

Elizaveta Rebrova

Contact information

email elizaveta.rebrova@gmail.com
phone (551) 227-1474
website <https://erebrova.github.io/>

Research interests

High-dimensional Probability, Non-asymptotic Random Matrix Theory,
Mathematics of Data, Matrix and Tensor Methods, Randomized Algorithms

Employment

2021 - now **Lawrence Berkeley National Laboratory, Berkeley, CA**
Tensor Factorization in Machine Learning Postdoctoral Scholar
Computational Research Division

2018 - 2020 **University of California, Los Angeles**
Assistant Adjunct Professor
Three year postdoc at the Department of Mathematics
Mentors *Deanna Needell, Terence Tao*

CAM UCLA REU Academic Mentor (Summer 2020)
Worked with 5 undergraduate students on topic modeling for CIP data
PI *Deanna Needell*

2017 - 2018 **Lawrence Berkeley National Lab, Berkeley, CA**
Graduate student Intern (Summer 2017)
Engineer I (Summer 2018)
Computational Research Division, Scalable Solvers Group;
Investigated applications of STRUMPACK linear solver to kernel matrices
Mentor *Xiaoye Sherry Li*

Education

2013 - 2018 **University of Michigan, Ann Arbor**
Ph.D. in Mathematics, conferral date 20.08.2018
Thesis *Spectral properties of heavy-tailed random matrices*
Advisor *Roman Vershynin*

2007 - 2012 **Lomonosov Moscow State University**
Specialist degree in Mathematics (B.S.+M.S. equivalent)
Diploma with honors, 5.00/5.00 GPA
Master thesis *Sobolev classes on infinite dimensional spaces*
Advisor *Vladimir I. Bogachev*

2011 - 2012 **Yandex School of Data Analysis, Moscow**
M.S. equivalent in Computer Science

Publications and preprints

Preprints

(2) J. Haddock, D. Needell, E. Rebrova, W. Swartworth, *Quantile-based Iterative Methods for Corrupted Systems of Linear Equations*, submitted, preprint available at arXiv:2009.08089

- (1) L. Kassab, A. Kryshchenko, H.Lyu, D. Molitor, D. Needell, E. Rebrova, *On Nonnegative Matrix and Tensor Decompositions for COVID-19 Twitter Dynamics*, submitted, preprint available at arxiv:2010.01600

Journal articles

- (8) M. Iwen, D. Needell, E. Rebrova, A. Zare, *Lower Memory Oblivious (Tensor) Subspace Embeddings with Fewer Random Bits: Modewise Methods for Least Squares*, accepted to **SIAM J. Matrix Anal. A.** (2020)
- (7) E. Rebrova, D. Needell, *On block Gaussian sketching for iterative projections*, accepted to **Numer. Algorithms** (2019)
- (6) Y. Liu, W. Sid-Lakhdar, E. Rebrova, P. Ghysels and X.S.Li, *A Parallel Hierarchical Blocked Adaptive Cross Approximation Algorithm*, accepted to **Int. J. High Perform. C.** (2019)
- (5) E. Rebrova, *Constructive local regularization of the operator norm of random matrices*, **J. Theor. Probab.**, Vol. 33(3), pp 1768-1790 (2020)
- (4) E. Rebrova, R. Vershynin, *Norms of random matrices: local and global problems*, **Adv. Math.**, Vol. 324, pp 40–83 (2018)
- (3) E. Rebrova, K. Tikhomirov, *Coverings of random ellipsoids, and invertibility of matrices with i.i.d. heavy-tailed entries*, **Israel J. Math.**, Vol. 227(2), pp 507-544 (2018)
- (2) V.I. Bogachev, A.Y. Pilipenko, E. Rebrova, *Classes of functions of bounded variation on infinite-dimensional domains*, **Dokl. Math.**, 88(1), pp 391-395 (2013)
- (1) V.I.Bogachev, E. Rebrova, *Functions of bounded variation on infinite-dimensional spaces with measures*, **Dokl. Math.**, 87(2), pp 144-147 (2013)

