics applications.* IEEE Quantum Week, Workshop on *Quantum Computing Market Success Requires an Application-level Programming Model that Delivers Performance.* (19 September 2023, Bellevue, WA, USA).
- 2023 *Panel: Challenges and Opportunities in Robust Quantum Circuits and Systems.* IEEE Quantum Week, Workshop on *Progress and Challenges in Quantum Intermediate Representations (QIR).* Panel member (18 September 2023, Bellevue, WA, USA).
- 2023 *An overview of the quantum compilation stack.* BIRS Workshop on *Mathematical Challenges in Adaptation of Quantum Chemistry to Quantum Computers* (2 September 2023, Banff, AB).
- 2023 *The quantum software ecosystem.* IQUS Workshop on Quantum Computing, Quantum Simulation, Quantum Gravity and the Standard Model (14 June 2023, Seattle, WA, USA).
- 2023 *Lost in translation: an adventure in running on quantum hardware.* Quantum BC Research Day (28 April 2023, Victoria, BC).
- 2023 *Quantum computing with differentiable quantum transforms.* APS March Meeting (7 March 2023, Las Vegas, NV, USA).
- 2023 *Quantum computing with differentiable quantum transforms.* Northwest Quantum Nexus Summit (24 January 2023, Seattle, WA, USA).
- 2022 *Perspectives on quantum software and algorithm development.* Quantum BC Roadmapping Workshop (1 September 2022, Surrey, BC).
- 2022 *Panel: Challenges and Opportunities in Robust Quantum Circuits and Systems.* 2022 International Symposium on Quantum Computing: Circuits Systems Automation and Applications (QC-CSAA). Panel member (18 July 2022, virtual).
- 2022 *Teaching quantum computing through quantum software* Canadian Association of Physicists Congress 2022 (8 June 2022, Hamilton, ON).
- 2021 *Interactive, online quantum computing education.* CASCON x EVOKE 2021 (23 November 2021, virtual).
- 2021 *Operational, gauge-free quantum tomography.* RIKEN-Vancouver Joint Workshop on Quantum Computing (23 August 2021, virtual).
- 2017 *Parallelizing quantum circuit synthesis.* ICCAD'17 Workshop on Design Automation for Quantum Computers (16 November 2017, Irvine, California, USA).

SEMINARS (INVITED)

- 2024 *An introduction to quantum computing and quantum software for physics applications.* Canadian Association of Physicists Lecture Tour (3 March 2024, virtual)
- 2024 *Quantum computing and quantum software for physics applications.* Simon Fraser University, Physics Department Colloquium (26 January 2024, Burnaby, BC)
- 2023 *Evaluating the neutron drip line using quantum computing.* Lakehead University (1 November 2023, Thunder Bay, ON)
- 2022 *Quantum computing fidelity susceptibility using automatic differentiation.* Lakehead University (10 November 2022, Thunder Bay, ON)
- 2022 P. Angara and O. Di Matteo. *Xanadu Quantum Codebook.* Quantum Algorithms Institute Lunch and Learn Seminar Series (25 May 2022, online seminar).

- 2022 *The current state of quantum computing.* Colloquium, TRIUMF (5 May 2022, Vancouver, BC).
- 2020 *A QUBO for qubit allocation.* KQCC Seminar, Keio University (4 November 2020, online seminar).
- 2020 *Reading between the bitlines: the current state of quantum RAM.* University of Technology Sydney (7 August 2020, online seminar).
- 2020 *Improving qubit Hamiltonian encodings with the Gray code.* Institute for Nuclear Theory, University of Washington (2 March 2020, Seattle, WA, USA).
- 2019 O. Di Matteo and B. Collignon. *Introduction to simulated classical and quantum annealing techniques.* Bank of Canada (26 August 2019, Ottawa, ON). Half-day workshop.
- 2019 *Fault-tolerant resource estimation of quantum random-access memories.* Microsoft Research (28 March 2019, Redmond, WA, USA).
- 2017 *Introduction to quantum computing and parallel quantum circuit synthesis.* Bank of Canada (28 November 2017, Ottawa, ON).

