

Ivan Rojkov

PhD Student · Trapped Ion Quantum Information group

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Personal

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ETH Zürich
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Education

○ FEB 2021 - PRESENT

PhD Physics, *Eidgenössische Technische Hochschule Zürich (ETH Zürich)*

- Advisors: Dr. Florentin REITER & Prof. Dr. Jonathan HOME

○ SEP 2019 - JAN 2021

MSc Physics, *Eidgenössische Technische Hochschule Zürich (ETH Zürich)*

- MSc thesis: "Bias in error-corrected quantum sensing"
- Advisors: Dr. Florentin REITER & Prof. Dr. Jonathan HOME

○ SEP 2016 - JUL 2019

BSc Physics, *École Polytechnique de Lausanne (EPFL)*

Experience

* research; + professional

○ FEB 2021 - PRESENT

Research assistant *, *Trapped Ion Quantum Information group, ETH Zürich*

- Advisors: Prof. Dr. Jonathan HOME, Dr. Florentin REITER

○ OCT 2019 - NOV 2020

Research assistant *, *BachLab, University of Zürich*

- Advisor: Prof. Dr. Dominik R. BACH

○ AUG 2014 - AUG 2019

Administrative assistant +, *Osteopathic Permanence of Geneva*

○ JUL 2019

Research assistant *, *Trisconne group, Department of Quantum Matter Physics, University of Geneva*

- Advisors: Prof. Dr. Jean-Marc TRISCONNE, Dr. Marios HADJIMICHAEL, Dr. Adrien WAELCHLI

○ APR 2016 - SEP 2016 + SUMMERS 2017 & 2018

Research assistant *, *Alpha Magnetic Spectrometer (AMS-02), CERN*

- Advisors: Prof. Dr. Samuel TING, Dr. Michael CAPELL

○ JUN 2015 - APR 2016

Swiss Military, Infantry +, *Federal Department of Defence, Civil Protection and Sport*

Awards & Grants

2025	Postdoc.Mobility , <i>Swiss National Science Foundation (SNSF)</i> Postdoctoral fellowship obtained for 24 month to work with Steve GIRVIN and Shruti PURI at Yale University.	CHF 128'000
2025	Monte Verità Conference , <i>Congressi Stefano Franscini</i> Grant obtained in collaboration with Jonathan HOME, Andreas WALLRAFF, Alexander GRIMM, Joseph RENNES, and Alfredo RICCI VÁSQUEZ to organize the Monte Verità Quantum Codes (MVQC) conference 2026.	CHF 17'000
2022	ETH-EPFL Summer Schools grant , <i>EPFL & ETH Zürich</i> Lead applicant for the grant obtained in collaboration with Stefano BARISON, Alfredo RICCI VÁSQUEZ, David SCHLEGEL, Gillenhaal BECK, and Moritz FONTBOTÉ-SCHMIDT, securing funding to organize the Quantum Computing Hard- and Software summer school 2022.	CHF 20'000
2015	Prix de l'Université de Genève , <i>University of Geneva</i> Prix Marc Birkigt , <i>Collège de Genève</i> Awards received prior starting the BSc.	CHF 500 CHF 300

Selected publications

- IR, E. Zapusek, and F. Reiter, "Scalable dissipative quantum error correction for discrete-variable codes", arXiv:quant-ph/2507.12534 (2025)
↪ Trickle-down error correction exponentially reduces the number of operators and boosts performance.
- IR, M. Simoni, E. Zapusek, F. Reiter, and J. Home, "Stabilization of cat-state manifolds using nonlinear reservoir engineering", arXiv:quant-ph/2407.18087 (2024)
↪ New paradigm generalizing reservoir engineering and quantum system operation to nonlinear regimes.
- IR, P. M. Röggl, M. Wagener, M. Fontboté-Schmidt, S. Welte, J. Home, and F. Reiter, "Two-qubit operations for finite-energy Gottesman-Kitaev-Preskill encodings", Phys. Rev. Lett. **133**, 100601 (2024)
↪ Physical distortion due to ideal operations can be corrected without altering the logical information.
- IR, D. Layden, P. Cappellaro, J. Home, and F. Reiter, "Bias in error-corrected quantum sensing", Phys. Rev. Lett. **128**, 140503 (2022)
↪ Finite-speed quantum error correction biases signals obtained from error-corrected quantum sensors.