Conference publications

- (7) J. Vendrow, J. Haddock, E. Rebrova, D. Needell, *On A Guided Nonnegative Matrix Factorization*, Proc. IEEE **ICASSP**, (2021)
- (6) R. Grotheer, K. Ha, L. Huang, Y. Huang, A. Kryshchenko, O. Kryshchenko, P. Li, X. Li, D. Needell, E. Rebrova, *COVID-19 Literature Topic-Based Search via Hierarchical NMF*, Proc. **NLP-COVID19-EMNLP** (2020)
- (5) J. Haddock, D. Needell, E. Rebrova, W. Swartworth, *Stochastic Gradient Descent Methods for Corrupted Systems of Linear Equations*, Proc. **CISS** (2020)
- (4) G. Chavez, E. Rebrova, Y. Liu, P. Ghysels and X.S.Li, *Scalable and Memory-Efficient Kernel Ridge Regression*, Proc. 34th IEEE **IPDPS** (2020)
- (3) E. Rebrova, D. Needell, *Sketching for Motzkin's iterative method for linear systems*, Proc. 50th IEEE **Asilomar SS&C** (2019)
- (2) E. Rebrova, D. Needell, *New bounds for the block Gaussian sketch and project method*, Proc. **ITA** (2019)
- (1) E. Rebrova, G. Chavez, Y. Liu, P. Ghysels and X.S.Li, *A study of clustering techniques and hierarchical matrix formats for kernel ridge regression*, 32th IEEE **IPDPS ParLearning workshop** (2018)

Ph.D. thesis

- (1) E. Rebrova, *Spectral Properties of Heavy-Tailed Random Matrices*, **University of Michigan** (2018)

Fellowships, grants, awards

2018 - 2020	Capital Fund Management sponsored postdoc grant, UCLA
2018	Allen Shields Memorial Fellowship, University of Michigan
2017	NSF ORISE scholarship for summer research internship at LBNL
2017	Rackham One-Term Dissertation Fellowship, University of Michigan
2014 - 2016	University of Michigan Math Department Graduate Summer Fellowships
2013	University of Michigan recruitment bonus
2012	RFFI 10-01-00518, research grant, Russia

Service and leadership

Mentoring	<p>Mentoring five undergraduate students in CAM UCLA REU program (Summer 2020) topic modeling on text data for California Innocence Project (CIP) PI Deanna Needell, assistant mentor Denali Molitor</p> <p>Co-leading three student projects for the UCLA Math 290J class (Spring 2020) (1) topic-based search for COVID-19 related scientific literature (2) topic modeling for COVID-19 related Twitter data (3) studying of the influence of demographics factors to the spread of COVID-19</p> <p>Co-mentoring PhD student Will Swartworth (2019 - now) scientific advisor Deanna Needell, co-mentor Jamie Haddock</p>
Leadership	<p>Co-organizing Reading Random Matrices Seminar (2018 - 2019) University of California, Los Angeles, CA faculty contact Terence Tao, co-organizer Palina Salanevich</p> <p>Co-organizing Student Analysis seminar (2015 - 2016) University of Michigan, Ann Arbor, MI co-organizer Siddhant Agrawal</p>
Events	<p>Member of Organizing Committee (2020) /postponed/ Southern California Applied Math Symposium (SoCAMS)</p> <p>Member of Organizing Committee (2007 - 2012) Mathematical and Linguistics Olympiads for high school students Moscow, Russia</p>
Reviewing	<p>Linear Algebra and Applications</p> <p>BIT Numerical Mathematics</p> <p>Journal of Statistical Computation and Simulation</p>

Teaching experience

2018 - now	<p>Professor, University of California, Los Angeles</p> <ul style="list-style-type: none">• 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	<p>Graduate Student Instructor, University of Michigan, Ann Arbor</p> <ul style="list-style-type: none">• 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)
 - Computational Finance: Fall 2017 (Teaching assistant role)
- 2017 **Machine learning instructor**, Lawrence Berkeley National Lab, Berkeley
- Led 16-session review of the classical machine learning methods
- 2013 - 2014 **Instructor** in Math Lab, University of Michigan, Ann Arbor
- One-on-one tutoring on all lower level undergraduate math classes
- 2012 - 2013 **Algebra instructor**, Kolmogorov math and physics high school, Moscow, Russia
- Teaching assistant role, including some lecturing and guiding solving algebra problems in class one-on-one with the students
- 2008 - 2012 **Calculus instructor**, Moscow State School 57, Moscow, Russia
- Teaching assistant role, guiding solving olympiad-style and calculus problems in class one-on-one with the students