CONFERENCE PRESENTATIONS (CONTRIBUTED)

- 2024 C. Sarma, O. Di Matteo, P. C. Srivastava. *Reducing resources for quantum simulation by leveraging entanglement measures.* Canadian Association of Physicists Congress 2024 (28 May 2024, London, ON). *Talk.*
- 2023 C. Sarma, O. Di Matteo, A. Abhishek, P. C. Srivastava. *Evaluating the neutron drip line using quantum computing.* Canadian Association of Physicists Congress 2023 (22 June 2023, Fredericton, NB). *Talk.*
- 2022 O. Di Matteo, R. Woloshyn. *Quantum computing fidelity susceptibility using automatic differentiation.* Canadian Association of Physicists Congress 2022 (8 June 2022, Hamilton, ON). *Talk.*
- 2021 O. Di Matteo, J. Gamble, C. Granade, K. Rudinger, N. Wiebe. *Operational, gauge-free quantum tomography.* SIAM CSE. Workshop on *Data-Driven Methods for Quantum Dynamics and Control.* (2 March 2021, virtual). *Talk.*
- 2019 O. Di Matteo, J. Gamble, C. Granade, K. Rudinger, N. Wiebe. *Operational quantum tomography.* Machine Learning for Quantum Design (11 July 2019, Perimeter Institute, Waterloo, ON). *Talk.*
- 2019 O. Di Matteo, V. Gheorghiu, M. Mosca. *Fault-tolerant resource estimation of quantum random-access memories.* 1st International Workshop on Quantum Resource Estimation, QRE2019 (22 June 2019, Phoenix, Arizona, USA). *Talk.*
- 2019 O. Di Matteo, J. Gamble, C. Granade, K. Rudinger, N. Wiebe. *Operational quantum tomography.* CAP Congress (4 June 2019, Burnaby, BC). *Talk.*
- 2018 O. Di Matteo, V. Gheorghiu, M. Mosca. *Fault-tolerant resource estimation of quantum random-access memories.* 2nd International Workshop on Quantum Compilation (8 November 2018, San Diego, California, USA). *Talk.*
- 2018 O. Di Matteo. *Resource estimation in quantum computing.* Theory Canada 13 (9 June 2018, Antigonish, NS). *Talk.*
- 2018 O. Di Matteo, M. Mosca. *Parallelizing quantum circuit synthesis.* Ontario Advanced Research Computing Congress (15-17 May 2018, Toronto, ON). *Poster.*

- 2016 M. Amy, O. Di Matteo, V. Gheorghiu, M. Mosca, A. Parent, J. Schanck. *Estimating the cost of generic quantum pre-image attacks on SHA-2 and SHA-3*. TQC (27 September 2016, Berlin, Germany). *Poster*.
- 2016 O. Di Matteo, M. Mosca. *Parallelizing quantum circuit synthesis*. TQC (27 September 2016, Berlin, Germany). *Poster*.
- 2016 O. Di Matteo, L. L. Sánchez-Soto, M. Grassl. *Multi-scale discrete Wigner functions*. 23rd Central European Workshop on Quantum Optics (30 June 2016, Kolymbari, Crete, Greece). *Talk*.
- 2016 O. Di Matteo. *Parallelizing quantum circuit synthesis*. Quantum Computer Science (21 April 2016, Banff International Research Station, Banff, AB). *Talk*.
- 2011 O. Di Matteo. *Dissociation of localized geminate excitations in amorphous selenium*. Lake Superior Medical Imaging Workshop (30 September 2011, Thunder Bay, ON). *Talk*.

