PERSONAL Name : Vladimir MILCHAKOV
Email : vladimir.milchakov@gmail.com

EDUCATION

- 2018–2021 : Ph.D. in Physics, CNRS / Institut Néel, Grenoble, France
  (affilated in Université Grenoble Alpes, UGA)
  Title : «Optimized transmon molecule for high fidelity quantum non demolition readout using cross-Kerr coupling», supervised by Dr. Olivier Buisson
- 2016–2018: Post-Master Research, ISSP RAS, Chernogolovka, Russia
  Project: Spectroscopic measurements of superconducting circuits and improvement of experimental setups, including device instrumentation and packaging. Supervised by Prof. Valeriy Ryazanov.
- 2010–2016: B.Sc. & M.Sc. in Physics, Novosibirsk State University, Russia
  Master's Thesis: Study of dark quantum states in entangled superconducting qubits, supervised by Prof. Valeriy Ryazanov.
  Bachelor's Thesis: Exploration of laser generation on self-terminating transitions in copper and thallium atoms, supervised by Dr. Ekaterina Belskaya.

PROFESSIONAL EXPERIENCE

- 2024–2025 : Staff Quantum Experimentalist, Alice & Bob, Paris, France

  Development of tools for characterizing and improving the experimental environment of superconducting qubits, including low-frequency magnetic noise and microwave radiation temperature. Implementation of monitoring of laboratory "health" parameters (noise, vibrations, electromagnetic interference). Characterization of flux noise and significant improvement in qubit coherence and relaxation times. Design and automation of measurement and data analysis protocols. Collaboration with nanofabrication, cryogenics, and electronics teams to optimize experiments.

- 2021–2024 : Quantum Engineer, IQM Quantum Computers, Helsinki, Finland

  Design and simulation of superconducting quantum processors (QPUs) and optimization of their scalability. Led a project to improve qubit coherence (T_1) with a team of more than 15 researchers; improved coherence time by a factor of more than 10. Development and automation of the Energy-Participation-Ratio (EPR) tool to reduce TLS losses and optimize circuits. Performing electromagnetic and RF circuit simulations to optimize capacitors, resonators, and Purcell filters. Coordination of design, nanofabrication, and measurement activities.

- 2018–2021 : PhD, CNRS / Institut Néel, Grenoble, France

  Development of a fast, non-destructive (QND) readout device for non-linearly coupled transmon qubits. Optimization of circuit parameters and microwave pulses to achieve high readout fidelity. Design and execution of self-calibration protocols with JPA and TWPA amplifiers. Development of a nanofabrication recipe improving coherence times and frequency reproducibility. Experimental study of quantum trajectories and electromagnetic simulations to adjust energy levels and reduce dielectric losses.

REFERENCES

- Prof. Mikko Möttönen, Professor, Aalto University, Finland – Expert in superconducting quantum circuits and co-founder of IQM Quantum Computers.
- Dr. Olivier Buisson, Research Director, CNRS, Institut Néel, Grenoble, France – Specialist in superconducting quantum circuits and high-fidelity readout devices.

Key collaborators in the field of superconducting quantum circuits.

SELECTED ARTICLES
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- Milchakov, V., Dassonneville, R., Ramos, T., Buisson, O. et al. (2025). *High-power readout of a transmon qubit using a nonlinear coupling*. **arXiv:2507.03642**. https://arxiv.org/abs/2507.03642
- Rönkkö, J., Ahonen, O., Bergholm, V., Milchakov, V. et al. (2024). *On-premises superconducting quantum computer for education and research*. **EPJ Quantum Technol**. 11, 32. https://doi.org/10.1140/epjqt/s40507-024-00243-z
- Dassonneville, R., Ramos, T., Milchakov, V., Buisson, O. et al. (2023). *Transmon-qubit readout using an in situ bifurcation amplification in the mesoscopic regime*. **Phys. Rev. Appl.**, 20, 044050. https://link.aps.org/doi/10.1103/PhysRevApplied.20.044050
- Dassonneville, R., Ramos, T., Milchakov, V., Buisson, O. et al. (2020). *Fast High-Fidelity Quantum Nondemolition Qubit Readout via a Nonperturbative Cross-Kerr Coupling*. **Phys. Rev. X**, 10, 011045. https://link.aps.org/doi/10.1103/PhysRevX.10.011045
- Planat, L., Milchakov, V., Buisson, O., Roch, N. et al. (2019). *Fabrication and Characterization of Aluminum SQUID Transmission Lines*. **Phys. Rev. Appl.**, 12, 064017. https://link.aps.org/doi/10.1103/PhysRevApplied.12.064017
- Léger, S., Puertas-Martínez, J., Milchakov, V., et al. (2019). *Observation of quantum many-body effects due to zero point fluctuations in superconducting circuits*. **Nat Commun** 10, 5259. https://doi.org/10.1038/s41467-019-13199-x
- Renger, M., Milchakov, V., et al. (2025). *A Superconducting Qubit-Resonator Quantum Processor with Effective All-to-All Connectivity*. **arXiv:2503.10903**. https://arxiv.org/abs/2503.10903
- Milchakov, V. (2022). *Optimized transmon molecule for high fidelity quantum non demolition readout using cross-Kerr coupling*. **PhD Thesis**, CNRS / Institut Néel, Grenoble, Université Grenoble Alpes (UGA).

SKILLS

- **Programming and automation:** Advanced Python for measurements, analysis, and automation; C/C++; Git, OOP.
- **Measurements and instrumentation:** Conducting quantum and cryogenic measurements, advanced laboratory instrumentation, principles of spectroscopy, and QND readout.
- **Simulations and design:** CAD for superconducting circuits; electromagnetic simulations and coherence optimization.
- **Nanofabrication:** General lithography and material deposition techniques; manufacturing processes and characterization of quantum devices.
- **Data analysis:** Structured and automated processing, statistical methods, signal and curve fitting, accurate reporting.
- **Project management and communication:** Agile methods, Jira/Notion, technical writing, and clear presentations to diverse audiences.

AWARDS

- **IQM Innovation Award (2023)** – Recognition of the team for collective efforts in innovation, with specific attribution to personal activity in the development of original ideas for the design of superconducting quantum processors (QPUs) and nanofabrication processes.

CONFERENCES & PRESENTATIONS

- JMC 2018, Grenoble, France – Poster: Qubit readout using a V-shaped transmon
- APS March Meeting 2019, Boston, USA – Presentation: Fast, high-fidelity readout of a molecular transmon qubit via cross-Kerr coupling
- Les Houches Summer School 2019, France – Poster: Non-destructive quantum readout of high-fidelity qubits via non-perturbative cross-Kerr coupling
- IQFA XI 2020, Grenoble, France – Poster: Circuit optimization to improve transmon qubit readout via cross-Kerr coupling
- APS March Meeting 2021 (online) – Presentation: Circuit optimization to improve transmon qubit readout via cross-Kerr coupling
- SQA 2022, Helsinki, Finland – Poster: Non-perturbative cross-Kerr coupling for high-fidelity QND measurement of a superconducting qubit
- SQA 2023, Munich, Germany – Poster: Simulations and EPR (Energy Participation Ratio) measurements of base layer TLS losses
- Business/Industry Conferences (participant, without presentation): VivaTech 2025 (Paris), French Quantum 2025 (Paris), Q2B 2024 (Paris)