Invited talks

- March 2021 SIAM Conference on Computational Science and Engineering, Fort Collins, TX (remote)
- February 2021 Applied Mathematics and Statistics seminar, Johns Hopkins University, Baltimore, MD (remote)
- November 2020 Random Tensors Seminar
Texas A&M, College Station, TX (remote)
- September 2020 Center for Data Science Lunch seminar
NYU, New York, NY (remote)
- June 2020 Online Asymptotic Geometric Analysis Seminar
- April 2020 Graduate Seminar
California State University Channel Islands, CA (remote)
- November 2019 Combinatorics and Probability Seminar
University of California, Irvine, CA
- November 2019 Asilomar Conference on Signals, Systems, and Computers
Pacific Grove, CA
- October 2019 Probability Seminar
Stanford University, Palo Alto, CA
- October 2019 Probability Seminar
University of Southern California, Los Angeles, CA
- March 2019 High-dimensional Seminar
Georgia Institute of Technology, Atlanta, GA
- March 2019 Probability Seminar
University of Alberta, Edmonton, Canada
- February 2019 Southern California Applied Mathematics Symposium (SoCAMS)
California Institute of Technology, Pasadena, CA
- September 2018 Structural Inference in High-Dimensional Models worksop, National Research University Higher School of Economics, Moscow, Russia

August 2018	Summer Informal Regional Functional Analysis Seminar (SUMIFRAS) Texas A&M University, College Station, TX
June 2017	Probability Seminar Université Paris Diderot, Paris, France
June 2017	Probability Seminar Université-Paris-Est Marne-la-Vallée, Champs-sur-Marne, France
May 2017	Analysis Seminar University of Alberta, Edmonton, Canada
March 2017	MIC Seminar Center for Data Science, NYU, New York
June 2016	CMS Summer Sectional Meeting University of Alberta, Edmonton, Canada
March 2016	AMS Sectional Meeting University of Georgia, Athens, GA

Other talks

2019	6 expository talks at Reading Random Matrices Seminar University of California, Los Angeles, CA
2018	Research talk at Random Matrices Seminar University of California, Los Angeles, CA
2015 - 2017	3 expository talks at Analysis/Probability Learning Seminar University of Michigan, Ann Arbor, MI
2014 - 2015	3 expository talks at Student Analysis Seminar University of Michigan, Ann Arbor, MI
2014 - 2015	Series expository of talks on Geometric Analysis Reading Seminar University of Michigan, Ann Arbor, MI

Conferences and workshops participation

March-June 2021	IPAM Long Program in Tensor Methods and Emerging Applications to the Physical and Data Sciences, Los Angeles, CA
March 2021	SIAM Conference on Computational Science and Engineering, Fort Collins, TX (remote)
November 2019	Asilomar Conference on Signals, Systems, and Computers Pacific Grove, CA
February 2019	Southern California Applied Mathematics Symposium (SoCAMS) California Institute of Technology, Pasadena, CA
August 2018	Summer Informal Regional Functional Analysis Seminar (SUMIFRAS) Work- shop Texas A&M University, College Station, TX
May 2018	Random Matrices and Free Probability Theory Workshop III within Quan- titative Linear Algebra long program Institute for Pure and Applied, Los Angeles, CA
November 2017	Geometric Functional Analysis and Applications Workshop Mathematical Sciences Research Institute, Berkeley, CA
August 2017	Phenomena in High Dimensions Introductory Workshop within Geometric Functional Analysis and Applications long program Mathematical Sciences Research Institute, Berkeley, CA

