

Dr. Violeta Nikolaeva Ivanova-Rohling

Postdoctoral Fellow, Department of Physics, University of Konstanz
Project Leader (DFG and DAAD funded projects)
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Research Profile

h-index: 8 — Publications: 14 — Research Areas: Quantum Computing, Machine Learning, Optimization

Academic Positions

Postdoctoral Researcher and Project Leader (DFG-funded project)

Department of Physics, University of Konstanz May 2024 – present

- Principal Investigator of the DFG-funded project “*Deep Learning Methods with Symmetry Priors for Problems in Quantum Computing*”
- Lead research on machine learning and optimization methods for quantum control and noisy quantum systems
- Develop symmetry-informed learning approaches for quantum systems

Postdoctoral Fellow, Zukunftskolleg

University of Konstanz June 2020 – March 2024

- Led an independent research project on machine learning methods for quantum computing
- Developed machine learning and optimization methods tailored to quantum computing problems
- Worked on interdisciplinary topics at the interface of quantum physics, machine learning, and optimization

Assistant Professor

Department of Mathematical Foundations of Computer Science
Institute of Mathematics and Informatics, Bulgarian Academy of Sciences Nov 2017 – June 2020

Education

Doctoral Degree (PhD), Computer Science

University of Konstanz Defense: May 3, 2019

- Thesis: “*Communication-less Strategies for Widening*”
- Supervisors: Prof. Michael Berthold, Prof. Sven Kosub

Doctoral Researcher

University of Konstanz Sept 2011 – Dec 2016

- Research Topic: Parallelizing machine learning and data mining algorithms
- DFG Graduate Program: “*Explorative Analysis and Visualization of Large Information Spaces*”

Master of Science in Computer Science

Max Planck Research School, MPI for Informatics and Saarland University 2010

Grants and Funding

Principal Investigator, German Research Foundation (DFG), “*Deep Learning Methods with Symmetry Priors for Problems in Quantum Computing*”, 2024–2026

Project Leader, German Academic Exchange Service (DAAD), *Germany/Hong Kong Joint Research Scheme*, “*Efficient and Robust Multi-Qubit Gates in Solid-State Quantum Computing*”, 2025–2027

Research Fellow and Project Leader, Zukunftscolleg, University of Konstanz, 2020–2024

Research Grant (First Place), Bulgarian National Science Fund, 2019

Visitor Fellowship, Abdus Salam International Centre for Theoretical Physics (ICTP), 2018

Max Planck Research School Scholarship, 2007–2010

Selected as Bulgaria’s representative, UNESCO workshop on AI in education (2019)

Member, Expert Working Group on AI in Higher Education, Ministry of Education (Bulgaria) (2019)

Conference Presentations

- APS March Meeting 2024
“*Discovery of exchange-only sequence with record-low time using reinforcement learning*”
- APS March Meeting 2023
“*Gate sequence optimisation under noise*”
- APS March Meeting 2022
“*Optimal Quantum State Tomography with Noisy Gates*”
- APS March Meeting 2021
“*Optimal state tomography by measuring the qubit of a qubit-qutrit system*”
- German Physical Society (DPG), SAMOP 2022
“*Machine learning approaches to optimal gate sequences under noise*”
- German Physical Society (DPG), SAMOP 2021
“*Machine-learning framework for customized optimal quantum state tomography*”
- Frontiers of Quantum and Mesoscopic Thermodynamics 2021
“*Machine-learning framework for customized optimal quantum state tomography*”

Teaching and Outreach

- Practical Machine Learning for Quantum Computing, University of Konstanz, 2022
- Machine Learning for Quantum Computing Seminar, 2021
- European Science Night, Sofia, 2019
- Summer Research School, Bulgarian Academy of Sciences, 2018
- Science on Board Lecture Series, Sofia

Academic Service

- Member, Executive Committee, Zukunftscolleg (since 2021)
- Member, Internal Liaison Board (Physics), Zukunftscolleg (since 2020)
- Member, Equal Opportunity Council, University of Konstanz (since 2022)
- Evaluation and selection of applicants, Zukunftscolleg Fellowships (2021–2024)

