VEDRAN DUNJKO

20th December 2021

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Employment

2018-pres.: Assistant Professor (tenure track, UD1), lead of aQa group, LIACS & LION, Leiden University
2017-2018: Post-doc, Max Planck Institute of Quantum Optics Garching, Germany
2013-2017: Post-doc, Institute for Theoretical Physics University of Innsbruck, Austria
2012-2013: Research associate, School of Informatics, University of Edinburgh, UK
2010-2012: PhD student, Institute of Photonics and Quantum Sciences, Heriot Watt University, UK
2008-2015: Research assistant, Division of Molecular Biology, Ruđer Bošković Institute, Zagreb, Croatia

Education & Academic degrees

2010-2012: PhD studies in Physics, Heriot-Watt University
2008-2010: Post-graduate in Mathematics & Computer Science, University of Zagreb (MSc equivalent)

PhD (in Physics), thesis "Ideal quantum protocols in the non-ideal physical world"
MSc (in Mathematics and Computer science), thesis "Shor's algorithm: fast factorization on a quantum computer" (orig. in Croatian); highest grade (5) achieved on Final Exam and Dissertation

Leadership and management

- Founding member and lead of applied Quantum algorithms interdisciplinary group in Leiden (>25 members, PhDs and Post-Docs)
- Contact point for the *Quantum Leiden* Quantum Delta NL Hub
- Work package lead for H2020 project NEASQC
- Chair and co-organizer of the LIACS Diversity and Inclusion Committee
- Co-organizer of the aQa weekly seminars
- Organizer of Industrial Students Seminar for Leiden Industrial Quantum Computing students
- Founder and PI of the LIACS Quantum@LIACS group
- Member of IFIP Working Group on Foundations of Quantum Computation
- Scientific advisor for Qu & Co

Grants & Funding

National and international competitive scientific grants:
2020: Consortium member: NWO/NWA consortium project "Quantum Inspire"
2020: WP lead: EC H2020 consortium project "NEASQC"
2018: PI/individual: Marie Curie Individual Fellowship (H2020-MSCA-IF-2017), 2 year project " Quantum Machine and Reinforcement Learning " (declined for tenure-track position)
2017: PI/individual: Humboldt Fellowship for Experienced Researchers (individual): 1.5 year project "Quantum Learning via Interaction" (discontinued for tenure-track position)

2012: PI/individual: EPSRC Doctoral Prize Fellowship (individual), project "Hybrid quantum-classical secure cloud computing"

Other funding:

2021: Nationaal Groeifonds, via Quantum Delta NL

2021: Google unrestricted gift (individual funding), project "QML for high energy physics

2020: Google unrestricted gift (individual funding), project "Hybrid QML"

2020: SurfSARA funding, project "Quantum Computing for Quantum Chemistry", as PI funding for 1y Postdoc.

2019: Joint funded project with TotalEnergies (2 PhD students)

2018: Funding for 1y Postdoc, Quantum Software Consortium internal cal

Other projects and consortia membership

2019: Founding member of the applied Quantum algorithms initiative (Netherlands)

2018: Member of the Quantum Software Consortium (Netherlands)

2018: Co-author and associate member of the SFB BeyondC (Austria, consortium of 7 experimental and 7 theory physics groups)

2016: Co-Principal Investigator of the SFB F40 (Austria), Foundations and Applications of Quantum Science (FoQuS) consortium, funded by the Austrian Science Fund (FWF)

Valorization

I have established notable contacts with **industry**, including funded projects with *Google*, *TOTAL*, *ATOS Bull* and *Volkswagen*, and have projects with SURF.

I am a scientific advisor for Qu & Co.

Group and supervision

Direct (daily) supervisor of PostDocs and PhDs:

Postdocs

2022-pres.: Adrián Pérez Salinas, Leiden (to start Feb 2022.)

