Dr. Yelena Guryanova

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Expertise and Academic Network

I am a theoretical physicist who specialises in quantum information. My research interests include: quantum algorithms, quantum thermodynamics, causality, higher-order processes, generalised probabilistic theories. In my career I have been main applicant on more than €4.5 million in funding and prizes and organised at least four international conferences. I am community oriented and have worked in several interdisciplinary projects, ranging from those with multinational pharmaceutical companies and emerging startups to groups with artists and philosophers; I manage an organisation to promote equal opportunities and diversity in quantum science.

Positions

10/2026 - now	**Senior Research Associate** Center for Quantum Computing and Quantum Coherence (QC2), University of Basel, Switzerland.
01/2025 - now	**Lead Academic Research.** QuantumBasel AG, Arlesheim, Switzerland.
07/2024 - 12/2024	**Quantum Algorithms Researcher.** QuantumBasel AG, Arlesheim, Switzerland.
04/2024 - 06/2024	**Senior researcher.** Technical Univerisity of Vienna (TU Wien). *Principal Investigator.*
04/2019 - 04/2024	**Group leader, principal investigator and coordinator.** Institute for Quantum Optics and Quantum Information, Austrian Academy of Sciences, Vienna *Young Independent Researcher Group (YIRG), joint between Austrian Academy of Sciences and University of Vienna* (Quantum information, causality, thermodynamics, non-locality).
09/2023 - 11/2023	**Senior postdoctoral researcher.** University of Graz, Department of Political Philosophy, Department of Philosophy. Editor and contributor to the *Atlas of the Irreverse*.
06/2022 - 06/2023	**Blaumann Foundation Fellow.** Interactions and the breakdown of relational dynamics.
03/2021 - now	**FQXi member.** Foundation Questions Institute member.
10/2016 - 03/2019	**Postdoctoral researcher.** Institute for Quantum Optics and Quantum Information, Vienna in the group of Marcus Huber. (Quantum information, quantum thermodynamics).

Education

2012 - 2016	**PhD Physics.** University of Bristol, Department of Physics Thesis Title: *Correlations, causality and thermodynamics in quantum theory and beyond*, Supervisor: Prof. Sandu Popescu. Thesis commendation by the Dean (top 10% in Faculty of Science).
2011 - 2012	**MSc Physics.** University of Bristol, Department of Physics Thesis Title: *Investigations into pre- and post-selection and dynamical nonlocality*. Supervisor: Prof. Sandu Popescu.
2007 - 2011	**MSci Mathematics and Physics.** University of Bristol, First Class Honours.

Awards, Grants and Fellowships

Approximate total grants obtained with co-authors EUR 4.5 million

2026 - now **Swiss Quantum Initiative, TRL enhancing initiatives (2 million CHF)**. *Fleck: quantum computing for the life sciences*.

2022 - 2023 **State of Styria Unconventional Research Grant (100 000 EUR)** with L Mackowitz. *Irreversibility* [German: Land Steiermark Unkonventionelle FOrschung].

2022 - 2023 **Blaumann Foundation (3000 EUR)** co-authors Maximilian Lock. *Passing the time: interactions and the breakdown of relational dynamics.*

2021 - 2023 **John Templeton Foundation Grant (180 000 EUR)** co-authors Marcus Huber (TU Wien) and Jörg Schmiedmayer (TU Wien) for the project *Bridging physical theories: how large-scale laws emerge from the perspective of algorithmic information theory and quantum many-body systems.*

2019 **Ehrenfest Award (2000 EUR)** shared with co-authors for the best paper in foundations of physics awarded by IQOQI Vienna, Austria.

2019 - 2023 **Young Independent Researcher Grant (1.9 million EUR)** FWF (Austrian National science fund) grant to start an independent research group between Institute for Quantum Optics and Quantum Information and the University of Vienna.

2017 **FQXi mini-grant (12 000 USD)** joint with Lidia del Rio, for Q-turn 2018 conference in Florianopolis, Brazil.

Conference Organisation, Committees, Reviewing Duties

2018, 2020 **Q-turn** Founder and co-organiser. Legally registered association in Austria for the support and promotion of diversity in quantum science (ZVR: 1975382805). 2018: conference in Florianopolis, Brazil raised over 60 000 EUR. 2020: online conference with over 900 registered participants. qturn.science

2021, 2022 **Ehrenfest Award** Committee member for the Ehrenfest Award (best paper in Quantum Foundations).

2022 **John Templeton Foundation** Large grant reviewer (USD 1.5M+)

2022 **QIP 2022** Program committee member.

2023 **Mapping the Irreverse** Interdisciplinary workshop and project on irreversibility. Co-PI and organiser. Working with political philosophers, artists, climate change scientists.

