Ilias Zadik

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Citizenship

- Greek. Resident in the USA on an H-1B visa.

Appointment

- **New York University (NYU)**   **New York, NY, USA**
  CDS Moore-Sloan Postdoctoral Fellow (Faculty Fellow), Center for Data Science (CDS)   *09/2019 – Present*

Education

- **Massachusetts Institute of Technology (MIT)**   **Cambridge, MA, USA**
  PhD, Operations Research. GPA: 5.0/5.0   *09/2014 – 09/2019*
  PhD advisor: David Gamarnik.
  Thesis: *"Computational and Statistical Challenges in High Dimensional Statistical Models"*

- **Trinity College, Cambridge University**   **Cambridge, UK**
  M.A.St. in Mathematics, Part III, with Distinction (ranked 13th out of 247 students)   *09/2013 – 07/2014*
  Part III Essay: *"Noise Sensitivity with applications to Percolation and Social Choice Theory"*
  Part III Essay advisor: Béla Bollobás

- **University of Athens**   **Athens, Greece**
  B.A. in Mathematics, Graduated with GPA 10/10.   *09/2009 – 02/2013*
  Undergraduate research advisor: Vassili Nestoridis

Research Interests

- High dimensional statistics, theory of machine learning, applied probability, differential privacy.

Industry Experience

- Microsoft Research New England Internship (Summer 2017)
  Mentored by Jennifer Chayes and Christian Borgs.

Awards and Honors

- CDS Moore-Sloan Postdoctoral Fellowship, 2019-2021.

- Top 400 Reviewers Award, for reviewing for Neural Information Processing Systems, 2019.

- Honorable Mention for MIT Operations Research Center Best Student Paper Award, 2017

- Senior scholarship from Trinity College, Cambridge University, 2014.

- The Onassis Foundation Scholarship for Master studies, 2013-2014.

- The Cambridge Home and European Scholarship Scheme (CHESS) award, 2013-2014.

- IKY scholarship for top academic performance during undergraduate studies, 2009-2012.

- International Mathematics Competition for university students (IMC):
  First Prize, 2011; Second Prize, 2010.

- South Eastern European Mathematical Olympiad for University students (SEEMOUS):
  Gold Medal (scored 39.5/40 and ranked 1st), 2011 ; Silver Medal, 2010.

- International Mathematical Olympiad (IMO): Honorable Mention, 2009.

Journal Papers (Published or Under review)

(J1) "The Landscape of the Planted Clique Problem: Dense Subgraphs and the Overlap Gap Property";
David Gamarnik, Ilias Zadik.
Annals of Applied Probability, Major Revisions.

(J2) "The All-or-Nothing Phenomenon in Sparse Linear Regression";
Galen Reeves, Jiaming Xu, Ilias Zadik.
Mathematics of Statistics and Learning, Major Revisions.
Journal version of conference paper (C5).

(J3) "Sparse High-Dimensional Regression. Algorithmic Barriers and a Local Search Algorithm";
David Gamarnik, Ilias Zadik.
Annals of Statistics, Minor Revisions.

(J4) "Inference in High-Dimensional Linear Regression via Lattice Basis Reduction and Integer Relation Detection";
David Gamarnik, Eren C. Kizildag, IIias Zadik
Transactions of Information Theory , Major Revisions
Journal version of conference paper (C8).

(J5) "Mixed integer convex representability";
Miles Lubin, Juan Pablo Vielma and Ilias Zadik
Mathematics of Operations Research, 2020+ (accepted)
Journal version of conference paper (C12).

(J6) "Universal Padé Approximants and their behaviour on the boundary"
Ilias Zadik
Monatshefte für Mathematik, Vol. 182, (2017), pp 173–193.

(J7) "Pade approximants, density of rational functions in $A^\infty(V)$ and smoothness of the integration operator";
Vassili Nestoridis, Ilias Zadik
Journal of Mathematical Analysis and Applications, Vol. 423 (2015) pp 1514-1539.