August 2017	Geometry and Probability in High Dimensions, Connections for Women Workshop Mathematical Sciences Research Institute, Berkeley, CA
July 2016	The Mathematics of Data, Graduate Summer School IAS/Park City Mathematics Institute, Park City, UT
June 2016	CMS Summer Meeting University of Edmonton, Alberta, Canada
June 2016	Summer School on Random Matrices University of Michigan, Ann Arbor, MI
April 2016	Informal Analysis Seminar Kent State University, Kent, OH
March 2016	AMS Sectional Meeting University of Georgia, Athens, GA
November 2015	Informal Analysis Seminar Kent State University, Kent, OH
November 2015	Analytic and Probabilistic Techniques in Modern Convex Geometry Conference University of Missouri, Columbia, MO
April 2015	Workshop on Information Theory and Concentration Phenomena Institute for Mathematics and its Applications, Twin Cities, MN
March 2015	Informal Analysis Seminar Kent State University, Kent, OH
October 2014	Informal Analysis Seminar University of Michigan, Ann Arbor, MI
May 2014	Random Matrix Theory School, program for Women and Mathematics Institute for Advanced Study, Princeton, NJ
May 2012	The XIX International Student, Postgraduate and Young Scientist Conference “Lomonosov” Moscow State University, Moscow, Russia
July 2006 - 2009	Summer School “Contemporary Mathematics” Ratmino, Russia

Technical skills

Math Software	Matlab, Excel/Sheets, \LaTeX
Languages	Python, C/C++
ML related	jupyter, pandas, numpy, scikit learn
Other	git, shell

Languages English (fluent), Russian (native), German (basic), French (basic)

Collaboration partners

Scientific advisors

Vladimir Bogachev (Moscow State University)

Roman Vershynin (UCI, former University of Michigan)

Tenured and non-tenured faculty

Gustavo Chavez (former Lawrence Berkeley National Lab)
Olivier Guedon (Universite Paris Marne-la-Vallee)
Pieter Ghysels (Lawrence Berkeley National Lab)
Rachel Groether (Goucher College)
Jamie Haddock (UCLA)
Longxiu Huang (UCLA)
Mark Iwen (Michigan State University)
Alona Kryshchenko (California State University Channel Islands)
Xiaoye Sherry Li (Lawrence Berkeley National Lab)
Yang Liu (Lawrence Berkeley National Lab)
Hanbaek Lyu (UCLA)
Galyna Livshyts (Georgia Tech)
Deanna Needell (UCLA)
Michael Perlmutter (UCLA, former Michigan State University)
Palina Salanevich (Utrecht University, former UCLA)
Wissam Sid-Lakhdar (former Lawrence Berkeley National Lab)
Elena Sizikova (NYU)
Konstantin Tikhomirov (Georgia Tech, former University of Alberta)

Ph.D. and undergraduate students

Kyung Ha (UCLA)
Yihuan Huang (UCLA)
Lara Kassab (Colorado State University)
Pengyu Li (UCLA)
Xia Li (UCLA)
Denali Molitor (UCLA)
William Swartworth (UCLA)
Ali Zare (Michigan State University)

Non-academic collaborations

Alissa Bjerkhoel (California Innocence Project)
Oleksandr Kryshchenko (LWS Research)
Michael Semanchik (California Innocence Project)

Research references

Prof. **Deanna Needell**

Department of Mathematics
University of California, Los Angeles, US
Email: deanna@math.ucla.edu

Prof. **Terence Tao**

Department of Mathematics
University of California, Los Angeles, US
Email: tao@math.ucla.edu

Prof. **Mark Iwen**

Department of Mathematics and Department of CMSE
Michigan State University, East Lansing, MI
Email: iwenmark@msu.edu

Prof. **Roman Vershynin** (Ph.D. advisor)

Department of Mathematics
University of California, Irvine, US
Email: rvershyn@uci.edu

Teaching references

Prof. **Don Blasius**

Department of Mathematics
University of California, Los Angeles, US
Email: blasius@math.ucla.edu

Prof. **Deanna Needell**

Department of Mathematics
University of California, Los Angeles, US
Email: deanna@math.ucla.edu