2021-pres.: Onur Danaci, Leiden

2020-2021: Eleanor Scerri, Leiden

2019-2021: Mathys Rennela, Leiden

PhDs

2021-pres.: Alice Barthe (LION, with Beenakker and Tura, external funded by CERN and ESA)

2021-pres.: David Dechant (LION, with Beenakker and Tura)

2021-pres.: Elies Gil-Fuster (ELLIS PhD, with J. Eisert, Freie Universität Berlin)

2021-pres.: Radoica Draškić, Leiden (starting Aug 2021)

2021-pres.: Simon Marshall, Leiden

2020-pres.: Andrea Skolik, Leiden (external)

2020-pres.: Yash Pater, Leiden (co-supervised with T. Back)

2019-pres.: Charles Moussa, Leiden
2019-pres.: Casper Gyurik, Leiden
2019-pres.: Sofiené Jerbi ITP, University of Innsbruck
2019-pres: Lea Trenkwalder, ITP, University of Innsbruck

Officially supervising (as second supervisor)
2020-pres: Titus de Haas (LIC, F. Buda)

Finished PhD students
2019: Davide Orsucci (Innsbruck University) - now researcher in The German Aerospace Center
2019: Alexander Pirker (Innsbruck University) - now a postdoc in Innsbruck
2018: Alexey Melnikov (Innsbruck University) - now a principal investigator at Terra Quantum
2016: Theodoros Kapourniotis (University of Edinburgh, credited but unofficial) - now postdoc at Warwick

PhD committee of (PhD steering)
2020: Gawel Kus (Delft University, with M. Bessa)

Master and BSc supervision
Master students
Current: Luuk Visser (LIACS), Marius van Laar (Groningen), Eliot Schwander (LION), Eva van der Meer (LION), Joëll Gaertner (LION)
Finished: Victoria Dominguez Tubio (LION, f. 2021), Orson Peters (LIACS, f. 2021), Martijn Swenne (LIACS, f. 2021), Tim Koremans (LION, f. 2021) , Dyon van Vreumingen (f. 2020, LION), Sevak Mardiosian (f. 2019. LIACS -- with IBM Amsterdam), Sofiené Jerbi (f. 2018, Innsbruck), Lea Trenkwalder (f. 2017, Innsbruck), Michael Sandbichler (f. 2017, Innsbruck).

MSc projects with: Sean van der Meer (f. 2020, Delft), Radoica Draškić (f. 2020, Delft)

BSc students
Current: Guus Hertogh
Finished: Marit Talsma (f. 2021), Julian Poelsma (f. 2021), Daan Planken (f. 2020), Miguel Blom (f. 2020), Koen Bowman (f. 2020), Martijn Swenne (f. 2019), Simon Hangl (Innsbruck, f. 2015)

Teaching

Leiden University
2022 spring: Complexity theory (LIACS, BSc, 6EC)
Applied quantum algorithms (LIACS+LION, MSc, 6EC)
2021 fall: Quantum algorithms (LIACS, MSc 6EC)
2021 spring: Complexity theory (LIACS, BSc, 6EC)
Applied quantum algorithms (LIACS+LION, MSc, 6EC)
2020 fall: Quantum algorithms (LIACS, MSc 6EC)
2020 spring: Applied Quantum Algorithms (LIACS+LION, MSc, 6EC)
2019 fall: Foundations of Computer Science (LIACS, BSc, 6EC),
Quantum algorithms (LIACS, MSc 6EC)

I have also given guest lectures in other courses (e.g, Natural Computing course in Leiden), and have contributed to the Leiden PRE-college education as Lecturer.

I have obtained my **BKO** in Leiden in 2021.

Summer Schools (since Leiden)
2021: Summer school on "Machine Learning in Quantum Physics and Chemistry", Warsaw

Teaching during other positions
2017: Course co-designed and taught: "Quantum computing, control, and learning" (Innsbruck, 6EC)
2016: Invited lecturer for the Master class on Agency and Quantum Physics (University of Konstanz)
2016: Invited lecturer for the Summer School on Quantum Information and Computation (Innsbruck)
2012: Course co-designed and taught: "An introduction to quantum computing" (University of Tartu, 3EC points, invited lecturer)

Course design:
I have organized and designed the following new courses: Quantum computing, control, and learning (Innsbruck, AUT), An introduction to quantum computing (Tartu, EST), Quantum algorithms (Leiden), Applied quantum algorithms (Leiden)

Curriculum design:
- member of the workgroup designing the upcoming **joint Leiden-Delft MSc on "Quantum Information Science & Technology"**
- member of the workgroup which designed the new **MSc Physics & Classical/Quantum Information** specialization in Leiden (pilot running)

Publications: highlights, scientometry

52 published papers in top journals: *Nature*, *Nat. Phys, NeurIPS, Nat. Comm., Proc. Natl. Acad. Sci., Rep. Prog. Phys., Phys. Rev. X, Phys. Rev. Lett* (6x). 11 preprints (**total 63 papers**). First/last author on more than 1/2 of papers.

