

# Jonathan Leake

Technische Universität, Berlin

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Interests in polynomials and combinatorics—especially analytic questions concerning linear operators and zeros of polynomials, discrete approximation, and applications to computer science.

## Education

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- **UC Berkeley** **Berkeley, CA**  
*PhD Mathematics, advised by Olga Holtz*  
2014–2019  
Dissertation Topic: Preservation Properties of Linear Operators on Polynomials
- **Texas A&M University** **College Station, TX**  
*MS Mathematics, advised by Roger Smith*  
2010–2012
- **Texas A&M University** **College Station, TX**  
*BS Applied Mathematics and Computer Engineering*  
2006–2010  
Summa Cum Laude with University Honors

## Positions Held

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- **TU Berlin** **Berlin, Germany**  
*Dirichlet Postdoc Fellowship, under Peter Bürgisser*  
2020–2022
- **Institut Mittag-Leffler** **Stockholm, Sweden**  
*Postdoc Fellowship, Algebraic and Enumerative Combinatorics*  
Spring 2020
- **KTH** **Stockholm, Sweden**  
*Postdoc, under Petter Brändén*  
2019–2020

## Invited Talks

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- **Institut Mittag-Leffler** **Stockholm, Sweden**  
*Unimodality, Log-concavity, and Beyond*  
Title: *Approximate Counting via Polynomial Capacity*  
March 2020
- **Simons Institute, UC Berkeley** **Berkeley, CA**  
*Deterministic Counting, Probability, and Zeros of Partition Functions*  
Title: *Counting Matchings via the Capacity Method*  
March 2019
- **Simons Institute, UC Berkeley** **Berkeley, CA**  
*Beyond Randomized Rounding and the Probabilistic Method*  
Title: *On the Further Structure of Finite Free Convolutions*  
February 2019
- **Institut Mittag-Leffler** **Stockholm, Sweden**  
*Hausdorff Geometry of Polynomials and Polynomial Sequences*  
Title: *Capacity Preserving Operators*  
May 2018
- **IPAM, UCLA** **Los Angeles, CA**  
*Expected Characteristic Polynomial Techniques and Applications*  
Title: *Extending the Borcea-Brändén Characterization*  
April 2018

## Awards

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- **James H. Simons Fellowship** **Berkeley, CA**  
*Simons Institute*  
Spring 2019

## Publications

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- **On the Computability of Continuous Maximum Entropy Distributions with Applications** (with N. Vishnoi), *STOC 2020*. [arXiv]
- **Mixed Determinants and the Kadison-Singer Problem** (with M. Ravichandran), *Mathematische Annalen* (2020). [PDF]
- **Generalizations of the Matching Polynomial to the Multivariate Independence Polynomial** (with N. Ryder), *Algebraic Combinatorics* (2019). [PDF]
- **On the Further Structure of the Finite Free Convolutions** (with N. Ryder), 2018. [arXiv]
- **Counting Matchings via Capacity Preserving Operators** (with L. Gurvits), accepted by *Combinatorics, Probability, and Computing* (2018). [arXiv]
- **Connecting the q-Multiplicative Convolution and the Finite Difference Convolution** (with N. Ryder), accepted by *Advances in Mathematics* (2018). [arXiv]
- **A Representation Theoretic Interpretation of the Borcea-Brändén Characterization**, 2017. [arXiv]

## Research Visits

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- **Boğaziçi University** **Istanbul, Turkey**  
*Invited by Mohan Ravichandran* *June 2018, 1 week*

## Other Talks

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- **Institut Mittag-Leffler** **Stockholm, Sweden**  
Title: *Log-concavity of Independence Sets of Claw-free Graphs* *March 2020*
- **Boğaziçi University** **Istanbul, Turkey**  
Title: *History and Applications of Stability Preservers* *June 2018*
- **UC Berkeley** **Berkeley, CA**  
*Student Discrete Analysis Seminar, run by Nikhil Srivastava* *2017–2019*  
Numerous talks given

## Teaching Experience

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- **UC Berkeley** **Berkeley, CA**  
*Graduate Student Instructor, Calculus and Discrete Mathematics* *2014–2017*
- **Texas A&M University** **College Station, TX**  
*Teaching Assistant, Calculus* *2010–2012*

## Outside Employment

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- **Texas Teachers' Public Pension Fund** **Austin, TX**  
*Part-time Developer* *2012–2014, 2017–2019*
- **Dell** **Round Rock, TX**  
*Intern, Developer* *Summer 2008*

## Other Skills

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- **Programming:** Java, Python, Matlab, Latex, Visual Studio
- **Software:** Matlab, Mathematica, MS Office
- **Industry:** finance, time series analysis, optimization