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# Ngoc Mai Tran

## Industry positions

**2021–current** **Quantitative Researcher**, Chicago Trading Company, USA

## Academic positions

2017–current **Assistant Professor**, *Mathematics*, University of Texas at Austin, USA  
2015–2017 **W-2 Professor**, *Mathematics*, University of Bonn, Germany  
2013–2015 **Simons Postdoctoral Fellow**, *Mathematics*, University of Texas at Austin, USA

## Education

2009–2013 **PhD**, *Statistics*, University of California at Berkeley, USA  
2007–2008 **Bachelor of Science (Honours)**, *Mathematics and Statistics*, University of Melbourne, Australia  
2005–2007 **Bachelor of Science**, *Mathematics*, University of Newcastle, Australia

## Grants obtained

**2022–2024** NSF Division of Mathematical Sciences, Standard Research Grant, PI, *200,000 USD*. Project title: **Causal inference for extremes via tropical geometry**

**2020–2021** AI for Social Good Grant, PI, *98,000 USD*. Project title: **Optimizing EMS responses during pandemics**

2019–2021 Dewitt-Morette France-UT endowed excellence grants, PI, *10,000 USD*. Project title: **Structural Change Assessment in Plant-pollinator Interaction Networks**

2017–2019 CNS Startup grant, *50,000 USD*

2016 HCM Summer School on Large Random Graphs: Geometry and Applications, *50,000 euro*

2015 HCM Summer School on Tropical Geometry and Economics, *50,000 euro*

2015 DAAD Summer School on Combinatorial Stochastic Processes, *50,000 euro*

2009–2013 VEF Fellowship, *15,000 USD*

## Honors and Awards

**2021** **Second Place Winner**, IEEE BigData Cup / IARAI Science4Cast Competition, joint work with graduate student Yangxinyu Xie

**2018– current** **Bonn Research Fellow**, Hausdorff Center for Mathematics, Bonn, Germany

**2017– current** **Honorary Senior Lecturer (Level C)**, Australian National University, Australia

2015–2017 *Bonn Junior Fellow*, Hausdorff Center for Mathematics

2013–2015 *Postdoctoral Fellow*, Simons Foundation

2009–2015 *Fellow*, Vietnam Education Foundation

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## Publications

- 2023 M-C Brandenburg, C Haase and N M Tran *Competitive equilibrium always exists for combinatorial auctions with graphical pricing schemes*, La Matematica, to appear
- 2023 E O'Reily and N M Tran, *Minimax Rates for High-Dimensional Random Tessellation Forests* Journal of Machine Learning Research, to appear, 2023
- 2022 E O'Reily and N M Tran, *Stochastic geometry to generalize the Mondrian process* SIAM Journal on Mathematics of Data Science (SIMODS), 4(2) 531-552, 2022
- 2022 C Améndola, C Klüppelberg, S Lauritzen, and N M Tran, *Conditional independence in max-linear Bayesian networks*, The Annals of Applied Probability 32.1 (2022): 1-45
- 2021 N M Tran and Y Xie, *Improving random walk rankings with feature selection and imputation*, 2021 IEEE International Conference on Big Data (Big Data) (pp. 5824-5827).
- 2021 J Ong, D Kulpanowski, Y Xie, E Nikolova and N M Tran, *Predicting Covid-19 EMS Incidents from Daily Hospitalization Trends*, Int J Clin Pract. 2021 Dec;75(12):e14920
- 2021 C Améndola, B Hollering, S Sullivant, N M Tran, *Markov Equivalence of Max-Linear Bayesian Networks*, UAI 2021 Conference
- 2021 N M Tran, *The finite matroid-based valuation conjecture is false*, SIAM Journal on Applied Algebra and Geometry 5.3 (2021): 506-525
- 2021 E Robeva, B Sturmfels, N M Tran and C Uhler, *Maximum likelihood estimation for totally positive log-concave densities*. Scandinavian Journal of Statistics 48.3 (2021): 817-844.
- 2020 H Zhu, X Li, L Sun, F He, Z Zhao, L Luan, C Xie and N M Tran, *Clustering with fast, automated and reproducible assessment applied to longitudinal neural tracking*, NAISys Conference
- 2020 N M Tran, *Tropical Gaussians: A brief survey*, Algebraic Statistics 11.2 (2020): 155-168
- 2019 F Baccelli and N M Tran, *Iterated Gilbert Mosais*, Stochastic Processes and their Applications, Volume 150, 2022, Pages 752-781
- 2019 A Haupt, M Khatami, T Schultz and N M Tran, *Classification on Large Networks: A Quantitative Bound via Motifs and Graphons*, Proceedings of the AWM Research Symposium