Special distinctions: 1 x **Corazelli Prize** of the US National Academy of Sciences (given to cca. 1 in 400 papers), 3 x **APS Editor's Suggestion**

Citations: **2727** (2494 since 2016); h-index: 26; i10-index: 44. (Source: Google Scholar, 20th Dec. 2021)

Publication full list

1. "Reinforcement learning for optimization of variational quantum circuit architectures" Mateusz Ostaszewski, Lea M Trenkwalder, Wojciech Masarczyk, Eleanor Scerri, Vedran Dunjko, Advances in Neural Information Processing Systems (NeurIPS) (2021)

2. "Variational quantum policies for reinforcement learning", Sofiene Jerbi, Casper Gyurik, Simon Marshall, Hans J Briegel, Vedran Dunjko, Advances in Neural Information Processing Systems (NeurIPS) (2021)

3. "Encoding strongly-correlated many-boson wavefunctions on a photonic quantum computer: application to the attractive Bose-Hubbard model", Saad Yalouz, Bruno Senjean, Filippo Miatto, Vedran Dunjko, *Quantum* 5, 572 (2021)

4. "On solving classes of positive-definite quantum linear systems with quadratically improved runtime in the condition number", Davide Orsucci, Vedran Dunjko, Quantum 5, 573 (2021)

5. "Quantum-accessible reinforcement learning beyond strictly epochal environments", Arne Hamann, Vedran Dunjko, Sabine Wölk, *Quantum Machine Intelligence* 3 (2), 1-18 (2021)

6. "Inside quantum black boxes," Vedran Dunjko. *Nature Physics* (2021). https://doi.org/10.1038/s41567-021-01246-8
7. "Smooth input preparation for quantum and quantum-inspired machine learning", Zhikuan Zhao, Jack Fitzsimons, Patrick Rebentrost, Vedran Dunjko, Joseph Fitzsimons, *Quant. Mach. Int.* 3 (1), 1-6 (2021)

8. "Tabu-driven Quantum Neighborhood Samplers", Charles Moussa, Hao Wang, Henri Calandra, Thomas Back, Vedran Dunjko, accepted *EvoStar 2021* (2021)

9. "Experimental quantum speed-up in reinforcement learning agents", Valeria Saggio, Beate E Asenbeck, Arne Hamann, Teodor Stromberg, Peter Schiansky, Vedran Dunjko, Nicolai Friis, Nicholas C Harris, Michael Hochberg, Dirk Englund, Sabine Wolk, Hans J Briegel, Philip Walther, *Nature* 591 (7849), 229-233 (2021)

10. "Quantum enhancements for deep reinforcement learning in large spaces", Sofiene Jerbi, Lea M Trenkwalder, Hendrik Poulsen Nautrup, Hans J Briegel, Vedran Dunjko, *PRX Quantum* 2 (1), 010328 (2021)

11. "To quantum or not to quantum: towards algorithm selection in near-term quantum optimization", Charles Moussa, Henri Calandra, Vedran Dunjko, *Quant. Sci. Tech.* 5 (4), 044009 (2020)

12. "On the convergence of projective-simulation-based reinforcement learning in Markov decision processes", Jens Clausen, Walter L. Boyajian, Lea M. Trenkwalder, Vedran Dunjko, Hans J. Briegel *Quant. Mach. Int.* 13 (2020)

13. "A non-review of Quantum Machine Learning: trends and explorations", Vedran Dunjko, Peter Wittek, Quantum Views 4, 32 (2020)

14. "A hybrid algorithm framework for small quantum computers with application to finding Hamiltonian cycles", Yimin Ge, Vedran Dunjko, *J. Math.Phys.* 61 (1), 012201 (2020)

15. "Skill Learning by Autonomous Robotic Playing Using Active Learning and Exploratory Behavior Composition", Simon Hangl, Vedran Dunjko, Hans J. Briegel, Justus Piater Front. *Robot. AI*, 03 April (2020)

