

# Nikita Doikov

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Residence: Switzerland, Lausanne

## RESEARCH INTERESTS

Optimization (numerical methods, convex optimization, second-order methods, tensor methods, global worst-case bounds, complexity, stochastic methods), Computer Science, Computational Mathematics, Algorithms, Statistics, Machine Learning (theory and practice)

## EDUCATION

**PhD**, [UCLouvain](#), Belgium 2021  
Thesis: “[New second-order and tensor methods in Convex Optimization](#)”  
Supervisor: [Yurii Nesterov](#)

**MSc**, [Higher School of Economics](#), Russia, GPA – 9.3/10.0 2017  
Faculty of Computer Science  
Program: Mathematical Methods of Optimization and Stochastics by [Vladimir Spokoyny](#)

**BSc**, [Lomonosov Moscow State University](#), Russia, GPA – 4.9/5.0 2015  
Faculty of Computational Mathematics and Cybernetics  
Program: Machine Learning

## EMPLOYMENT

Postdoctoral Researcher at **EPFL**, Switzerland (2 years) 09.2022 – 08.2024  
[Machine Learning and Optimization Laboratory](#)

Postdoctoral Researcher at **UCLouvain**, Belgium (1 year) 09.2021 – 08.2022  
[ICTEAM](#) / [CORE](#)

Software Engineering Intern at **Google**, Zürich, Switzerland (4 months) 08.2018 – 11.2018

Research Intern at **Skoltech**, Moscow, Russia (1 year) 10.2016 – 09.2017

Software Engineering Intern at **Google**, Zürich, Switzerland (3 months) 07.2016 – 09.2016

Software Engineer at **Yandex**, Moscow, Russia (9 months) 11.2015 – 07.2016

## TEACHING

Optimization models and methods II at [UCLouvain](#) 2021

Bayesian Methods in Machine Learning at [HSE](#) 2017, 2018, 2019

Optimization Methods at [Faculty of Computer Science](#), [HSE](#) 2017, 2018

Large-scale Optimization and Applications at [Skoltech](#) 2017

Direct supervision of MSc student projects and theses ([MIPT](#), [HSE](#), and [EPFL](#))

## TECHNICAL SKILLS

**Advanced:** Algorithms and Data Structures, Numerical Optimization Methods, Machine Learning

**Technologies:** C++, Python, Matlab, R, SQL, Intel Assembler, UNIX OS architecture, MapReduce, Flume, TensorFlow, PyTorch, JAX,  $\LaTeX$ , Git, SVN

**Languages:** Russian (native), English (fluent), French (basic)

## PUBLICATIONS

**Refereed Publications** (14 papers in the leading peer-reviewed journals and conferences on Mathematical Optimization, Statistics, and Machine Learning):

<i>Super-Universal Regularized Newton Method</i> , <b>N. Doikov</b> , K. Mishchenko, and Yu. Nesterov, <a href="#">SIAM Journal on Optimization</a>	2024
<i>Linearization Algorithms for Fully Composite Optimization</i> , M.L. Vladarean, <b>N. Doikov</b> , M. Jaggi, and N. Flammarion, <a href="#">COLT</a>	2023
<i>Polynomial Preconditioning for Gradient Methods</i> , <b>N. Doikov</b> , A. Rodomanov, <a href="#">ICML</a>	2023
<i>Second-order optimization with lazy Hessians</i> , <b>N. Doikov</b> , E.M. Chayti, and M. Jaggi, <a href="#">ICML (Oral Presentation)</a>	2023
<i>Gradient Regularization of Newton Method with Bregman Distances</i> , <b>N. Doikov</b> and Yu. Nesterov, <a href="#">Mathematical Programming Journal</a>	2023
<i>High-Order Optimization Methods for Fully Composite Problems</i> , <b>N. Doikov</b> and Yu. Nesterov, <a href="#">SIAM Journal on Optimization</a>	2022
<i>Affine-invariant contracting-point methods for Convex Optimization</i> , <b>N. Doikov</b> and Yu. Nesterov, <a href="#">Mathematical Programming Journal</a>	2022
<i>Local Convergence of Tensor Methods</i> , <b>N. Doikov</b> and Yu. Nesterov, <a href="#">Mathematical Programming Journal</a>	2021
<i>Minimizing Uniformly Convex Functions by Cubic Regularization of Newton Method</i> , <b>N. Doikov</b> and Yu. Nesterov, <a href="#">Journal of Optimization Theory and Applications</a>	2021
<i>Convex optimization based on global lower second-order models</i> , <b>N. Doikov</b> and Yu. Nesterov, <a href="#">NeurIPS (Oral Presentation)</a>	2020
<i>Contracting Proximal Methods for Smooth Convex Optimization</i> , <b>N. Doikov</b> and Yu. Nesterov, <a href="#">SIAM Journal on Optimization</a>	2020
<i>Stochastic Subspace Cubic Newton Method</i> , F. Hanzely, <b>N. Doikov</b> , P. Richtárik, and Yu. Nesterov, <a href="#">ICML</a>	2020
<i>Inexact Tensor Methods with Dynamic Accuracies</i> , <b>N. Doikov</b> and Yu. Nesterov, <a href="#">ICML</a>	2020
<i>Randomized Block Cubic Newton Method</i> , <b>N. Doikov</b> and P. Richtárik, <a href="#">ICML (Oral Presentation)</a>	2018