Mentoring

Spring 2024	Frederik VAN DER BRUGGE , <i>MSc Thesis</i> "Dissipatively stabilized cat qudits for analog quantum simulation" Co-supervised with F. Reiter and J. Home
Spring 2023	Lorenzo FIORONI , <i>MSc Thesis</i> "QMLA method for quantum Liouvillian learning" Co-supervised with F. Reiter and J. Home
Fall 2022	Noah KAUFMANN , <i>MSc Thesis</i> "Noise Characterization of Near-Term Quantum Devices" Co-supervised with F. Reiter and J. Home
Spring 2022	Paul MOSER RÖGGLA , <i>MSc Thesis</i> "Two qubit gates for Gottesmann-Kitaev-Preskill states" Co-supervised with F. Reiter and J. Home
Spring 2021	Gerard AGUILAR TAPIA , <i>Semester project</i> "Study of the efficiency of GKP codes to correct various oscillator error models" Co-supervised with F. Reiter and J. Home

Teaching Experience

Spring 2025	Energy and Sustainability in the 21st Century (II), Teaching Assistant	ETH Zürich
Fall 2024	Energy and Sustainability in the 21st Century (I), Teaching Assistant	ETH Zürich
Spring 2024	Physics Lab 1, Teaching Assistant	ETH Zürich
Fall 2023	Physics Lab 1, Teaching Assistant	ETH Zürich
Spring 2023	Quantum Information Processing I: Concepts, Teaching Assistant	ETH Zürich
Fall 2022	Physics Lab 1, Teaching Assistant	ETH Zürich
Spring 2022	Quantum Information Processing I: Concepts, Teaching Assistant	ETH Zürich
Fall 2021	Quantum Information Theory, Teaching Assistant	ETH Zürich

Academic services

• Peer Review

Phys. Rev. Lett. / Phys. Rev. X / PRX Quantum / Phys. Rev. A / Phys. Rev. Research / Npj Quantum Inf.

• Grant Contributions

Contributed to grant proposals including "Implementations and Applications of Bosonic Codes" (SNSF Project Funding) and "Interacting error-correction codes in Penning trap arrays" (SNSF Advanced Grant).

• Organizations

Apr 2026	Monte Verità Quantum Codes (MVQC), Co-organizer
2024-2025	Ion Trapping Online Seminar (ITOS), Co-organizer
Jun 2022	Quantum Computing Hard- and Software summer school 2022, Lead organizer
2020-2022	Quantum Engineering Commission (QEC), Board member In charge of the weekly journal club (Quantum Paper Club) at the QEC (association of students interested in quantum engineering).
2018-2019	International Physicists' Tournament, Member of Swiss Team

Languages

Computer	Julia, Python, C++11, C, Bash, Ruby, HTML, CSS, MatLab,
Human	English (fluent), French (first), Russian (first), German (B2),

Publication list

IR, E. Zapusek, and F. Reiter, "Scalable dissipative quantum error correction for discrete-variable codes", arXiv:quant-ph/2507.12534 (2025)

E. Zapusek, IR, and F. Reiter, "Scaling quantum algorithms via dissipation: avoiding barren plateaus", arXiv:quant-ph/2507.02043 (2025)

N. Kaufmann, IR, and F. Reiter, "Characterization of coherent errors in gate layers with robustness to pauli noise", Phys. Rev. Appl. **23**, 034014 (2025)

L. Fioroni, IR, and F. Reiter, "A learning agent-based approach to the characterization of open quantum systems", arXiv:quant-ph/2501.05350 (2025)

IR, M. Simoni, E. Zapusek, F. Reiter, and J. Home, "Stabilization of cat-state manifolds using nonlinear reservoir engineering", arXiv:quant-ph/2407.18087 (2024)

IR, P. M. Rögglä, M. Wagener, M. Fontboté-Schmidt, S. Welte, J. Home, and F. Reiter, "Two-qubit operations for finite-energy Gottesman-Kitaev-Preskill encodings", Phys. Rev. Lett. **133**, 100601 (2024)

A. Abivardi, C. W. Korn, **IR**, S. Gerster, R. Hurlmann, and D. R. Bach, "Acceleration of inferred neural responses to oddball targets in an individual with bilateral amygdala lesion compared to healthy controls", *Sci. Rep.* **13**, 14550 (2023)

M. Malinowski, C. Zhang, V. Negnevitsky, **IR**, F. Reiter, T.-L. Nguyen, M. Stadler, D. Kienzler, K. K. Mehta, and J. P. Home, "Generation of a maximally entangled state using collective optical pumping", *Phys. Rev. Lett.* **128**, 080503 (2022)