16. "Optimizing quantum error correction codes with reinforcement learning", Hendrik Poulsen Nautrup, Nicolas Delfosse, Vedran Dunjko, Hans J Briegel, Nicolai Friis, Quantum 3, 215 (2019)

17. "Simple proof of confidentiality for private quantum channels in noisy environments", Alexander Pirker, Michael Zwerger, Vedran Dunjko, Hans J. Briegel, Wolfgang Dür, *Quant, Sci. Techn.,* 4, 2 (2019)

18. "Speeding-up the decision making of a learning agent using an ion trap quantum processor", Theeraphot Sriarunothai, Sabine Wolk, Gouri Shankar Giri, Nicolai Friis, Vedran Dunjko, Hans J. Briegel, Christof Wunderlich, *Quant. Sci. Techn.* 4, 015014 (2019)

19. "Computational speedups using small quantum devices". Vedran Dunjko, Yimin Ge and J. Ignacio Cirac, *Phys. Rev. Lett.* 121, 250501 (Editor's suggestion, Featured in Physics) (2018)

20. "Neural Network Operations and Susuki-Trotter evolution of Neural Network States", Nahuel Freitas, Giovanna Morigi, Vedran Dunjko, *Int. J. Quantum Inf.* 16, 1840008 (2018)

21. "Optimal sequential quantum mixing for slowly evolving sequences of Markov chains", Davide Orsucci, Hans J. Briegel and Vedran Dunjko, *Quantum* 2, 105 (2018)

22. "Machine learning & arti cial intelligence in the quantum domain: a review of recent progress", Vedran Dunjko and Hans J. Briegel Rep., *Prog. Phys* 81, 074001 (2018)

23. "Active learning machine learns to create new quantum experiments", Alexey A. Melnikov, Hendrik Poulsen Nautrup, Mario Krenn, Vedran Dunjko, Markus Tiersch, Anton Zeilinger, Hans J. Briegel, *Proc. Natl. Acad. Sci.* 115 (6) pp. 1221-1226 (PNAS Cozzarelli Prize) (2018)

24. "Long-range big quantum-data transmission", Michael Zwerger, Alexander Pirker, Vedran Dunjko, Wofgang Dur, Hans J. Briegel, *Phys. Rev. Lett.* 120, 030503 (2018)

25. "Advances in quantum reinforcement learning", Vedran Dunjko, Jacob M. Taylor, Hans J. Briegel, *IEEE SMC,* Banff, AB, 2017, pp. 282-287. doi: 10.1109/SMC.2017.8122616 (2017).

26. "Projective simulation with generalization", Alexey A. Melnikov, Adi Makmal, Vedran Dunjko, Hans J. Briegel, *Sci. Rep.* 7, 14430 (2017)

27. "Entanglement generation secure against general attacks", Alexander Pirker, Vedran Dunjko, Wolfgang Dür, Hans J. Briegel, *New J. Phys.* 19, 113012 (2017)

28. "Flexible resources for quantum metrology", Nicolai Friis, Davide Orsucci, Michalis Skotiniotis, Pavel Sekatski, Vedran Dunjko, Hans J. Briegel, Wolfgang Dür, *New J. Phys.,*19, 063044 (2017)

29. "Quantum-enhanced machine learning", Vedran Dunjko, Jacob M. Taylor, Hans J. Briegel. *Phys. Rev. Lett.* 117, 130501 (2016)

30. "Meta-learning within Projective Simulation", Adi Makmal, Alexey A. Melnikov, Vedran Dunjko, Hans J. Briegel, *IEEE Access* 4, 2110 (2016)

31. "Enhanced delegated computing using coherence", Stefanie Barz, Vedran Dunjko, Florian Schlederer, Merritt Moore, Elham Kashefi, Ian A. Walmsley, *Phys. Rev.* A 93, 032339 (2016)

32. "Quantum-enhanced Secure Delegated Classical Computing", Vedran Dunjko, Theodoros Kapourniotis, Elham Kashefi, *Quant. Inf. Comput.* 16, pp 61-86 (2016)

33. "Experimental demonstration of kilometer-range quantum digital signatures", Ross J. Donaldson, Robert J. Collins, Klaudia Kleczkowska, Ryan Amiri, Petros Wallden, Vedran Dunjko, John Jeffers, Erika Andersson, Gerald S. Buller, *Phys. Rev. A* 93, 012329, (Editors' suggestion) (2016)