GRANTS AND AWARDS

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| Sep. 2023 - Sep. 2024 | NSERC Alliance International Catalyst Quantum. <i>Qutrit compilation strategies toward practical quantum simulations of lattice gauge theories</i> . \$25,000. Principal applicant. |
| Apr. 2023 - Apr. 2024 | UBC Open Educational Resource Implementation Fund. <i>Developing programming-based tutorials to enable the exploration of real-world applications of signals and systems in engineering courses</i> . \$11,648. Co-applicant. |
| Apr. 2023 - Dec. 2027 | NSERC Alliance Quantum Consortium on Quantum Simulation with Spin Qubits. \$4,925,000. Co-applicant. |
| Dec. 2022 - Dec. 2023 | NSERC Alliance Quantum. <i>Quantum computing with differentiable quantum transforms</i> . \$149,000. Principal applicant. |
| Oct. 2022 - Sep. 2027 | Tier 2 Canada Research Chair in Quantum Software and Algorithms. \$600,000. Principal applicant. |
| Apr. 2022 - Mar. 2027 | NSERC Discovery Grant. <i>Software and algorithms for enabling noise-aware quantum computation on near-term devices</i> . \$125,000 + \$12,500 early-career launch supplement. Principal applicant. |
| June 2020 | Unitary Fund microgrant. <i>Building and optimizing a library for qRAM in Q#</i> . \$4,000 USD. Co-applicant. |
| Apr. 2020 - Apr. 2021 | Small Teaching and Learning Enhancement Fund (UBC). <i>Developing curricular and pedagogical tools for introductory quantum computing graduate courses</i> . \$10,775 CAD. Co-applicant. |

RESEARCH AND PROFESSIONAL EXPERIENCE

Jan. 2022 - Present	Assistant Professor Department of Electrical and Computer Engineering The University of British Columbia, Vancouver, BC
Sep. 2020 - Nov. 2021	Quantum Computing Educator & Researcher Xanadu, Toronto, ON
Jan. 2019 - Aug. 2020	Quantum Information Science Associate TRIUMF, Vancouver, BC
June 2018 - Sep. 2018	Research Intern Quantum Architectures and Computation group Microsoft Research, Redmond, WA, USA Supervisor: Christopher Granade
June 2017 - Aug. 2017	Visiting student researcher
Oct. 2016b - Nov. 2016	Max Planck Institute for the Science of Light, Erlangen, Germany
May 2015 - Aug. 2015	Supervisors: Markus Grassl and Luis L. Sánchez-Soto
June 2014 - Aug. 2015	Part-time course manager, data science stream Udacity, Mountain View, California, USA (remote)
May 2013 - Aug. 2013	NSERC USRA summer student Lakehead University, Canada Supervisor: Hubert de Guise
May 2012 - Aug. 2012	NSERC USRA summer student McMaster University, Canada Supervisor: James Wadsley
May 2011 - Aug. 2011	NSERC USRA summer student Lakehead University / TBRRI, Canada Supervisor: Oleg Rubel
2011-2013	Marker Dept. of Physics and Dept. of Mathematical Sciences Lakehead University, Canada

TEACHING EXPERIENCE

Jan. 2024 - Apr. 2024	CPEN 400Q, <i>Gate-model quantum computing</i> . Dept. of Electrical and Computer Engineering, UBC, Canada
Jan. 2023 - Apr. 2023	CPEN 400Q, <i>Gate-model quantum computing</i> . Dept. of Electrical and Computer Engineering, UBC, Canada

Sept. 2022 - Dec. 2022	ELEC 221, <i>Signals and Systems</i> . Dept. of Electrical and Computer Engineering, UBC, Canada
Jan. 2022 - Apr. 2022	CPEN 400Q / EECE 571Q, <i>Gate-model quantum computing</i> . Dept. of Electrical and Computer Engineering, UBC, Canada
June 2020	CIRTL Associate – Postdoc Instructional Skills Workshop Centre for Teaching, Learning, and Technology, UBC, Canada
2019	<i>Introduction to quantum computing and quantum annealing</i> Lecture series (9, 10, 13, 14 May 2019) TRIUMF, Canada
2017	Fundamentals of University Teaching (certificate) Centre for Teaching Excellence, University of Waterloo, Canada
Jan. 2017 - Apr. 2017	Teaching assistant, PHYS 467 (Intro to Quant. Info. Processing)
Jan. 2016 - Apr. 2016	Filling in for lectures, office hours, assignment marking University of Waterloo, Canada
Jan. 2014 - Apr. 2014	Teaching assistant, PHYS 111 (Physics I) In-class tutorials, online course management, marking University of Waterloo, Canada
Sep. 2012 - Dec. 2012	Teaching assistant, PHYS 1113 (Physics Essentials I) In-class tutorials Lakehead University, Canada

