# Mansur Ziiatdinov

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## Research Interests

I'm interested in **theoretical computer science**, in particular **quantum algorithms**, their complexity and design, and the construction of quantum input oracles.

## Education

May, 2022 **PhD (eq.) in Computer Science**, *Kazan Federal University*, Kazan, Thesis Title: "Quantum Information Transmission: Effective Cryptographic Protocols"
Advisor: Farid Ablayev.
PDF of PhD Thesis is available on the website of KFU
Candidate of Sciences degree is equivalent to the PhD degree

Sept. 2005 — June 2010 **MSc (eq.) in Mathematics and IT**, *Kazan Federal University*, Kazan (cum laude)

### Other

October 2017 **Center for Quantum Computing Science**, *University of Latvia*, Riga, Latvia, (short-term visit)

April-June 2016 **Special Semester Program on Complexity Theory**, *St.Petersburg State University*, St.Petersburg

June 2015 **Summer School on Lower Bounds**, *Charles University*, Prague, Czech Republic

May-June 2012 **Training in International Laser Center**, *Moscow State University*, Moscow

## Work Experience

May 2020 — Dec 2023 **Research Fellow**, *Kazan Federal university, "Quantum Methods for Information Processing" Lab*, Kazan, (remotely since September 2022)
- used algebraic methods and found original constructions of quantum hashes;
- communicated with physicists to transfer mathematical models to hardware;
- wrote in Matlab, Python, C++ and R to perform numerical experiments;
- wrote in Qiskit and Cirq to model quantum computations.

August 2014 — January 2022 **Senior Developer**, *Lambda LLC*, Kazan
lambdasoft.ru (mirror)
- implemented API clients in Clojure;
- developed event stream processor in Haskell;
- developed frontend in Purescript and Elm;
- maintained old Java code;
- was responsible for CI/CD and server administration.

Open source contributions can be found on the corporate Github, and on personal Github, Bitbucket and Sourcehut.

September 2010 — June 2023

**Teacher**, *Kazan Federal University*, Kazan, (remotely since September 2022)

- Programming in Pascal
- Programming in C++
- Programming in Java
- Algorithms and Data Structures (also developed online course)
- Information Security
- Functional Programming in Haskell (see tasks for self-testing)
- Quantum Cryptography
- Quantum Algorithms (see online notes and automated testing system)

Supervised undergraduate students.

## Community Services

2017 Local organiser of "Computer Science in Russia-2017" symposium

2014 Local organiser of "Problemy teoreticheskoj kibernetiki" (Problems of theoretical computer science) conference

2010 Local organiser of "Computer Science in Russia-2010" symposium

## Personal Skills

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|---|---|---|---|
| Russian | Native | Tatar | Native |
| English | C1 *(Pearson PTE: 81/90)* | | |
| Haskell | expert | Linux | expert |
| Clojure | proficient | Automation | proficient |
| Python | proficient | CI/CD | proficient |
| C++ | proficient | Emacs | proficient |

## Journal Publications


[1] Farid Ablayev and Mansur Ziatdinov. "Identification of Quantum Hashes: Numerical Experiment". In: *Lobachevskii Journal of Mathematics* 44.2 (Feb. 2023), pp. 667–677.

[2] Kamil Khadiev, Nikita Savelyev, Mansur Ziatdinov, and Denis Melnikov. "Noisy Tree Data Structures and Quantum Applications". In: *Mathematics* 11.22 (2023). URL: https://www.mdpi.com/2227-7390/11/22/4707.

[3] Aliya Khadieva and Mansur Ziatdinov. "Deterministic Construction of QFAs Based on the Quantum Fingerprinting Technique". In: *Lobachevskii Journal of Mathematics* 44.2 (Feb. 2023), pp. 707–717.

[4] Kamil Khadiev, Aliya Khadieva, Mansur Ziiatdinov, Ilnaz Mannapov, Dmitry Kravchenko, Alexander Rivosh, and Ramis Yamilov. "Two-way and one-way quantum and classical automata with advice for online minimization problems". In: *Theoretical Computer Science* 920 (June 2022), pp. 76–94.

[5] Farid Ablayev and Mansur Ziiatdinov. "Universal Hash Functions from Quantum Procedures". In: *Uchenye Zapiski Kazanskogo Universiteta. Seriya Fiziko-Matematicheskie Nauki* 162.3 (2020), pp. 259–268.

[6] Kirill Erofeev, Mansur Ziiatdinov, and Evgenii Mokshin. "Persistent Homology: Application To Monitoring Hydraulic Fracturing". In: *Rssian Digital Libraries Journal* (2020).

[7] Farid Ablayev, Dmitry Bulychkov, Dmitry Sapaev, Alexander Vasiliev, and Mansur Ziiatdinov. "Quantum-Assisted Blockchain". In: *Lobachevskii Journal of Mathematics* 39.7 (Sept. 2018), pp. 957–960.

[8] Mansur Ziiatdinov. "Attacking Quantum Hashing. Protocols and Their Cryptanalysis". In: *Lobachevskii Journal of Mathematics* 39.7 (2018), pp. 1039–1045.

[9] Farid Ablayev, Marat Ablayev, Alexander Vasiliev, and Mansur Ziiatdinov. "Quantum Fingerprinting and Quantum Hashing. Computational and Cryptographical Aspects". In: *Baltic Journal of Modern Computing* 4.4 (2016), pp. 860–875.