34. "Quantum mixing of Markov chains for special distributions", Vedran Dunjko, Hans J. Briegel, New J. Phys. 17, 073004 (2015)

35. "Quantum digital signatures with quantum-key-distribution components", Petros Wallden, Vedran Dunjko, Adrian Kent, Erika Andersson, *Phys. Rev.* A 91, 042304 (2015)

36. "Quantum-enhanced deliberation of learning agents in trapped ions", Vedran Dunjko, Nicolai Friis, Hans J. Briegel, *New J. Phys.* 17, 023006 (2015)

37. "Ground state blind quantum computation on AKLT state", Tomoyuki Morimae, Vedran Dunjko, Elham Kashefi, *Quantum Inf. Comput.* 15, 3&4, pp 200-234 (2015)

38. "Entanglement of pi-locally-maximally-entanglable states and the satis ability problem", Adi Makmal, Markus Tiersch, Vedran Dunjko, Shengjun Wu, *Phys. Rev.* A 90, 042308 (2014)

39. "Quantum speed-up for active learning agents", Giuseppe Davide Paparo, Vedran Dunjko, Adi Makmal, Miguel Angel Martin-Delgado, Hans J. Briegel, *Phys. Rev. X* 4, 031002 (2014)

40. "Implementing quantum control for unknown subroutines", Nicolai Friis, Vedran Dunjko, Wolfgang Dür, Hans J. Briegel Phys., *Rev A* 89, 030303(R) (2014)

41. "Optical realisation of Quantum Digital Signatures without quantum memory". Robert J. Collins, Ross J. Donaldson, Vedran Dunjko, Petros Wallden, Patrick J. Clarke, Erika Andersson, John Je ers, Gerald S. Buller, *Phys. Rev. Lett.* 113, 040502, (Editors' Suggestion; Featured in Physics) (2014)

42. "Minimum-cost quantum measurements for quantum information", Petros Wallden, Vedran Dunjko, Erika Andersson, *J. Phys. A* 47 125303 (2014)

43. "Quantum Digital Signatures without Quantum Memory", Vedran Dunjko, Petros Wallden, Erika Andersson, *Phys. Rev. Lett.* 112 040502 (2014)

44. "Composable security of delegated quantum computation", Vedran Dunjko, Joseph F. Fitzsimons, Christopher Portmann, Renato Renner, *Lecture Notes in Computer Science* 8874 pp 406-425 (Asiacrypt 2014) (2014)

45. "Philostratigraphic profiles reveal a deep evolutionary history of the vertebrate head sensory systems", Martin Sebastijan Šestak, Vedran Božičević, Robert Bakarić, Vedran Dunjko, Tomislav Domazet-Lošo, *Front. Zool.* 10:18 (2013)

46. "Extended phase map decompositions for unitaries", Vedran Dunjko, Elham Kashefi, *Math. Struct. Comput. Sci.,* 23, pp 360-385, (2013)

47. "Experimental demonstration of quantum digital signatures", Patrick J. Clarke, Robert J. Collins, Vedran Dunjko, Erika Andersson, John Jeffers, Gerald S. Buller, *Nat. Commun.* 3:1174 (2012)

48. "Truly noiseless probabilistic amplification", Vedran Dunjko, Erika Andersson, Phys. Rev. A 86 042322 (2012)

49. "Transformations between symmetric sets of quantum states", Vedran Dunjko, Erika Andersson*, J. Phys. A* 45 365304 (2012)

50. "Universal blind quantum computing with weak coherent pulses", Vedran Dunjko, Elham Kashefi, Anthony Leverrier, *Phys. Rev. Lett.* 108 200502 (2012)

51. "Novel modifications of parallel Jacobi algorithms", Sanja Singer, Saša Singer, Vedran Novaković, Aleksandar Ušćumlić, Vedran Dunjko, *Numer. Algorithms* 59 1-27 (2012)

52. Algebraic characterisation of one-way patterns Vedran Dunjko, Elham Kashefi, *In Proc. 6th Workshop on Developments in Computational Models: Causality, Computation, and Physics* 26 EPTCS, pp 85-100 (2010)