Peer-reviewed Conference Papers

(C1) " The All-or-Nothing Phenomenon in Sparse Tensor PCA ";
Jonathan Niles-Weed, Ilias Zadik.
In Advances of the 34th *Neural Information Processing Systems* (NeurIPS) 2020

(C2) "Optimal Private Median Estimation under Minimal Distributional Assumptions ";
Christos Tzamos, Emmanouil Vlatakis, Ilias Zadik.
In Advances of the 34th *Neural Information Processing Systems* (NeurIPS) 2020 **(Spotlight)**

(C3) "Free Energy Wells and the Overlap Gap Property in Sparse PCA" ;
Gérard Ben Arous, Alexander Wein, Ilias Zadik.
In Proceedings of the 33rd *Conference on Learning Theory* (COLT) 2020, pages 479-482.

(C4) "All-or-Nothing Phenomena: From Single-Letter to High Dimensions";
Galen Reeves, Jiaming Xu, Ilias Zadik.
In Proceedings of the 8th IEEE *International Workshop on Computational Advances in Multi-Sensor Adaptive Processing,* (CAMSAP) 2019, pages 654-658.

(C5) "The All-or-Nothing Phenomenon in Sparse Linear Regression";
with Galen Reeves and Jiaming Xu.
In Proceedings of the 32nd *Conference on Learning Theory* (COLT) 2019, pages 2652-2663.

(C6) "Improved bounds on Gaussian MAC and sparse regression via Gaussian inequalities";
Yury Polyanskiy, Christos Thrampoulidis, Ilias Zadik
In Proceedings of the IEEE *International Symposium of Information Theory* (ISIT) 2019, pages 430-434.

(C7) "A Simple Bound On The BER Of The MAP Decoder For Massive MIMO System";
Yury Polyanskiy, Christos Thrampoulidis, Ilias Zadik
In Proceedings of the 44th *International Conference on Acoustics, Speech, and Signal Processing* (ICASSP) 2019, pages 4544-4548.

(C8) " High-Dimensional Linear Regression using Lattice Basis Reduction"
David Gamarnik, Ilias Zadik
In Advances of the 32nd *Neural Information Processing Systems* (NeurIPS) 2018, pages 1842–1852.

(C9) " Revealing Network Structure Confidentially: Improved Rates for Node-Private Graphon Estimation";
Christian Borgs, Jennifer Chayes, Adam Smith, Ilias Zadik.
In Proceedings of the 59th IEEE Annual Symposium on *Foundations of Computer Science* (FOCS) 2018, pages 533–543.

(C10) "Orthogonal Machine Learning: Power and Limitations";
Lester Mackey, Vasilis Sygrkanis, Ilias Zadik.
In Proceedings of the 35th *International Conference of Machine Learning* (ICML) 2018, pages 5723–5731.

(C11) "High-dimensional Regression with Binary Coefficients. Estimating Squared error and the Phase Transition Property" ;
David Gamarnik, Ilias Zadik.
In Proceedings of the 30th *Conference on Learning Theory* (COLT) 2017, pages 948–953.

(C12) "Mixed integer convex representability";
Miles Lubin, Juan Pablo Vielma, Ilias Zadik.
In Proceedings of the 19th *Integer Programming and Combinatorial Optimization* conference (IPCO) 2017, pages 392–404.

Submitted Papers

- "Free Energy Wells and the Overlap Gap Property in Sparse PCA" ;
  Gérard Ben Arous, Alexander Wein, Ilias Zadik.
  In submission to *Communications on Pure and Applied Mathematics*.
  Preprint available at https://arxiv.org/abs/2006.10689.
  Journal version of conference paper (C3).

- "Group testing and local search: is there a computational-statistical gap?";
  Fotis Iliopoulos, Ilias Zadik.
  In submission to *Symposium of Theory of Computing (STOC), 2021*.
  Preprint available at https://arxiv.org/abs/2011.05258.

- "Stationary Points of Shallow Neural Networks with Quadratic Activation Function";
  David Gamarnik, Eren Kizildag, Ilias Zadik
  In submission to *Journal of Machine Learning Research*.
  Preprint available at https://arxiv.org/abs/1912.01599.

