

# OLIVIA DI MATTEO

## PERSONAL DATA

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

**E-mail:** [olivia@ece.ubc.ca](mailto:olivia@ece.ubc.ca)

**Web:** [glassnotes.github.io](https://glassnotes.github.io) | [github.com/glassnotes](https://github.com/glassnotes)

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

## EDUCATION

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

## PUBLICATIONS

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- 2021 **ODM**, A. McCoy, P. Gysbers, T. Miyagi, R. Woloshyn, P. Navrátil. *Improving Hamiltonian encodings with the Gray code*. Phys. Rev. A **103** 042405.
- 2020 **ODM**, J. Gamble, C. Granade, K. Rudinger, and N. Wiebe. *Operational, gauge-free quantum tomography*. Quantum **4** 364.
- 2020 **ODM**, 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, **ODM**, and L. L. Sánchez-Soto. *Simple factorization of unitary transformations*. Phys. Rev. A **97** 022328.
- 2017 **ODM**, L. L. Sánchez-Soto, G. Leuchs and M. Grassl. *Coarse graining the phase space of  $N$  qubits*. Phys. Rev. A **95** 022340.

- 2017 Amy M., **ODM**, 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.
- 2016 **ODM**, M. Mosca *Parallelizing quantum circuit synthesis*. Quantum Science and Technology **1** (1).
- 2015 **ODM**, 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, **ODM**, 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, **ODM**, 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.

## PREPRINTS

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- 2022 **ODM**, J. Izaac, T. Bromley, A. Hayes, C. Lee, M. Schuld, A. Száva, C. Roberts, and N. Killoran. *Quantum computing with differentiable quantum transforms*. arXiv:2202.13414 (quant-ph).
- 2021 J. M. Arrazola, S. Jahangiri, A. Delgado, J. Ceroni, J. Izaac, A. Száva, U. Azad, R. A. Lang, Z. Niu, **ODM**, 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).
- 2021 J. M. Arrazola, **ODM**, N. Quesada, S. Jahangiri, A. Delgado, N. Killoran. *Universal quantum circuits for quantum chemistry*. arXiv:2106.13839 (quant-ph). (Under review)
- 2020 B. Dury and **ODM**. *A QUBO formulation for qubit allocation*. arXiv:2009.00140 (quant-ph).

## CONFERENCE PRESENTATIONS (INVITED)

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- 2021 **ODM**. *Interactive, online quantum computing education*. CASCON x EVOKE 2021 (23 November 2021, virtual). *Talk*.
- 2021 **ODM**. *Operational, gauge-free quantum tomography*. RIKEN-Vancouver Joint Workshop on Quantum Computing (23 August 2021, virtual). *Talk*.
- 2017 **ODM**. *Parallelizing quantum circuit synthesis*. ICCAD'17 Workshop on Design Automation for Quantum Computers (16 November 2017, Irvine, California, USA). *Talk*.

## SEMINARS (INVITED)

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- 2022 **ODM**. *The current state of quantum computing*. Colloquium, TRIUMF (5 May 2022, Vancouver, BC).
- 2020 **ODM**. *A QUBO for qubit allocation*. KQCC Seminar, Keio University (4 November 2020, online seminar).

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

## CONFERENCE PRESENTATIONS (CONTRIBUTED)

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- 2021 **ODM**, 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 **ODM**, 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 **ODM**, 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 **ODM**, J. Gamble, C. Granade, K. Rudinger, N. Wiebe. *Operational quantum tomography*. CAP Congress (4 June 2019, Burnaby, BC). *Talk*.
- 2018 **ODM**, 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 **ODM**. *Resource estimation in quantum computing*. Theory Canada 13 (9 June 2018, Antigonish, NS). *Talk*.
- 2018 **ODM**, M. Mosca. *Parallelizing quantum circuit synthesis*. Ontario Advanced Research Computing Congress (15-17 May 2018, Toronto, ON). *Poster*.
- 2016 M. Amy, **ODM**, 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 **ODM**, M. Mosca. *Parallelizing quantum circuit synthesis*. TQC (27 September 2016, Berlin, Germany). *Poster*.
- 2016 **ODM**, 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 **ODM**. *Parallelizing quantum circuit synthesis*. Quantum Computer Science (21 April 2016, Banff International Research Station, Banff, AB). *Talk*.
- 2011 **ODM**. *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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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

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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. 2016 - 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

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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 Jan. 2016 - Apr. 2016	Teaching assistant, PHYS 467 (Intro to Quant. Info. Processing) 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

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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	<b>ODM</b> . <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

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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

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- 2022 Editor, Quantum (term 2022-2024)  
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.
- 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