Submitted and preprints

53. "Quantum machine learning beyond kernel methods", Sofiene Jerbi, Lucas. J Fiderer, Hendrik Poulsen Nautrup, Jonas M Kübler, Hans J Briegel, Vedran Dunjko, arXiv:2110.13162 (2021)

54. "LIMDD: A Decision Diagram for Simulation of Quantum Computing Including Stabilizer States", Lieuwe Vinkhuijzen, Tim Coopmans, David Elkouss, Vedran Dunjko, Alfons Laarman, arXiv:2108.00931 (2021)

55. "Performance comparison of optimization methods on variational quantum algorithms", Xavier Bonet-Monroig, Hao Wang, Diederick Vermetten, Bruno Senjean, Charles Moussa, Thomas Bäck, Vedran Dunjko, Thomas E O'Brien, arXiv:2111.13454 (2021)

56. "Quantum agents in the Gym: a variational quantum algorithm for deep Q-learning", Andrea Skolik, Sofiene Jerbi, Vedran Dunjko, arXiv:2103.15084 (2021)

57. "Structural risk minimization for quantum linear classifiers", Casper Gyurik, Dyon van Vreumingen, Vedran Dunjko, arXiv:2105.05566 (2021)

58. "Certificates of quantum many-body properties assisted by machine learning", Borja Requena, Gorka Muñoz-Gil, Maciej Lewenstein, Vedran Dunjko, Jordi Tura, arXiv:2103.03830 (2021)

59. "Hybrid divide-and-conquer approach for tree search algorithms", Mathys Rennela, Alfons Laarman, Vedran Dunjko, arXiv:2007.07040 (2020)

60. "Towards quantum advantage for topological data analysis", Casper Gyurik, Chris Cade, Vedran Dunjko, arXiv:2005.02607 (2020)

61. "Blind quantum computing with two almost identical states", Vedran Dunjko, Elham Kashefi, arXiv:1604.01586 (2016)

62. "Framework for learning agents in quantum environments", Vedran Dunjko, Jacob M. Taylor, Hans J. Briegel, arXiv:1507.08482 (2015)

63. "On optimising quantum communication in verifiable quantum computing", Theodoros Kapourniotis, Vedran Dunjko, Elham Kashefi, arXiv:1506.06943 [presented at AQIS 2015] (2015)

Conferences & Workshops

Invited talks

1.	Jan 2022	Quantum Natural Language Processing 2020, Oxford, UK
2.	Oct 2021	IEEE International Conference on Quantum Computing and Engineering '21, Virtual
3.	Oct 2021	INFORMS '21, Virtual
4.	Oct 2021	Google Quantum AI EMEA/APAC Forum, Virtual
5.	Sept 2021	FME-platform ‘AI for Industry’ '21, Den Haag
6.	Aug 2021	Summer school on "Machine Learning in Quantum Physics and Chemistry", Warsaw
7.	Aug 2021	Heraeus workshop on "Optical information processing - from quantum computing to artificial intelligence", Virtual
8.	Aug 2021	IJCAI Tutorial on "Quantum Neural Networks for Speech and Natural Language Processing"
9.	Jun 2021	International Conference on Quantum Intelligence, Shanghai
10.	Mar 2021	IMPRS-ICFO workshop at MPQ, Garching, Virtual