IR, D. Layden, P. Cappellaro, J. Home, and F. Reiter, "Bias in error-corrected quantum sensing", *Phys. Rev. Lett.* **128**, 140503 (2022)

Presentations

Invited Talks

- Sep 2024 **AWS Center for Quantum Computing, California Institute of Technology**
Host: Dr. Connor HANN; "Stabilization of cat-state manifolds using nonlinear reservoir engineering", **IR**
- Aug 2024 **Pritzker School of Molecular Engineering, University of Chicago**
Host: Prof. Dr. Liang JIANG; "Stabilization of cat-state manifolds using nonlinear reservoir engineering", **IR**
- Aug 2024 **Joint Center for Quantum Information and Computer Science, University of Maryland**
Host: Prof. Dr. Victor V. ALBERT; "Stabilization of cat-state manifolds using nonlinear reservoir engineering", **IR**
- Aug 2024 **Thompson Lab, Princeton University**
Host: Prof. Dr. Jeff THOMPSON; "Stabilization of cat-state manifolds using nonlinear reservoir engineering", **IR**
- Aug 2024 **Yale Quantum Institute, Yale University**
Hosts: Prof. Dr. Steven GIRVIN & Prof. Dr. Shruti PURI; "Stabilization of cat-state manifolds using nonlinear reservoir engineering", **IR**
- Aug 2024 **Lukin group - Quantum Optics Laboratory, Harvard University**
Host: Dr. Johannes BORREGAARD; "Stabilization of cat-state manifolds using nonlinear reservoir engineering", **IR**
- Aug 2024 **iQULSE seminar, Massachusetts Institute of Technology**
Host: Prof. Dr. Paolla CAPPELLARO; "Stabilization of cat-state manifolds using nonlinear reservoir engineering", **IR**
- Mar 2024 **Collège Sismondi, Highschools of Geneva**
Host: Dr. Julien PONARD; "Quantum Computers with Trapped Ions", **IR**
- Feb 2024 **Quantum Paper Club, ETH Zürich**
Host: Quantum Engineering Commission; "Multi-Qubit Gates for Bosonic Logical Qubits", **IR**
- Nov 2023 **Lunch seminar, ETH Zürich**
Host: Quantum Center; "Stabilisation of cat-state manifolds using nonlinear interactions", **IR** and Matteo SIMONI
- Jan 2022 **Hammerer's group, Leibniz Universität Hannover**
Host: Prof. Dr. Klemens HAMMERER; "Bias in Error-Corrected Quantum Sensing", **IR**

Contributed Presentations

* oral presentation; + poster presentation

- Mar 2025 **Global Physics Summit (March Meeting) 2025 ***, *Anaheim, USA*
 “Stabilisation of cat-state manifolds using nonlinear reservoir engineering”
- Jan 2024 **Swiss Quantum Days** ⁺, *Villars-sur-Ollon, CH*
 “Stabilisation of cat-state manifolds using nonlinear interactions”
- Jun 2023 **Bolder Boulder Quantum Workshop (BBQ)** ⁺, *Boulder, USA*
 “Dissipative stabilization of rotational symmetric codes”
- Jan 2023 **Coping with Errors in Scalable Quantum Computing Systems (778. WE-Heraeus-Seminar)** ⁺,
Bad Honnef, DE
 “Characterization and mitigation of coherent errors of near-term quantum devices”
- Jul 2022 **Quantum Communication, Measurement and Computing (QCMC)** ⁺, *Lisbon, PT*
 “Bias in Error-Corrected Quantum Sensing”
- Jun 2022 **Quantum Computing Hard- and Software (QCHS)** ⁺, *Lausanne, CH*
 “Bias in Error-Corrected Quantum Sensing”
- Jun 2022 **QSIT - Quantum Science and Technology Junior meeting ***, *Flumserberg, CH*
 “Bias in Error-Corrected Quantum Sensing”
- Nov 2021 **European Quantum Technologies Conference (EQTC)** ⁺, *Online*
 “Bias in Error-Corrected Quantum Sensing”
- Jun 2021 **Quantum Computing Hard- and Software (QCHS)** ⁺, *Online*
 “Bias in Error-Corrected Quantum Sensing”
- May 2021 **Division of Atomic, Molecular and Optical Physics (DAMOP)** ^{*}, *Online*
 “Bias in Error-Corrected Quantum Sensing”