Elizaveta (Liza) Rebrova

https://erebrova.github.io/

elre@princeton.edu, elizaveta.rebrova@gmail.com

Academic employment

2021 - now	**Princeton University, ORFE Department** ***Tenure-track Assistant Professor*** Research focus: randomized numerical linear algebra, mathematics of data science, related to stochastic optimization and high-dimensional probability
2021, 2017 - 2018	**Postdoc at Lawrence Berkeley National Lab** Also **Graduate student Intern** (Summer '17), **Engineer I** (Summer '18) Computational Research Division, Scalable Solvers Group, Mentor: *X.S.Li*
2018 - 2020	**Department of Mathematics, UCLA** ***Assistant Adjunct Professor*** Applied Mathematics postdoc, mentors: *D. Needell, T. Tao*

Education

2013 - 2018	**Ph.D. in Mathematics, Univ. of Michigan - Ann Arbor** Thesis *Spectral properties of heavy-tailed random matrices* Advisor *Roman Vershynin*
2007 - 2012	**Specialist in Mathematics, Lomonosov Moscow State University** B.S.+M.S. equivalent, diploma with honors, 5.00/5.00 GPA Master thesis *"Sobolev classes on infinite dimensional spaces"* Advisor *V. I. Bogachev*
2011 - 2012	**Yandex School of Data Analysis, Moscow** M.S. equivalent in Computer Science

Fellowships, grants, awards

2023-2026	NSF DMS-2309685 proposal "Outliers are not what they seem: data-aware, flexible, and robust randomized iterative methods", Single PI
2021-2024	NSF DMS 2106472 collaborative proposal "Fast, Low-Memory Embeddings for Tensor Data with Applications", Co-PIs Deanna Needell and Mark Iwen
2018 - 2020	Capital Fund Management sponsored postdoc grant, UCLA
2017, 2018	Allen Shields Memorial, Rackham Dissertation Fellowships, Univ. Michigan
2017	NSF ORISE scholarship for summer research internship at LBNL
2012	RFFI 10-01-00518, research grant, Russia

Selected publications and preprints

(Preprint)	*Randomized Kaczmarz methods with beyond-Krylov convergence,* with M. Dereziński, D. Needell, J. Yang, arXiv:2501.11673
(Preprint)	*On trimming tensor-structured measurements and efficient low-rank tensor recovery,* with S. Suryanarayanan, arXiv:2502.02843
(Preprint)	*Learning nonnegative matrix factorizations from compressed data,* with A. Chaudhry, arXiv:2409.04994
(Preprint)	*On regularization via early stopping for least squares regression,* with R. Sonthalia, J. Lok, arXiv:2406.04425
(Preprint)	*Fine-grained analysis and faster algorithms for iteratively solving linear systems,* with M. Derezinski, D. LeJeune, D. Needell, arXiv:2405.05818

(SIMODS,'25)	*Stochastic gradient descent for streaming linear and rectified linear systems with adversarial corruptions*, with H. Jeong, D. Needell, accepted
(ALT, '25)	*Discrete error dynamics of mini-batch gradient descent for least squares regression*, with J. Lok, R. Sonthalia, Algorithmic Learning Theory conference
(LAA, '24)	*Subspace constrained randomized Kaczmarz method for structure or external knowledge exploitation*, with J. Lok, Lin. Alg. Appl., 698, 220-260
(SIMODS,'24)	*Sharp analysis of sketch-and-project methods via a connection to randomized singular value decomposition*, with M. Derezinski, SIAM J. on Mathematics of Data Science, 6(1), 127-153 (2024)
(ACHA, '23)	*Modewise operators, the tensor restricted isometry property, and low-rank tensor recovery*, with C. Haselby, M. Iwen, D. Needell, M. Perlmutter, Applied Computational Harmonic Analysis, 66, 161-192 (2023)
(SIMAX, '22)	*Quantile-based iterative methods for corrupted systems of linear equations*, with J. Haddock, D. Needell, W. Swartworth, SIAM J. on Matrix Analysis and Appl., 43 (2), 605-637 (2022)
(SIMAX, '21)	*Lower memory oblivious (tensor) subspace embeddings with fewer random bits: modewise methods for least squares*, with M. Iwen, D. Needell, A. Zare, SIAM J. on Matrix An. and Appl. 42 (1), 376-416 (2021)
(NUMA, '21)	*On block Gaussian sketching for iterative projections*, with D. Needell, Numerical Algorithms 86 (1), 443-473 (2021)
(ICASSP, '21)	*On a guided nonnegative matrix factorization*, with J. Vendrow, J. Haddock, D. Needell, Proc. IEEE ICASSP, (2021)
(TheorPr,'20)	*Constructive local regularization of the operator norm of random matrices*, Journal of Theoretical Probability, Vol. 33(3), pp 1768-1790 (2020)
(IPDPS, '18)	*A study of clustering techniques and hierarchical matrix formats for kernel ridge regression*, with G. Chavez, Y. Liu, P. Ghysels and X.S.Li, 32th IEEE IPDPS ParLearning workshop (2018)
(AdvMath,'18)	*Norms of random matrices: local and global problems*, with R. Vershynin, Advances in Mathematics, Vol. 324, pp 40–83 (2018)