[10] Mansur Ziiatdinov. "From graphs to keyed quantum hash functions". In: *Lobachevskii Journal of Mathematics* 37.6 (2016), pp. 705–712.

[11] Mansur Ziiatdinov. "Quantum Hashing. Group approach". In: *Lobachevskii Journal of Mathematics* 37.2 (2016), pp. 222–226.

[12] Mansur Ziiatdinov. "Using frequency analysis and Grover's algorithm to implement known ciphertext attack on symmetric ciphers". In: *Lobachevskii Journal of Mathematics* 34.4 (2013), pp. 313–315.

## Conference Papers

[13] Mansur Ziiatdinov, Aliya Khadieva, and Abuzer Yakaryılmaz. "GAPs for Shallow Implementation of Quantum Finite Automata". In: *Proceedings of the 16th International Conference on Automata and Formal Languages, Eger, Hungary, Sep. 5-7, 2023*. Ed. by Zsolt Gazdag, Szabolcs Iván, and Gergely Kovásznai. Vol. 386. Electronic Proceedings in Theoretical Computer Science. Open Publishing Association, 2023, pp. 269–280.

## Other Publications and Presentations

June 2023 **QScience Days 2023**, *online*, QJudge: Automated Testing of Students Solutions for Quantum Algorithms Courses, M.Ziiatdinov
(open source tool: `https://qjudge.gltronred.info`, description, source code)

June 2022 **Discrete Mathematics and its Applications**, *Moscow; online*, Lower Bounds for Query Complexity of Radix Sort, M.Ziiatdinov

June 2019 **Workshop on Quantum Computing and Quantum Information**, *Tokyo, Japan*, Deterministic Construction of QFAs based on the Quantum Fingerprinting Technique (poster), A.Khadieva, M.Ziiatdinov

June 2018 **14th Conference IQSA "Quantum Structures"**, *Kazan*, The Structure of Quantum Hash Functions for Groups, M.Ziiatdinov

May 2018 **Discrete Models in Theory of Control Systems**, *Moscow*, On Quantum Online Algorithms with Limited Memory and Advice, K.Khadiev, A.Khadieva, A.Rivosh, D.Kravchenko, M.Ziiatdinov, I.Mannapov, R.Yamilov

May 2018 **Discrete Models in Theory of Control Systems**, *Moscow*, Quantum Blockchain, F.Ablayev, D.Bulychkov, D.Sapaev, A.Vasiliev and M.Ziiatdinov

May 2018 **Discrete Models in Theory of Control Systems**, *Moscow*, Quantum hash functions for message authentication, M.Ziiatdinov

February 2018 **44th International Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM 2018)**, *Krems an der Donau, Austria*, Attacking Quantum Hashing. Protocols and their Cryptanalysis (poster), M.Ziiatdinov

January 2018 **21th Annual Conference on Quantum Information Processing (QIP)**, *Delft, Netherlands*, Quantum Online Algorithms with Advice Bits and Restricted Memory (poster), K.Khadiev, I.Mannapov and M.Ziiatdinov

October 2017 **3rd International Conference for Young Quantum Information Scientists (YQIS)**, *Erlangen, Germany*, The Security of the Quantum MAC (poster), M.Ziiatdinov

July 2017 **IV International Conference on Quantum Technologies**, *Moscow*, Quantum Fingerprinting and Quantum Hashing (poster), F.Ablayev, A.Vasiliev, M.Ziiatdinov

June 2017 **Problems of Theoretical Computer Science**, *Penza*, Quantum Hashing Method (plenary talk), F.Ablayev, M.Ablayev, A.Vasiliev, M.Ziiatdinov

June 2017 **Problems of Theoretical Computer Science**, *Penza*, On Authenticating Messages with Graph-based MACs, M.Ziiatdinov

April 2017 **Programming Languages and Compilers**, *Rostov-on-Don*, Free Bi-Arrows, or How to generate students' programming assignments, A.Marchenko, M.Ziiatdinov

June 2015 **IV International Symposium "Current Trends in Cryptography" (CTCrypt)**, *Kazan*, Minimizing collisions for quantum hashing, M.Ziiatdinov

May 2015 **Discrete Models in Theory of Control Systems**, *Moscow*, Minimizing collisions of quantum hashing, A.Vasiliev, M.Ziiatdinov

June 2014 **Problems of Theoretical Computer Science**, *Kazan*, On one construction of quantum hash function. Algebraic approach, M.Ziiatdinov

## Outreach

2022 **AtomSkills-2022 championship**, *Ekaterinburg*, Expert in "Quantum Technologies" discipline

2020, 2021 **"Ya Professional" olympiad ("I am Professional")**, *online*, Jury member for "Quantum Technologies" discipline

## Grants and Awards

2020–2021 **Analysis and construction of quantum algorithms in different models of computing**, RFBR 20–37–70080, (named researcher)

2017–2019 **Development of a quantum cloud platform**, RFBR 17-07-01606, (named researcher)

2017 **Kazan Federal University rector's stipend**

2014–2016 **A physical and mathematical model of quantum digital signature based on quantum hashing in multi-atom systems states**, RFBR 14-07-00878, (named researcher)

# References

References are available upon request