

# Diana Halikias

## CONTACT

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## RESEARCH INTERESTS

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Numerical analysis, randomized linear algebra, theoretical aspects of PDE learning, matrix theory, approximation theory, probability theory

## EDUCATION

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August 2020 - Present      Ph.D. in MATHEMATICS, **Cornell University**, Ithaca, NY  
Advisor: Alex Townsend  
M.S. in Mathematics awarded April 2023  
Expected graduation: May 2025

August 2016 - May 2020      B.A. (Intensive) in MATHEMATICS, **Yale University**, New Haven, CT  
Graduated with distinction in the mathematics major  
Thesis: *Determinantal Processes: Discrete and Continuous Cases*,  
advised by Richard Kenyon

## EXPERIENCE

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May 2023 - August 2023      Research Intern, **Lawrence Berkeley National Laboratory**, Berkeley, CA  
- Worked in the Machine Learning and Analytics group led by Michael Mahoney  
- Designed a PDE learning neural network architecture which exploits  
hierarchical structure and symmetry of Green's functions

May 2019 - August 2019      Summer Researcher, **Weizmann Institute**, Rehovot, Israel  
- Conducted research in convex geometry as part of the Yale-Weizmann program

## PUBLICATIONS AND PREPRINTS

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N. BOULLE, D. HALIKIAS, S. OTTO, AND A. TOWNSEND. *Operator learning without the adjoint*. In preparation.

N. BOULLE, D. HALIKIAS, AND A. TOWNSEND. *Elliptic PDE learning is provably data-efficient*. PNAS Brief Report Vol. 120, no. 39, (2023) [doi:10.1073/pnas.2303904120](https://doi.org/10.1073/pnas.2303904120)

D. HALIKIAS AND A. TOWNSEND. *Structured matrix recovery from matrix-vector products*. Numer. Linear Algebra Appl. e2531, (2023). [doi:10.1002/nla.2531](https://doi.org/10.1002/nla.2531)

A. YU, C. BECQUEY, D. HALIKIAS, M. E. MALLORY, AND A. TOWNSEND. *Arbitrary depth universal approximation theorems for operator neural networks*. [arXiv:2109.11354](https://arxiv.org/abs/2109.11354), submitted to Neural Computations.

D. HALIKIAS, B. KLARTAG, AND B. SLOMKA. *Discrete variants of Brunn-Minkowski type inequalities*. Ann. Fac. Sci. Toulouse Math. (6), Vol. 30, no. 2, (2021), 267–279. [doi:10.5802/afst.1674](https://doi.org/10.5802/afst.1674)

E. GELERT, D. HALIKIAS, C. KENNEY, AND N. MARSHALL. *A Cheeger inequality for graphs based on a reflection principle*. Involve 13 no. 3, (2020) 475–486. [doi:10.2140/involve.2020.13.475](https://doi.org/10.2140/involve.2020.13.475)

## PRESENTATIONS

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- **SIAM NY-NJ-PA section meeting, New Jersey Institute of Technology (October 2023)**  
Talk in query complexity minisymposium: Data-efficient matrix recovery and PDE learning
- **ICIAM at Waseda University, Tokyo, Japan (August 2023)**

Talk in randomized numerical linear algebra minisymposium: Matrix recovery from randomized matrix-vector products

- **Synergistic Interactions between Theory and Computation, MIT (July 2023)**  
Poster: Data-efficient matrix recovery and PDE learning
- **Modern Applied and Computational Analysis at ICERM, Brown University (June 2023)**  
Poster: Data-efficient matrix recovery and PDE learning
- **Latest trends and insights into matrix theory, iterative methods, and preconditioning at Temple University, Philadelphia, PA (March 2022)**  
Talk: Hierarchical matrix recovery from matrix-vector products
- **Olivetti Club (Cornell University)**
  - Talk: Matrix recovery problems and their continuous analogues (November 2022)
  - Talk: Matrix recovery and PDE learning (March 2023)

## RESEARCH FELLOWSHIPS AND AWARDS

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- 2021 **NSF Graduate Research Fellow**  
Awarded 5-year NSF-GRFP fellowship providing 3 years of financial support.
- 2020 **Cornell Mathematics First Year Fellowship**  
Awarded funding for first year in graduate school by the Cornell math department.
- 2020 **Distinction in Yale Mathematics Major (intensive)**
- 2020 **Second Place Montaigne Prize, Yale University Department of French**
- 2019 **Yale-Weizmann Summer Science Fellowship**  
Awarded travel funding to conduct math research at the Weizmann Institute in Rehovot, Israel.
- 2018 **Summer Undergraduate Research in Mathematics at Yale (SUMRY)**  
Awarded funding to participate in Yale's Research Experience for Undergraduates in mathematics.

## TEACHING EXPERIENCE

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### Cornell University

Fall 2023 **Teaching Assistant, Math 2210 (Linear Algebra)**

### Yale University

Spring 2020 **Undergraduate teaching assistant, Math 231 (Vector Calculus and Linear Algebra II)**  
Fall 2019 **Undergraduate teaching assistant, Math 230 (Vector Calculus and Linear Algebra I)**  
Spring 2019 **Undergraduate teaching assistant, Math 244 (Discrete Mathematics)**  
Fall 2018 **Undergraduate teaching assistant, Math 115 (Calculus II)**

## ACTIVITIES

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- 2022 **MSRI Summer Graduate School on Mathematics of Machine Learning (Courant Institute)**  
Nominated by Cornell's math department to attend funded MSRI graduate school on machine learning theory.
- 2021 **Cornell Mathematics Department REU**  
Mentored undergraduate research project in theoretical aspects of deep learning.

## OUTREACH

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- 2022 - Present **Directed Reading Program, Mentor**  
Mentored two Cornell undergraduates in reading projects on spectral graph theory.
- 2021 - Present **Little Math Circle, Leader**  
Lead and teach weekly creative math circle for elementary school students in the Ithaca area.
- 2021 - Present **Graduate Mentorship Program, Mentor**  
Mentored incoming graduate students at Cornell on transitioning to graduate life.
- 2020 - Present **Association for Women in Mathematics Mentorship Program, Mentor**  
Mentored three undergraduate women, provided support and guidance on early mathematical careers.
- 2020 - 2021 **Cornell Association for Women in Mathematics Chapter, Officer**  
Taught L<sup>A</sup>T<sub>E</sub>X workshop for Cornell women in STEM.
- 2017 - 2020 **Yale Association for Women in Mathematics Student Chapter, President**

## TECHNICAL SKILLS AND LANGUAGES

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PROGRAMMING: Matlab, Python, L<sup>A</sup>T<sub>E</sub>X

LANGUAGES: English, French, Modern Greek, Chinese (Mandarin)

## MISCELLANEOUS

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- Host of weekly Cornell graduate student trivia night at the Big Red Barn
- Former student employee in the Numismatics Department of the Yale University Art Gallery
- Silver Medalist in piano performance, AADGT International Competition; performed twice at Carnegie Hall (2014)