

Aleksandar Makelov

Education

- 2016–2022 **PhD candidate**, *MIT EECS*.
Robust machine learning, spectral graph theory, mathematical optimization
- 2015–2016 **Part III Mathematical Tripos**, *Emmanuel College*, University of Cambridge, with distinction.
Coursework in combinatorics and algebra. Part III Essay: 'The graph isomorphism problem', supervised by Prof. Timothy Gowers
- 2011–2015 **BA in Honors Mathematics and Computer Science**, *Harvard University*, summa cum laude.
Undergraduate thesis: 'Expansion in lifts of graphs', supervised by Prof. Salil Vadhan

Awards and Honors

- 2015 **Akamai fellowship for first-year graduate students**, *MIT*, (declined).
- 2015 **Thomas Temple Hoopes Prize**, *Harvard University*.
For undergraduate thesis 'Expansion in lifts of graphs'
- 2015 **Herchel Smith fellowship**, *Harvard University*.
To support graduate studies at the University of Cambridge
- 2015 **Certificate of Teaching Excellence**, *Harvard University*.
For 'Algorithms and complexity', Fall 2014
- 2014 **Phi Beta Kappa Junior 24**, *Harvard University*.
- 2012 **Honorable mention**, *William Lowell Putnam Mathematical Competition*.
- 2010 **AMC Medal**, *Australian Mathematics Competition*.
- 2010 **Silver medal**, *International Mathematical Olympiad*, Kazakhstan.
Representing Bulgaria
- 2010 **Gold Medal**, *Balkan Mathematical Olympiad*, Moldova.
Representing Bulgaria
- 2009, 2010 **Bronze & Silver medal**, *International Physics Olympiad*, Mexico & Croatia.
Representing Bulgaria

Teaching and Service

- Fall 2019 **6.854: Advanced Algorithms**, *MIT*, Teaching Assistant.
- Spring 2019 **6.046: Design and Analysis of Algorithms**, *MIT*, Teaching Assistant.
- July 2017 **International Mathematical Olympiad**, *Brazil*, Observer A for Bulgaria, With support from 'American Foundation for Bulgaria'.

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- July 2016 **International Mathematical Olympiad**, *Hong Kong*, Observer A for Bulgaria, With support from 'American Foundation for Bulgaria'.
- Fall 2014 **CS 125: Algorithms and Complexity**, *Harvard University*, Teaching Fellow.
- Fall 2013 **Math 131: Topology**, *Harvard University*, Teaching Fellow.
- 2010-2017 **International Mathematics Olympiad Preparation**, *With Bulgarian national team*, Delivered lectures on topics in olympiad mathematics.

Publications

- 2018 **Towards Deep Learning Models Resistant to Adversarial Attacks**, *A. Madry, A. Makelov, L. Schmidt, D. Tsipras, A. Vladu.*, International Conference on Learning Representations (poster).
- 2015 **Expansion in Lifts of Graphs**, *A. Makelov*, Undergraduate final thesis.

Open source software projects

- 2022 **mandala**.
A high-level data management language for computational experiments, integrated with Python

Open source software contributions

- 2017 **CIFAR10 Adversarial Examples Challenge**.
A benchmark for training neural networks on the CIFAR10 dataset robust to adversarial examples
- 2012 **sympy**, *Google summer of code*.
Contributed algorithms for computational group theory, advised by Prof. David Joyner, United States Naval Academy

Coursework

Advanced Algorithms, *MIT*.

Math 231a&b: Algebraic Topology, *Harvard University*.

Graduate courses in CS Theory, *Harvard University*.

CS221 (Complexity), CS225 (Pseudorandomness), CS228 (Learning Theory), 2xCS229r (Topics in the Theory of Computation)

Physics 16, *Harvard University*.

Math 55a&b, *Harvard University*, with Prof. Yum-Tong Siu.

Technical skills

Programming Languages.

Proficient in Python. Extensive experience with the PyData stack (numpy, pandas, scikit-learn, dask, matplotlib), Pytorch

Databases.

SQL (Postgres, sqlite) and ORMs (SQLAlchemy)

OS.

Linux/Unix

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Personal

In my free time I enjoy cycling, playing guitar/singing, hiking, and reading sci-fi.

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