- 2019 R Mulas and N M Tran, *Minimal Embedding Dimensions of Connected Neural Codes*, Journal of Algebraic Statistics
- 2019 B Lin and N M Tran, *Two-player incentive compatible outcome functions are affine maximizers*, Linear Algebra and its Applications, 578:133 – 152
- 2019 M Johnson and N M Tran, *Geometry and algorithms for upper triangular tropical matrix identities*, Journal of Algebra, 530:470 – 507, 2019
- 2018 N M Tran, M Osipenko and W Haerdle, *Principal Component Analysis in an Asymmetric Norm*, Journal of Multivariate Analysis, 171:1–21, 2019
- 2018 N M Tran and Josephine Yu, *Product-Mix Auctions and Tropical Geometry*, Mathematics of Operations Research
- 2017 N M Tran and C Hillar, *Robust Exponential Memory in Hopfield Networks*, The Journal of Mathematical Neuroscience, 8(1):1, 2018
- 2017 N M Tran, *Enumerating Polytropes*, Journal of Combinatorial Theory, Series A 151 (2017): 1-22.
- 2017 N M Tran and Jed Yang, *Antibiotics Time Machines are hard to build*, Notices of the AMS, 64(10), 2017
- 2016 R Morisson and N M Tran, *Commuting Tropical Variety*, Linear Algebra and its Applications, 507, 300-321
- 2016 F Baccelli and N M Tran, *Zeros of Random Tropical Polynomials, Random Polygons and Stick-breaking*, Transactions of the American Mathematical Society 368(10), 7281-7303
- 2016 N M Tran, *HodgeRank is the Limit of Perron Rank*, Mathematics of Operations Research 41(2), 643-647
- 2015 J Pitman and N M Tran, *Size-biased Permutation of an i.i.d Sequence*, Bernoulli 21(4), 2484–2512
- 2015 I Fiete and N M Tran, *Linear-complexity denoising of the exponential-capacity grid cell code*, Computational and Systems Neuroscience (COSYNE) 2015
- 2015 N M Tran, *The PerronRank Family: A Brief Review*, Evolutionary and Institutional Economics Review 12(1), 213-221
- 2014 I Fiete, D J Schwab and N M Tran, *A binary Hopfield network with  $1/\log(n)$  information rate and applications to grid cell decoding*, Workshop on Biological Distributed Algorithms 2014
- 2014 N M Tran, *Polytropes and Tropical Eigenspaces: Cones of Linearity*, Discrete & Computational Geometry 51(3), 539–558
- 2013 B Sturmfels and N M Tran, *Combinatorial types of tropical eigenvectors*, Bulletin London Mathematical Society 45, 27-36
- 2013 N M Tran, *Pairwise ranking: choice of method can produce arbitrarily different rank order*, Linear Algebra and its Applications 438, 1012-1024
- 2009 M H Pham, T Tran, T D Tran, N M Tran, V D Dao, K P Nguyen, T D Le , *Measuring the risk of catastrophic expenditure: the CATA and IMPOOR indicators of Vietnam during 1993-2004*, Journal of the Central Institute for Medical Science Information of Vietnam, 7 (2009) 17-21

2007 D Cotton, N M Tran and C Waters, *Sunspot number, Southern Oscillation Index and their correlation to rainfall*, Proceedings of the 7th Australian Space Science Conference (2007) 150-161