PUBLIC OUTREACH

2022	O. Di Matteo <i>Quantum circuit optimization: perspectives and discussion</i> . QIR Community Call (27 October 2022, Unitary Fund, virtual seminar).
2022	Panel member: <i>A New Approach to Harnessing the Potential of Quantum Computing</i> . Canada School of Public Service Digital Academy Event (16 February 2022, virtual).
2020	O. Di Matteo. <i>Quantum 101: Do I need a quantum RAM?</i> . WIQCA Seattle — Meet-up group for Women in Quantum Computing and Applications. (13 May 2020, virtual seminar).

AWARDS

- 2019 W. B. Pearson Medal (Dept. of Physics and Astronomy), University of Waterloo
- 2017 Outstanding Reviewer Award, New Journal of Physics
- 2015-2018 President's Graduate Scholarship, University of Waterloo
- 2015-2018 NSERC CGS D, University of Waterloo
- 2013-2014 President's Graduate Scholarship, University of Waterloo
- 2013-2014 NSERC CGS M, University of Waterloo
- 2013 Institute for Quantum Computing Entrance Award, University of Waterloo
- 2013 Dean's Scholar Award, Physics, Lakehead University
- 2013 Ontario Graduate Scholarship (*declined*), Lakehead University
- 2013 NSERC USRA, Lakehead University
- 2012 NSERC USRA, McMaster University
- 2011 NSERC USRA, Lakehead University
- 2009-2013 President's List, Lakehead University
- 2009-2013 Free Tuition Entrance Scholarship, Lakehead University
- 2009 Millennium Scholarship

SERVICE

- 2024 Vice Chair, Division of Quantum Information, Canadian Association of Physicists
Unitary Fund Open Quantum Benchmark Committee member
IEEE Quantum Week (QCE24) Birds-of-a-Feather Co-chair, Quantum Systems Software Technical Program Committee member, Workshop proposal reviewer
PLDI Workshop on Quantum Software Technical Program Committee member
- 2023 Category Lead, "Near-term quantum computers", APS Division of Quantum Information for APS March Meeting 2024
Organizer, CAPC Q-STATE Symposium, and Theory Canada 15
UBC ECE Undergraduate Scholarship Awards Committee member
- 2022 Editor, Quantum (term 2022-2024)
Member of Program Committee, PPlanQC 2022.
Member of Program Committee, Quantum Systems Software technical paper track at IEEE International Conference on Quantum Computing & Engineering
Referee for ACM Transactions on Quantum Computing; IEEE Transactions on Quantum Engineering.
Member of Education Committee, *NSERC CREATE in Quantum Computing Program*, UBC / SFU / UVic (on-going)
- 2021 Referee for PRX Quantum; Quantum Information Processing
Organizer, *Cornerstone Models of Quantum Computing* virtual seminar series, July-August 2021
- 2020 Referee for Nature Communications; QCTIP 2020; Quantum; Quantum Information Processing
Member of Technical Program Committee, QRE 2020
Organizer, *Cornerstone Models of Quantum Computing* virtual seminar series, July-August 2020
- 2019 Referee for Quantum Information Processing; Quantum; SODA 2020
Local Organizer, Theory Canada 14, 30 May - 1 June, Vancouver, BC

Co-leader of working group in quantum computing, collaboration between Helmholtz Association and TRIUMF (2019-2020)

Website maintenance for the Canadian Association of Physicists' Division of Theoretical Physics (on-going)

2018 Referee for Quantum Information Processing

2017 Referee for Journal of Physics A, New Journal of Physics, Quantum Information Processing

2016 Referee for Quantum Information Processing

2015-2016 Vice president social, IQC Graduate Student Association

2014-2015 Member at large, IQC Graduate Student Association