Invited Talks

(T1) 19th Northeast Probability Seminar, November 2020

(T2) INFORMS Annual Meeting, November 2020

(T3) Simons workshop on "Computational Phase Transitions", September 2020

(T4) Graphical Models, Statistical Inference and Applications (GRAMSIA), Harvard University, April 2020 (canceled due to the COVID-19 pandemic)

(T5) Graph limits workshop, Eurandom, April 2020 (canceled due to the COVID-19 pandemic)

(T6) IBM Thomas J Watson Research Center, February 2020

(T7) Google Research Algorithm's Seminar, February 2019

(T8) New York University, Mathematics, Information and Computation (MIC) Seminar, February 2019

(T9) Stanford, Theory of Computer Science Seminar, January 2019

(T10) Northeastern University, Theory of Computer Science Seminar, November 2018

(T11) Microsoft Research New England, Machine Learning (ML) Ideas Lunch, November 2018

(T12) Cornell University, workshop for young Operations Research researhers, October 2018

(T13) MIT LIDS and Statistics Tea talk, April 2018

(T14) Oberwolfach's workshop on Network Models: Stucture and Functions, December 2017

(T15) INFORMS Annual Meeting, November 2017

(T16) INFORMS Applied Probability Society Conference, July 2017

(T17) Integer Programming and Combinatorial Optimization Conference, July 2017

(T18) MIT LIDS and Statistics Tea talk, March 2017

(T19) MIT LIDS student seminar, January 2017

(T20) University of Athens Probability and Statistics Seminar, January 2017

(T21) MIT Operations Research Center Student Seminar, November 2016

Teaching Experience

- Fall 2020: DS-GA 1005 (NYU), "Inference and Representation."
  Co-instructor with Joan Bruna. We partially co-designed the class this year.
  Graduate-level advanced class on topics such as:
  graphical models, variational inference, MCMC sampling and optimal transport.

- Fall 2019, DS-GA 1002 (NYU), "Probability and Statistics for Data Science."
  Co-instructor with Carlos Fernandez-Granda.
  Graduate-level introductory class on probability and statistics.

- Spring 2017, 15.070J/6.265J (MIT),"Modern Discrete Probability."
  Teaching assistant.
  Graduate-level class taught by Yury Polyanskiy and Guy Bresler.

- Fall 2016, 15.085J/6.436J (MIT), "Fundamentals of Probability."
  Teaching assistant.
  Graduate-level class taught by David Gamarnik.

Service and Outreach

- Co-organizing the (virtual) MaD+ seminar during Spring 2020 and Fall 2020.

- Served as a reviewer for SIAM Journal on Discrete Mathematics, SIAM Journal on Optimization, Combinatorica, Operations Research, Annals of Statistics, IEEE Journal on Selected Areas of Information Theory.

- Served as a reviewer/sub-reviewer for COLT, NeurIPS, ICALP, ISIT, ITCS and SODA.

- Co-ordinated MIT Operations Research Seminar during Fall 2018

- Proctored 2017 Qualifying Exams in Probability Theory for MIT Operations Research Center

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References (upon request)

- Dr. David Gamarnik
  Professor of Operations Research,
  Sloan School of Management,
  Massachusetts Institute of Technology.
  Email: gamarnik@mit.edu

- Dr. Jennifer Chayes
  Associate Provost, Division of Computing, Data Science and Society.
  Dean, School of Information.
  Professor of EECS, Mathematics, Statistics and Information,
  University of California, Berkeley.
  Email: jchayes@berkeley.edu

- Dr. Joan Bruna
  Assistant Professor of Computer Science, Data Science and Mathematics,
  Courant Institute of Mathematical Sciences and Center for Data Science,
  New York University.
  Email: bruna@cims.nyu.edu

- Dr. Gérard Ben Arous
  Professor of Mathematics,
  Courant Institute of Mathematical Sciences,
  New York University.
  Email: benarous@cims.nyu.edu