11.	Nov 2020	Quantum Techniques in Machine Learning, Virtual
12.	Sept 2020	Quantum Natural Language Processing 2020, Virtual
13.	Sept 2020	Workshop on Quantum Information, Computation, and Foundation 2020, Virtual
14.	July 2020	Ellis QPhML 2020 Workshop, Virtual
15.	May 2020	Simons Institute For the Theory of Computing: Quantum Devices: Simulation, Supremacy, and Optimization Workshop, Virtual
16.	Dec 2019	Quantum Natural Language Processing 2019, Oxford, UK
17.	Oct 2019	ICFO Quantum Machine Learning Workshop 2019, Barcelona
18.	Sept 2019	QuantumAlgo consortium workshop, Amsterdam, The Netherlands
19.	May 2019	Outreach talk: IBM (Quantum Meet-Up), Amsterdam, The Netherlands
20.	July 2019	Workshop: QuHackEd , Edinburgh, UK
21.	June 2019	Workshop: Quantum Information and String Theory , Kyoto, Japan
22.	May 2019	Workshop: Dutch Research School of Theoretical Physics, Dalfsen, The Netherlands
23.	April 2019	55th Dutch Mathematical Congress, Veldhoven, The Netherlands
24.	April 2019	ESA Workshop: Quantum Processing of Big Data, Rome, Italy
25.	Nov 2018	Quantum Techniques in Machine Learning, Durban, RSA
26.	Aug 2018	JQI Workshop on QML, Maryland, USA
27.	Apr 2018	2nd Quantum UnConference, Barcelona, Spain
28.	Mar 2018	QML and Biomimetic Quantum Technologies Workshop, Bilbao, Spain
29.	Dec 2017	Arti cial Intelligence and Quantum Physics Workshop, Nanjing, China
30.	Nov 2017	Quantum Techniques in Machine Learning, Verona, Italy
31.	Jun 2017	Workshop on quantum CyberSecurity 2017, Kent, UK
32.	Jun 2017	Trustworthy Quantum Information Workshop (TYQI 2017), Paris, France
33.	Nov 2016	Workshop of Quantum Simulation and Quantum Walks, Prague, Czech Rep.
34.	Sept 2016	Agency and (quantum) physics Conference, Konstanz, Germany
35.	Jun 2016	3rd Seefeld workshop on Quantum Information, Seefeld, Austria
36.	Feb 2016	International Conference on Quantum Optics 2016, Obergurgl, Austria
37.	May 2015	Quantum Randomness and Beyond, Barcelona, Spain
38.	Dec 2012	(QUISCO) Classical and quantum security meeting, Edinburgh, UK

Contributing

39.	Jan 2017	QIP 2018, Delft, Netherlands Poster: “Exponential speed-ups for quantum reinforcement learning”
40.	Oct 2017	IEEE SMC, Banff, Canada Talk: “Advances in quantum reinforcement learning”
41.	Jul 2016	Quantum Machine Learning Meetings, KwaZulu-Natal, South Africa Talk: “Quantum-enhanced learning agents”
42.	Apr 2016	European Symposium on Artificial Neural Networks, Bruges, Belgium Spotlight presentation: “Quantum enhanced machine learning”

43.	Oct 2014	SFB meeting, Innsbruck, Austria Talk: “Quantum speed-up of active learning agents”
44.	Jul/Aug 2014	Gordon Research Conferences, Quantum Science: Simulation, Verification and Control of Complex Quantum Many-Body Systems, Easton, MA Poster: “Quantum speed-up of active learning agents”
45.	Jun/Jul 2014	2nd Seefeld workshop on Quantum Information, Seefeld, Austria Poster: “Quantum-enhanced active learning agents”
46.	Apr 2013	Quantum Fields, Gravity and Information, Nottingham, UK Poster: “Composable security of delegated quantum computation”
47.	Dec 2012	Institute of Physics Meeting on Quantum Technologies, London, UK Talk: “Experimental demonstration of quantum digital signatures”
48.	Jul/Aug 2012	11th International Conference on Quantum Communication, Measurement and Computing, Vienna, Austria Poster: “Universal blind quantum computing with weak coherent pulses” Poster: “Experimental demonstration of QDS”
49.	Jun 2011	8th Central European Quantum Information Processing workshop, Znojmo, Czech Rep. Talk: “Transformations between symmetric sets of quantum states”
50.	Jul 2010	DCM, Federated Logic Conference workshop, Edinburgh Talk: “Algebraic characterization of one-way patterns”
51.	Jun 2010	17th Central European Workshop on Quantum Optics, St. Andrews, UK Poster: “Algebraic characterization of one-way patterns”
52.	Sept 2008	12th Evolutionary Biology Meeting at Marseilles, Marseilles, France Poster and Talk: “Quest for the pervasive definition of homology”