2023 **APS March Meeting Las Vegas** Co-organiser with Gabriel Landi of three sessions (W02: Thermodynamics of Many-body Quantum Systems, Y02: Quantum Thermodynamic Processes and Protocols, Z02: Experimental Advances and Open Quantum Systems in the Thermodynamic Regime).

Talks and visiting researcher

2026 Sep Talk: *Cloning Quantum Channels*, Foundations of Quantum Technologies Conference, **Girton College, University of Cambridge**.

2026 Sep Talk: *Fleck: quantum computing in the life sciences*, UpQuantVal, **University of Basel**.

2026 May Invited: *Ongoing collaboration*, week long visit, **University of Granada, Spain**.

2024 Sept	Invited lecturer: *Diffracting the Copenhagen Interpretation*, **Royal Danish Academy of Fine Arts, Copenhagen**.
2023 Aug	Keynote: *On Entanglement in Quantum Theory*, Summer School, **FH Technikum Vienna**.
2023 Jun	Invited: *3 fragments, 2 examples and 4 concepts from quantum theory*, Transpositions, a workshop on the intraplay between artistic practice and quantic thought, **Royal Danish Academy of Fine Art**.
2023 Dec	Seminar: *From cloning to super-replication: results for general quantum maps.* **University of Bristol**.
2022 Nov	Colloquium talk: *Why Quantum?* **Trinity College Dublin, Ireland**.
2022 Sep	Invited talk: *Measuring the thermodynamic cost of timekeeping,* **DPG, Regensburg**.
2022 Mar	*Thermodynamic costs: from ideals to applications*, **Invited speaker APS March Meeting, Chicago, USA**.
2021 May	*The thermodynamic cost of timekeeping*, **Technical University of Vienna, Austria**.
2020 May	*Work estimation and fluctuations with non-ideal Measurements*, **BQIT, Bristol, UK**.
2020 Feb	*Visiting researcher* hosted by Prof. Mio Murao, **University of Tokyo, Japan.**
2019 Dec	*Visiting researcher* hosted by Prof. Fernando de Melo, **CBPF, Rio de Janeiro, Brazil.**
2018 Jun	*Ideal Projective Measurements Have an Infinite Energy Cost*, conference in **Espoo, Finland.**
2018 Dec	*Ideal Projective Measurements Have an Infinite Energy Cost*, Colloquium, **University of Buenos Aires, Argentina**.
2018 Nov	*Exploring the limits of no- backwards-in-time signalling*, Quantum Maiwar, **Univesity of Queensland, Australia**.
2018 Oct	*Ideal Projective Measurements Have an Infinite Energy Cost*, Young Quantum Innovators, **IQC, Waterloo, Canada.**
2016 Dec	*Thermodynamics of systems with multiple conserved quantities*, Mathematical Foundations of Quantum Mechanics, **Smolenice, Slovakia**.

Teaching

2022	Thermodynamics of multiple conserved quantities at Qlypso in Malta.
2021	Away from ideals: thermodynamic costs with realistic resources, invited lecturer at summer school in Les Diablerets, Switzlerand.
2019	Entanglement theory, invited lecturer at summer school in Paraty, Brazil.
2019	Lecturer in *Entanglement theory* masters/PhD course at University of Vienna.
2012 - 2016	Teaching assistant for undergraduate courses at University of Bristol. Classical mechanics II: Electromagnetism II, Calculus I and II.

Languages and skills

Human: English, German, Russian, Portuguese and French. **Computer:** Python, MatLab and Mathematica.
S2DS Science to data science course London 2018. Neural networks for image recognition; intern at Outra.

Papers with peer reviewers and those in preparation

in review	**Cloning Quantum Channels** Pavel Sekatski, YG, Naga Bhavya Teja Kothakonda, Michalis Skotiniotis. Accepted at *Nat. Comms.*, arXiv:2509.08059.
in review	**Indefinite causal order in boxworld theories.** Jessica Bavaresco, Ämin Baumeler, Yelena Guryanova, Costantino Budroni, Under review at *Quantum* Journal, arXiv.2411.00951
ongoing 2026	**Entropy production in retrodicted control systems.** Alec Boyd, Felix Binder, YG (Dublin, Dublin, Vienna). Calculating the differences in entropy production in classical versus quantum systems in a setting where one makes a statement about the past states, rather than the future ones.
submit 2026	**Non-unitarity in the Page-Wooters Formalism**, Časlav Brukner, YG, Maximilian Lock, Ismael Paiva, (Vienna, Bristol, Basel). The breakdown of unitarity in the Page-Wooters formalism.
submit 2026	**Conceptual crossings over allegorical bridges**, YG, Paper in philosophy of physics.