### Preprints / under review:

<i>Spectral Preconditioning for Gradient Methods on Graded Non-convex Functions</i> , <b>N. Doikov</b> , S.U. Stich, and M. Jaggi, <a href="#">arXiv:2402.04843</a>	2024
<i>First and zeroth-order implementations of the regularized Newton method with lazy approximated Hessians</i> , <b>N. Doikov</b> and G. N. Grapiglia <a href="#">arXiv:2309.02412</a>	2023
<i>Minimizing Quasi-Self-Concordant Functions by Gradient Regularization of Newton Method</i> , <b>N. Doikov</b> <a href="#">arXiv:2308.14742</a>	2023
<i>On Convergence of Incremental Gradient for Non-Convex Smooth Functions</i> , A. Koloskova, <b>N. Doikov</b> , S.U. Stich, and M. Jaggi, <a href="#">arXiv:2305.19259</a>	2023
<i>Unified Convergence Theory of Stochastic and Variance-Reduced Cubic Newton Methods</i> , E.M. Chayti, <b>N. Doikov</b> , and M. Jaggi <a href="#">arXiv:2302.11962</a>	2023
<i>Lower Complexity Bounds for Minimizing Regularized Functions</i> , <b>N. Doikov</b> <a href="#">arXiv:2202.04545</a>	2022

## ACADEMIC SERVICE

**Conference reviews:** Conference on Learning Theory (COLT), Conference on Neural Information Processing Systems (NeurIPS), International Conference on Machine Learning (ICML)

**Journal reviews:** Mathematical Programming, SIAM Journal on Optimization, Journal of Optimization Theory and Applications, Journal of Global Optimization, IMA Journal of Numerical Analysis, Computational Optimization and Applications, Optimization Methods and Software, IEEE Transactions on Information Theory

## INVITED TALKS, CONFERENCES AND SCHOOLS

- 20th Workshop on Advances in Continuous Optimization ([EUROPT](#)), Budapest, 2023\*
- International Conference on Machine Learning ([ICML](#)), Hawaii, 2023\*
- SIAM Conference on Optimization ([OP23](#)), Seattle, 2023\*
- Workshop on Advances in Continuous Optimization ([EUROPT](#)), Lisbon, 2022\*
- French-German-Portuguese conference on Optimization ([FGP](#)), Porto, 2022\*
- Workshop on Advances in Continuous Optimization ([EUROPT](#)), online, 2021\*
- [Symposium on Numerical Analysis and Optimization](#), UFPR, online, 2021\*
- Conference on Neural Information Processing Systems ([NeurIPS](#)), online, 2020\*
- International Conference on Machine Learning ([ICML](#)), online, 2020\*
- French-German-Swiss conference on Optimization ([FGS](#)), Nice, 2019\*
- International Conference on Continuous Optimization ([ICCOPT](#)), Berlin, 2019\*
- Workshop on Advances in Continuous Optimization ([EUROPT](#)), Glasgow, 2019\*
- Summer School on [Optimization, Big Data and Applications](#) in Veroli, 2019\*
- Traditional School [Control, Information and Optimization](#) in Moscow, 2018\* – 2019
- International Conference on Machine Learning ([ICML](#)), Stockholm, 2018\*
- [Recent Advances in Algorithms](#) in St. Petersburg, 2017
- [Deep Hack](#) Artificial Intelligence competition and lecture series at [MIPT](#), 2016
- Participant of the [MIPT fall programming training](#), 2014
- Winter and Summer [Programming Training Camps](#) in Petrozavodsk, 2012 – 2014
- [Winter Programming School](#) on Advanced Algorithms in Kharkiv, 2012

\*The talk was given.

## ACHIEVEMENTS AND AWARDS

- 2023 [ICML](#) Oral Presentation
- 2020 [ICML](#) Top Reviewer  
[NeurIPS](#) Oral Presentation
- 2019 Best Paper Presentation Award at [OBA School](#)  
[NeurIPS](#) Top Reviewers Award
- 2018 Best Talk Award at [Control, Information and Optimization School](#)  
[ICML](#) travel award
- 2015 – 2016 Participant of [Challenge24](#) Finals – International 24-hour Programming Contest
- 2015 Top-200 in [Facebook Hacker Cup](#)  
[Moscow festival of sport programming](#) – First degree diploma
- 2012 – 2015 University Advanced Scholarship
- 2014 [Moscow festival of sport programming](#) – Second degree diploma  
[All Siberian open programming contest](#) – Second degree diploma  
Participant of [ACM ICPC NEERC](#) – Third degree diploma
- 2013 Top-600 in [Russian Code Cup](#)
- 2011 Prizewinner of ROI (Russian National Olympiad in Informatics among high school students) – 26th place  
Gold medal for extraordinary successes in study
- 2010 Prizewinner of ROI – 90th place