Selected invited talks (out of > 50)

October 2024	SIAM Math of Data Science conference, minisymposium "Structure in Data: Theory, Learning, and Algorithms", Atlanta, USA
May 2024	SIAM LAA conference, minisymposium "Recent Advances and Critical Challenges in Randomized Linear Algebra", Paris, France
January 2024	Data Science seminar, Oxford, UK (invited by J. Tanner)
August 2023	ICIAM 2023 congress, talk at a minisymposium "Optimal and efficient algorithms for inverse problems", Waseda University, Tokyo, Japan
June 2023	FOCM conference, talks in the sections "Random matrices" and "Theoretical foundations of data science", Paris, France
June 2023	Probability seminar, Utrecht University, The Netherlands
November 2022	High-dimensional statistics and probability seminar, Harvard, USA
June 2022	Conference on Random Matrix Theory and Numerical Linear Algebra, University of Washington, USA
March 2022	Joint Mathematics and CMSE Colloquium, Michigan State University, USA
May 2021	Random Matrix Theory Seminar, Oxford, UK (remote, invited by J. Keating)
October 2019	Probability Seminar, Stanford University
February 2019	SoCAMS Symposium, CalTech
June 2017	Probability Seminar, Université Paris Diderot, Paris, France

May 2017	Analysis Seminar, University of Alberta, Edmonton, Canada

---

Professional activities

Ph.D. advising		Jackie Lok, Shambhavi Suryanarayanan, Sofiia Shvaiko (current) Abraar Chauhdry – Ph.D. (2024), first placement: post-doc at Georgia Tech Nicolo Grometto – Masters degree (2023)
UG mentoring	2021-	**Advising senior thesis projects at Princeton ORFE** Year-long independent research projects
	2022, 2024	**Undergraduate independent work supervision** (2022-2023) Marko Medvedev, Princeton Center for Statistics and Machine learning certificate (2024-2025) Laya Reddy, Princeton Applied and Comp Math certficate
	2020	**REU** Mentoring five undergraduate students in CAM UCLA Summer Research for Undergraduates program
Leadership	2021-	**Section organizer** for multiple conferences including SIAM MDS (Atlanta, '24), SIAM LAA (Paris, '24), Princeton Day of Statistics ('21, '23), SAMPTA (Yale, '23), ICCOPT (Lehigh,'22)
	2022, 2023	**Women in Math engagement** Speaker at AWM Research Symposium ("Women in Tensor Optimization"); application review panel and speaker at Math of Data Science Women in Math program at Princeton IAS
Reviewing	2018-	**Reviewing** for multiple journals including SIMAX, SIAM J. on Scientific Computing, SIAM J. on Imaging Sciences, Linear Algebra and Appl., BIT Numerical Mathematics, Numerical Algorithms, Numerical Linear Algebra and Appl., JMLR (J. of Machine Learning Research), IMA Information and Inference, Bernoulli, J. of Global Optimization
	2021, 2022, 2025	National Science Foundation (NSF) Panelist

Teaching experience

2022-   **Professor**, ORFE, Princeton University

- ORF526: Probability and Stochastic Processes (graduate course)
- ORF387: Networks
- ORF523: Convex and Conic Optimization (graduate course)

2018 - 2020   **Professor**, University of California, Los Angeles

- Probability I: Fall 2018 and Spring 2020 (restructured for Math majors)
- Statistics: Winter 2019, Spring 2019, Winter 2020
- Stochastic Processes: Spring 2020
- Optimization: Fall 2020

2014 - 2017   **Graduate Student Instructor**, University of Michigan, Ann Arbor

- Calculus I: Fall 2014 (Teacher role in an IBL classroom)
- Differential Equations: Winter 2015, Winter 2016, Fall 2016 (Teaching assistant role, including discussion sessions and labs)
- "Mathlab instructor": One-on-one tutoring on all first level undergraduate math classes

2008 - 2013   **Teaching assistant in high schools**, 57th school and Kolmogorov math and physics high school, Moscow, Russia

- Teaching assistant role focused on guiding solving olympiad-style and calculus problems in class one-on-one with the students