

Aleksandr Berezutskii

PhD Student @ Université de Sherbrooke

📍 Sherbrooke, QC, Canada
☎ +1 (438) 3783087
✉ aleksandr.berezutskii@usherbrooke.ca
🌐 github.com/meandmytram
in linkedin.com/in/berezutskii

Education

Université de Sherbrooke – Département de physique, Institut Quantique *Sherbrooke, Canada*
Ph.D. in Physics 2020–2024
Advisor : Prof. Stefanos Kourtis (Quantum Information and Computational Physics Lab)
Selected coursework: modelling of matter and quantum computing, topological condensed matter physics

Skolkovo Institute of Science and Technology *Moscow, Russia*
M.Sc. in Physics and Mathematics 2017–2019
Thesis title: "Probing criticality in quantum spin chains with neural networks"
Advisor : Prof. Jacob Biamonte (Deep Quantum Laboratory), Dr. Zoltán Zimborás (Wigner Research Centre for Physics)
Selected coursework: quantum mechanics, quantum computing, transport in mesoscopic systems
GPA: 4.57/5.00

Moscow Institute of Physics and Technology *Moscow, Russia*
B.Sc. in Physics and Mathematics 2013–2017
Thesis title: "Studying electron dynamics in topological insulators with femtosecond laser spectroscopy"
Advisor : Dr. Victor Kompanets (Institute for Spectroscopy)
Selected coursework: statistical physics, solid state physics, field theory, computational mathematics
GPA: 4.53/5.00

Career Trajectory

1QB Information Technologies (1QBit)

Waterloo, ON, Canada

Machine Learning Scientist

2019–2020

Project title: "Conditional generative machine learning for simulations of many-body spin systems"

Supervisor : Dr. Pooya Ronagh

I worked on applications of conditional generative models to classical many-body spin systems. In particular, I worked on the design of a conditional generative model such that it can sample from the Boltzmann distribution conditioned on physical parameters of the system such as couplings and local fields. The project resulted in a patent.

Huawei

Moscow, Russia

Summer Research Intern

2018

Project title: "Realization of Shor's algorithm using Approximate Quantum Fourier Transform"

Supervisor : Dr. Yuri Zotov

I studied the Approximate Quantum Fourier Transform (AQFT) and applied it to Shor's factoring algorithm. I implemented the AQFT for number factoring instead of the full QFT inside Shor's algorithm and obtained the algorithm success probabilities with respect to the approximation degree. The project was summarized in a poster presented at the Skoltech/MIT industrial conference.

Russian Quantum Centre

Moscow, Russia

Summer Research Intern

2017

Project title: "Polarized ultracold atomic cloud of Thulium atoms"

Supervisor : Dr. Alexey Akimov

I conducted numerical simulations of the excited level population decay of an ensemble of ultracold magnetically polarized Thulium atoms near the degeneracy temperature.

Publications

• Probing Criticality in Quantum Spin Chains with Neural Networks

A. Berezutskii, M. Bektov, D. Yudin, Z. Zimborás, and J. Biamonte

Journal of Physics: Complexity 1.3 (2020): 03LT01

• Polarized Cold Cloud of Thulium Atom

V. Tsyganok, V. Khlebnikov, E. Kalganova, D. Pershin, E. Davletov, I. Cojocaru, I. Luchnikov, A. Berezutskii, V. Bushmakina, V. Sorokin and A. Akimov

Journal of Physics B: Atomic, Molecular and Optical Physics 51.16 (2018): 165001

Conferences

- **International Conference on Quantum Technologies**, 2021, Russian Quantum Centre – poster
- **Machine Learning for Quantum Design**, 2019, Perimeter Institute for Theoretical Physics – poster
- **International Conference on Quantum Technologies**, 2019, Russian Quantum Centre – poster
- **Entanglement Days**, 2018, Budapest University of Technology and Economics – poster

Research Interests

I am interested in quantum information and quantum many-body physics with an emphasis on modern computational methods, such as tensor networks, differentiable programming, machine learning.

Skills

- Python
- Tensor networks: tenpy, quimb
- Differentiable programming: PyTorch, JAX, Tensorflow
- Data science: Scikit-learn, Pandas
- Cloud computing: Google Cloud Platform
- MLOps: Weights and Biases
- GNU/Linux, Unix-based operating systems

Teaching Experience

International Physicists' Tournament, University of Warsaw

2021

I served as a member of jury in physics fights at a graduate-level international physics competition.

Special Topics in Physics (PHYS490), University of Waterloo

2020

I delivered two lectures in a graduate-level physics class on Variational Autoencoders, a specific model used in generative machine learning.

Reviewing Activities

NeurIPS, Machine Learning and the Physical Sciences Workshop

2019

I was involved as a junior reviewer in a physics-devoted workshop at the biggest machine learning conference.

Additional Education

- Quantum Machine Learning
- Deep Learning with Tensorflow
- Machine Learning with Python

References

Dr. Jacob Biamonte

Skolkovo Institute of Science and Technology
Deep Quantum Laboratory
30 Bolshoy Boulevard, bld. 1
Moscow, Russia 121205
✉ j.biamonte@skoltech.ru

Dr. Zoltán Zimborás

Wigner Research Centre for Physics
Theoretical Physics Department
29-33 Konkoly-Thege Miklós str.
Budapest, Hungary 1121
✉ Zimboras.Zoltan@Wigner.mta.hu

Dr. Pooya Ronagh

1QB Information Technologies (1QBit)
Hardware Innovation Lab
1285 West Pender Street, Unit 200
Vancouver BC, Canada V6E 4B1
✉ pooya.ronagh@1qbit.com