## Invited Talks

- Fall 2023 Speaker / Program Participant, Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University
- Fall 2023 Speaker / Program Participant, Institute for Mathematical and Statistical Innovation (IMSI), University of Chicago
- July 2023 Plenary Speaker, SIAM Conference on Applied Algebraic Geometry (AG23), Eindhoven TU, Netherlands
- Oct 2022 Colloquium Speaker, UW Madison
- Jun 2022 Speaker, Conference on Combinatorial, Computational, and Applied Algebraic Geometry, Seattle WA
- Oct 2021 Plenary Speaker, Panorama of Mathematics, Hausdorff Center for Mathematics, Bonn, Germany
- September 2021 Mini-course Lecturer, p-adic in the Sciences, Max-Planck Institute for Mathematical Sciences, Germany
- May 2020 Gross substitutes and competitive equilibrium, ICERM, Brown University
- Mar 2020 Algebraic methods in Statistics, Oberwolfach, Germany
- Oct 2019 Workshop on Graphical Models, TU Munich, Germany
- Aug 2019 Geometric, Algebraic, and Topological Combinatorics, Oberwolfach, Germany
- Jul 2019 SIAM Applied Algebraic Geometry Conference, Bern, Switzerland
- June 2019 Conference on Network Games, Tropical Geometry, and Quantum Communication, TU Berlin
- Apr 2019 Symposium of the Association for Women in Mathematics, Rice University
- Sep 2018 Boltzmann Machine Workshop, American Institute for Mathematics, California
- July 2018 Tropical Panorama, Max-Planck Institute for Mathematical Sciences, Leipzig
- June 2018 Plenary Speaker, Stochastic Networks conference, Edinburgh
- March 2018 AMS Sectional Meeting, Ohio
- Feb 2018 Semester program on Tropical Geometry, Mittag-Leffler Institute, Sweden
- Mar 2017 Seminar, Australian National University
- Mar 2017 Seminar, UT Austin
- Feb 2017 Tropical Mathematics and its Applications, Warwick
- Feb 2017 Seminar, Oxford University
- Nov 2016 Topology and Geometry in Discrete Settings, ICERM, Brown University
- Sept 2016 Vanderbilt Mechanism Design Conference, Nashville
- Mar 2016 Spring School on Combinatorial Stochastic Processes, Hanoi, Vietnam
- Oct 2016 Seminar, Ruhr-Bochum University
- Jun 2016 SIAM Conference on Discrete Mathematics, Atlanta

- Nov 2015 Workshop on Algebraic and Stochastic Aspects in Graph Theory, Osnabrueck
- May 2015 Workshop on Nonlinear Algebra, Berlin
- March 2015 Computational and Systems Neuroscience (Cosyne), Salt Lake City
- Jan 2015 Session on Graph Theory, Combinatorics and Discrete Geometry, AMS Joint Meeting
- Jan 2015 Session on Probability and Applications, AMS Joint Meeting
- Dec 2014 Seminar, Humboldt University, Berlin
- Fall 2014 Algebraic Geometry Seminar, Texas A&M
- Oct 2014 Combinatorics Seminar, Georgia Tech
- Aug 2014 Workshop on Mathematics and Economics, Hokkaido, Japan
- Jul 2014 Algebraic Geometry and Optimization, Korea
- May 2014 Math Colloquium, University of Queensland, Australia
- May 2014 Statistics Seminar, University of Sydney, Australia
- May 2014 Probability Seminar, University of Melbourne, Australia
- Apr 2014 Seminar, Sam Houston State University, Texas
- Apr 2014 Plenary Talk, CombinaTexas, Houston
- Mar 2014 Seminar on Stochastic Processes, San Diego
- Jan 2014 Seminar, Vietnam Institute for Advanced Study in Mathematics, Vietnam
- Jan 2014 Algebra Seminar, Hanoi Institute of Mathematics, Vietnam
- Sep 2013 Random Structures Seminar, UT Austin
- May 2013 Combinatorics Seminar, UC Berkeley
- Apr 2013 Workshop on Mathematics of Partially Identified Objects, Oberwolfach, Germany
- Apr 2013 Probability Seminar, UC Berkeley
- Feb 2013 Seminar, Department of Mathematics, UT Austin
- Nov 2012 Statistics Graduate Student Association Seminar, UC Berkeley
- Nov 2012 Seminar, Center for Applied Statistics and Economics, Humboldt University, Berlin
- Oct 2012 Workshop for Women in Probability, Duke University
- Jun 2012 Seminar, Centre de Mathématiques Appliquées, École Polytechnique, Paris
- Jun 2012 Discrete Geometry seminar, Freie Universität Berlin
- Jun 2012 Tropical Mathematics and its Applications, UK
- Jun 2012 Mathematics Seminar, University of Manchester, UK
- Oct 2011 SIAM Conference on Applied Algebraic Geometry, North Carolina State
- Jul 2011 Kaiserslautern-Saarbruecken Biweekly Algebra Seminar, Germany
- Apr 2011 Algebraic Statistics seminar, UC Berkeley
- Jan 2011 Algebraic Geometry in the Sciences, Oslo, Norway
- May 2011 SIAM Conference on Optimization, Darmstadt, Germany