Research visits and collaborations

1. JRC of the European Commission, Italy (Jan 2019)
2. QuTech, Netherlands (December 2018)
3. CWI Amsterdam, Netherlands (July 2018)
4. University of Stuttgart, Germany (May 2018)
5. NUI Galway, Ireland (Sept 2017)
6. Universitat des Saarlandes, Germany (Apr & Jul 2017)
7. Joint Quantum Institute, MD, USA (Apr 2017)
8. Technische Universität München, Germany (Jul 2016)
9. Max Planck Institute of Quantum Optics, Garching, Germany (Mar 2016)
10. Research Center for Quantum Information, Slovakian Academy of Sciences, Slovakia (Apr 2015)
11. Institute for Theoretical Physics, ETH, Zurich, Switzerland (Oct 2014 & Jun 2012)
12. Departmento de Fisica Teorica I, Universidad Complutense, Madrid, Spain (Nov 2013)
13. IQOQI, Austrian Academy of Sciences, Innsbruck, Austria (Jun 2012)

14. The Centre for Quantum Information and Foundations, University of Cambridge, UK (May 2012)
15. Atomic, Molecular, Optical and Positron Physics group, University College London, UK (May 2012)
16. Quant. Correlations in Physics, Maths, and Computer Science group, Freiburg,, Germany (Apr 2012)
17. Quantum Information LIVE at ICL, Imperial College London, UK, (Apr 2012)
18. Algorithms and Complexity Reading Group, School of Informatics, Edinburgh, UK, (Nov 2011)
19. Quantum Information group, Telecom ParisTech, Paris, France, (Jan 2011)

Notable long-term collaboration partners (international partners listed only):
University of Innsbruck (Briegel, Dür in physics, Piater in AI), MPQ Garching (Cirac), Joint Quantum Institute, MD, USA (Taylor), University of Edinburgh, UK (Wallden), Heriot-Watt, Edinburgh, UK (Andersson) Sorbonne Universite (Kashefi) Kyoto University (Morimae), CQT Singapore (Fitzsimons), ETH Zürich (Renner), Google Quantum AI (Babbush, O'Brien)

Within Netherlands I tightly collaborate with a number of groups, mostly in Amsterdam (de Wolf, Cade, Jeffery, Ozols), Delft (Elkouss, Vandersypen) and Nijmegen (Kappen).
I am a member of 4 large international consortia, and as contact point for Quantum Delta NL.

Academic service

Editorial duties	-Editor of journal *Quantum* -Editorial Board Member of journal *PRX Quantum* -Associate Editor of journal *Quantum Machine Intelligence* (QMI)
Reviewing recognition	-APS lifetime Outstanding reviewer recognition -IOP Trusted reviewer recognition
Reviewer for	Journals: *Science, Nat. Phys., Phys. Rev. Lett, Phys. Rev. X, Phys. Rev. A, Quant. Inf. Comp., Quant. Inf. Proc., Eur. Phys. J. D, New J. Phys., Phys. Scripta, Int. J. Quant. Inf., Photon. Res., Sci. Rep.,IEEE Sec. & Priv., Proc. R. Soc. A.; NPG QI; Next Gen. Comput, Quantum, Quant. Sci. Tech.* Conferences: QIP, TQC, ESANN, IEEE SMC, IEEE ITW, CEQIP
PC member	Quantum Interaction 2016, IEEE SMC special session 2017 (TP CEQIP ’17 & ’19, QTML '19 & '21, SPIN 2021, Software Engineering in Quantum Computing topic at KKIO '21
Committees	Chair of LIACS Diversity and inclusion Committee, QSC Diversity Committee
PhD defense committees	4
Grant reviews	4 (incl. ERC)

Organized conferences and workshops	2022: "Measurement-based quantum computing, agency and learning", Austria 2021: One-day workshop "Theory of Quantum Machine Learning", online only 2021: "NEASQC webinar series", online only 2018: “Quantum Machine Learning Plus” conference Innsbruck, Austria 2016: "Agency and Quantum Physics (AQP)" Conference, Konstanz, Germany 2015: "Agency and Quantum Physics (AQP") Workshop, Innsbruck, Austria 2011-2014: Assisted in organization of Quantum Information Scotland (QUISCO) workshops (3–4 meetings per year), Edinburgh, UK
Other	I am a member of the International Federation for Information Processing (IFIP) organization, in the newly founded working group on Foundations of Quantum Computation

Patents

Patent application "Client-server communication system", Application no.: PCT/GB2015/050306; Publication no.: WO2015121619 A3, Feb. 4th, 2015. Co-inventors: Elham Kashefi , Theodoros Kapourniotis and Einar Pius

Other

Languages: Croatian (native), English (fluent), German (good - B2), Dutch (beginner, currently studying)