Exhibitions

Insurance forms/forms of insurance: precautions against the precarity of irreversibility, YG (as part of the solo show by Milica Tomíc), Installation (text, video), *Berlin Biennale for Contemporary Art* (2025).

Atlas of the Irreverse, vernissage, Galerie Martine Aboucaya, Paris, France (2024).

Peer Reviewed Publications

Regulatory Measures on Goods and Services in the Quantum Computing Industry, Amin Alavi and YG, Journal of World Trade Volume 59, Issue 6 pp. 1055-1082 (2025). 10.54648/trad2025051

Atlas of the Irreverse, Laurin Mackowitz and YG, *Graz University Publishing*, Book: ISBN 978-3-903374-28-7 (2023). 10.25364/9783903374287

On Retrocausality: Looking Forward to Looking Back, YG, *Book chapter*, Atlas of the Irreverse, *Graz University Publishing* (2023). 10.25364/97839033742875

Disease control as an optimization problem, Miguel Navascués ,Costantino Budroni, YG *PLOS ONE*, **16**, 9: e0257958, (2021). 10.1371/journal.pone.0257958

Measuring the thermodynamic cost of timekeeping, A. N. Pearson, YG, P. Erker, E. A. Laird, G. A. D. Briggs, M. Huber and N. Ares. *Phys Rev. X*, **11**, 021029, (2021). 10.1103/PhysRevX.11.021029

Ideal Projective Measurements Have Infinite Resource Costs, YG, Nicolai Friis and Marcus Huber. *Quantum* **4**, 222, (2020). 10.22331/q-2020-01-13-222

Overcoming Noise in Entanglement Distribution, Sebastian Ecker, Frédéric Bouchard, Lukas Bulla, Florian Brandt, Oskar Kohout, Fabian Steinlechner, Robert Fickler, Mehul Malik, YG, Rupert Ursin and Marcus Huber. *Phys. Rev. X* **9**, 4, 041042, (2019). 10.1103/PhysRevX.9.041042

Quantum Thermodynamics with Multiple Conserved Quantities, Erick Hinds, Mingo, YG, Philippe Faist and David Jennings, in: *Thermodynamics in the Quantum Regime. Fundamental Theories of Physics*, vol **195**. Springer, Cham. Binder F., Correa L., Gogolin C., Anders J., Adesso G. (eds), (2018). 10.1007/978-3-319-99046-0

Work estimation and work fluctuations in the presence of non-ideal measurements, Tiago Debarba, Gonzalo Manzano, Yelena Guryanova, Marcus Huber, Nicolai Friis, *New J Phys*, **21**, 113002, (2019). https://iopscience.iop.org/article/10.1088/1367-2630/ab4d9d

Exploring the limits of no backward in time signalling, Yelena Guryanova, Ralph Silva, Anthony J. Short, Paul Skrzypczyk, Nicolas Brunner and Sandu Popescu. *Quantum* **3**, 211, (2019). 10.22331/q-2019-12-09-211

Almost quantum correlations violate the no-restriction hypothesis, Ana Belén Sainz, Yelena Guryanova, Antonio Acín, Miguel Navascués. *Phys. Rev. Lett.* **120**, 200402, (2018). 10.1103/PhysRevLett.120.200402

Connecting processes with indefinite causal order and multi-time quantum states, Ralph Silva, Yelena Guryanova, Anthony J. Short, Paul Skrzypczyk, Nicolas Brunner, Sandu Popescu. *New J. Phys.* **19**, 103022, (2017). 10.1088/1367-2630/aa84fe

Adjusting inequalities for detection loophole-free steering experiments, Ana Belén Sainz, Yelena Guryanova, Will McCutcheon, Paul Skrzypczyk, *Phys. Rev. A* **94**, 032122, (2016). 10.1103/PhysRevA.94.032122

Thermodynamics of quantum systems with multiple conserved quantities, Yelena Guryanova, Sandu Popescu, Anthony J. Short, Ralph Silva and Paul Skrzypczyk. 10.1038/ncomms12049

Multiple Observers Can Share the Nonlocality of Half of an Entangled Pair by Using Optimal Weak Measurements, Ralph Silva, Nicolas Gisin, Yelena Guryanova and Sandu Popescu. *Phys. Rev. Lett.*, **114**, 250401, (2015). 10.1103/PhysRevLett.114.250401

Almost quantum correlations, Miguel Navascués, Yelena Guryanova, Matty J. Hoban, Antonio Acín. *Nat Comms.*, **6**, 6288, (2015). 10.1038/ncomms7288

Pre- and post-selected quantum states: density matrices, tomography, and Kraus operators, Ralph Silva, Yelena Guryanova, Nicolas Brunner, Noah Linden, Anthony J. Short and Sandu Popescu. *Phys. Rev. A*, **89**, 012121, (2014). 10.1103/PhysRevA.89.012121