

Philip Walther (*12-May-1978 in Vienna, Austria)

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Research Focus

Photonic quantum computation and quantum simulation;

Quantum-enhanced cybersecurity;

Development of scalable quantum photonic technology;

Experimental investigation of the interface between quantum physics and gravity

Education

2012 Habilitation in Quantum Optics, Faculty of Physics, University of Vienna, Austria

2005 PhD (Dr. rer. nat.) in Physics; University of Vienna, Austria (with A. Zeilinger)

2002 Diploma (Dipl.-Ing.) in Chemistry, Vienna University of Technology, Austria (with K. Schwarz)

Current Positions

07/2020 – Head, Christian Doppler Laboratory for Photonic Quantum Computing, Faculty of Physics, University of Vienna

03/2019 – Speaker, Special Research Programme (SFB) “Quantum Information Systems Beyond Classical Capabilities (BeyondC)” by the Austrian Science Fund (FWF)

01/2017 – Speaker, Research Network “Quantum Aspects of Spacetime (TURIS)”, Faculty of Physics, University of Vienna

07/2013 – Speaker, Quantum Optics, Quantum Nanophysics, Quantum Information Group, Faculty of Physics, University of Vienna

Career History

2015 – Professor of Physics (tenured), Faculty of Physics, University of Vienna

2013 – 2015 Associate Professor (tenured), Faculty of Physics, University of Vienna

2011 – 2012 Assistant Professor (tenure-track), Faculty of Physics, University of Vienna

2008 – 2011 Assistant Professor (Univ.-Ass.) Faculty of Physics, University of Vienna

2005 – 2008 Postdoctoral Researcher, Department of Physics, Harvard University, USA (with M. Lukin)

Honors and Awards

- 2023 ERC Synergy Grant
- 2022 Falling Walls Global Call Winner 2022 (Engineering and Technology)
- 2021 Friedrich Wilhelm Bessel Award (Alexander von Humboldt Stiftung)
- 2014 Recognition Award for Science 2014 by Lower State Austria
- 2014 Visiting Professor Fellowship by the Brazilian Federal Government
- 2011 Vienna Funding Award in Science (Förderungspreis der Stadt Wien)
- 2011 START Prize, Austrian Ministry of Science and Education (BMWF)
- 2009 Fresnel Prize, European Physical Society (EPS)
- 2006 Prize for outstanding academic performance, University of Vienna
- 2005 Loschmidt Prize, Chemical-Physical Society of Vienna

Elected Memberships

- 2019 Fellow of The Optical Society (OSA)
- 2015 Fellow of The American Physical Society (APS)
- 2014 - 2022 Member of the Austrian Academy of Sciences - "Junge Akademie" (Young Academy)
- 2012 – 2017 Member of The Global Young Academy
- 2007 – 2012 Member of The German Young Academy at the Berlin-Brandenburg Academy of Sciences and the German Academy of Natural Scientists Leopoldina

Editorial Boards

- 2016 Journal of Optics, Guest Editor
- 2014 – Nature Publishing Group “Quantum Information”, Associate Editor
- 2014 – 2015 Nature Publishing Group “Scientific Reports”, Associate Editor

Institutional Responsibilities

- 2014 – 2018 Vice-Dean of the Faculty of Physics, University of Vienna
- 2012 – Member of the Vienna Center for Quantum Science and Technology (VCQ)
- 2012 – Member of the Committee for the Vienna Doctoral Training Center on Complex Quantum Systems (CoQuS/VCQ), Faculty of Physics, University of Vienna

Other Activities

- 2023 Co-Founder of QUBO Technology GmbH
- 2023 Co-founder of the research network TURIS
- 2022 Member of the European Quantum Software Institute Hardware Board
- 2018 Member of the Advisory Board, VitreaLab GmbH
- 2017 Co-Founder of the research platform TURIS

Selected Publications

1. *Experimental observation of Earth's rotation with quantum entanglement*
R. Silvestri *et al.*, **Science Advances** 10, eadov0215 (2024).
2. *Demonstration of universal time-reversal for qubit processes*
P. Schiansky *et al.*, **Optica** 10, 200 (2023).
3. *Experimental photonic quantum memristor*
M. Spagnolo *et al.*, **Nature Photonics** 16, 318–323 (2022).
4. *Experimental quantum speed-up in reinforcement learning agents*,
V. Saggio *et al.*, **Nature** 591, 229–233 (2021).
5. *Giant enhancement of third-harmonic generation in graphene–metal heterostructures*,
I. Alonso Calafell *et al.*, **Nature Nanotechnology** 16, 318–324 (2021).
6. *Quantum cryptography with highly entangled photons from semiconductor quantum dots*
C. Schimpf *et al.*, **Science Advances** 7, 16 (2021)
7. *Experimental few-copy multipartite entanglement detection*,
V. Saggio *et al.*, **Nature Physics** 15, 935–940 (2019).
8. *Quantum advantage for probabilistic one-time programs*,
M. C. Roehsner *et al.*, **Nature Communications** 9 (1), 1-8 (2018).
9. *Experimental Verification of an Indefinite Causal Order*,
G. Rubino *et al.*, **Science Advances** 3, e1602589 (2017).
10. *Experimental superposition of orders of quantum gates*,
L.M. Procopio *et al.*, **Nature Communications** 6, 7913 (2015).
11. *Experimental verification of quantum computations*,
S. Barz *et al.*, **Nature Physics** 9, 727-731 (2013).
12. *Experimental Boson sampling*,
M. Tillmann *et al.*, **Nature Photonics** 7, 540-544 (2013).
13. *Demonstration of blind quantum computing*,
S. Barz *et al.*, **Science** 335, 303-308 (2012).
14. *Quantum simulation of the wavefunction to probe frustrated Heisenberg spin systems*,
X.S. Ma *et al.*, **Nature Physics** 7, 399-405 (2011).
15. *Experimental One-Way Quantum Computing*,
P. Walther *et al.*, **Nature** 434, 169-176 (2005).