Supervision

- Supervisor of Master Project: Daniel Schick (2021)

Publications

1. Ivanova-Rohling, V. N., Rohling, N., & Burkard, G. (2023). Optimal quantum state tomography with noisy gates. *EPJ Quantum Technology*, 10, 25. doi:10.1140/epjqt/s40507-023-00181-2
2. Ivanova-Rohling, V. N., Burkard, G., & Rohling, N. (2021). Quantum state tomography as a numerical optimization problem. *New Journal of Physics*, 23(12), 123034. doi:10.1088/1367-2630/ac3c0e
3. Ivanova-Rohling, V. N., & Rohling, N. (2020). Evaluating machine learning approaches for discovering optimal sets of projection operators for quantum state tomography of qubit systems. *Cybernetics and Information Technologies*, 20(6), 61–75. doi:10.2478/cait-2020-0061
4. Ivanova-Rohling, V. N., & Rohling, N. (2019). Optimal choice of state tomography quorum formed by projection operators. *Physical Review A*, 100(3), 032332. doi:10.1103/PhysRevA.100.032332
5. Ivanova-Rohling, V. N. (2018). Neighborhood-based strategies for widening of the greedy algorithm of the set cover problem. In *Proceedings of the 19th International Conference on Computer Systems and Technologies (CompSysTech)*. doi:10.1145/3274005.3274036
6. Ivanova-Rohling, V. N. (2020). Theoretical properties of a neighborhood-based approach for widening. *Serdica Journal of Computing*, 14(3–4), 65–91. doi:10.55630/sjc.2020.14.65-91
7. Ivanova-Rohling, V. N. (2018). Approaches to communication-less diversity in the widening of rule induction. In *Proceedings of the 19th International Conference on Computer Systems and Technologies (CompSysTech)*. doi:10.1145/3274005.3274033
8. Ivanova, V. N., & Berthold, M. R. (2013). Diversity-driven widening. In *Proceedings of the 12th International Symposium on Intelligent Data Analysis (IDA)*, pp. 223–236. doi:10.1007/978-3-642-41398-8_20
9. Akbar, Z., Ivanova, V. N., & Berthold, M. R. (2012). Parallel data mining revisited: Better, not faster. In *Proceedings of the 11th International Symposium on Intelligent Data Analysis (IDA)*, pp. 23–34. doi:10.1007/978-3-642-34156-4_4
10. Balmer, N. V., Weng, M. K., Zimmer, B., Ivanova, V. N., et al. (2012). Epigenetic changes and disturbed neural development in a human embryonic stem cell-based model relating to fetal valproate syndrome. *Human Molecular Genetics*. doi:10.1093/hmg/ddc239
11. Weng, M. K., Zimmer, B., Pörtl, D., Broeg, M. P., Ivanova, V. N., et al. (2012). Extensive transcriptional regulation of chromatin modifiers during human neurodevelopment. *PLoS One*, 7(5), e36708. doi:10.1371/journal.pone.0036708
12. Weng, M. K., Natarajan, K., Scholz, D., Ivanova, V. N., et al. (2014). Lineage-specific regulation of epigenetic modifier genes in human liver and brain. *PLoS One*, 9(7), e102035.
13. Krug, A. K., Gutbier, S., Zhao, L., Pörtl, D., Ivanova, V., et al. (2014). Transcriptional and metabolic adaptation of human neurons to the mitochondrial toxicant MPP+. *Cell Death & Disease*, 5, e1222.

14. Balmer, N. V., Klima, S., Rempel, E., Ivanova, V. N., Kolde, R., et al. (2014). From transient transcriptome responses to disturbed neurodevelopment: role of histone acetylation and methylation as epigenetic switch between reversible and irreversible drug effects. *Archives of Toxicology*, 88, 1451–1468.

Skills

- Project Management (GPM Certificate)
- International Communication, Conflict Resolution, Team Management