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## Conference organized

- Mar 2022 Workshop on Theory and Applications of Stable Polynomials, MATRIX Institute, Australia

- July 2019 Minisymposium on Tropical Mathematics, SIAM AG 2019
- April 2017 Hausdorff Summer School on Large Networks and their applications, Bonn, Germany
- June 2016 SIAM Minisymposium on Tropical Algebra and its applications, Atlanta, USA
- May 2016 Hausdorff Summer School on Tropical Geometry and Economics, Bonn, Germany
- Mar 2016 DAAD Spring School on Combinatorial Stochastic Processes, Hanoi, Vietnam

## Professional Services

- Associate Editor Bernoulli (2017-2019)
- Reviewer AMS Mathematical Reviews, zbMath, IEEE Transactions on Multimedia, Journal of Combinatorial Theory Series A, Annals of Applied Probability, PLOS One Biology, AISTATS, NeurIPS, ICLR, UAI, Journal of Applied Probability, Journal of Machine Learning Research, Acta Applicandae Mathematicae, London Mathematical Society, SIAM Journal on Discrete Mathematics, Operations Research, Journal of Symbolic Computation, SIAM Review, Vietnam Journal of Mathematics, Annals of Statistics, Mathematical Programming, Algebraic Statistics, IEEE Transactions on Cognitive and Developmental Systems
- Organizer Random Structures Seminar, Department of Mathematics, UT Austin, 2013, 2014, 2015, 2017, 2018
- Active Member Women In Probability Group, 2013–current

## Master, PhD Students and Postdoc

- Sep 2021 - current Jayden Wang, PhD candidate
- Feb 2019 - current George Torres, PhD candidate
- Sep 2018 - Austin Alderete, PhD
- May 2022
- Jul 2017 - Dec 2018 Bo Lin, postdoc
- Jul 2015 - Apr 2017 Spencer Backman, postdoc
- Jul 2017 Max Goldowsky, *Topics in Mathematical Neuroscience*
- Jul 2017 Andreas Haupt, *Making Sparse Graphons Work*
- Dec 2017 Raffaella Mulas, *Topology of Neural Codes*
- Dec 2017 Silvia Cavadas, *Exchangeability in features allocations*
- Jul 2018 Robert Crowell, *Tropical geometry and economics*

## Teaching

- Fall 2020 Lecturer, Introduction to Graduate Probability, Department of Mathematics, UT Austin
- Spring 2019 Lecturer, Tropical Geometry and its applications, Department of Mathematics, UT Austin
- Fall 2017, 2018, 2019 Lecturer, Applied Statistics, Department of Mathematics, UT Austin
- Fall 2017, 2021 Lecturer, Probability 1, Department of Mathematics, UT Austin
- Summer 2017 Lecturer, Topics in Exchangeability (graduate class), Department of Mathematics, University of Bonn
- Winter 2016 Lecturer, Open problems in Combinatorial Stochastic Processes (graduate class), Department of Mathematics, University of Bonn
- Summer 2016 Lecturer, Combinatorial Stochastic Processes (graduate class), Department of Mathematics, University of Bonn
- Winter 2015 Lecturer, Mathematical Neuroscience (graduate class), Department of Mathematics, University of Bonn
- Fall 2014 Lecturer, Enumerative Combinatorics (graduate class), Department of Mathematics, UT Austin
- Fall 2013 Lecturer, Multivariable Calculus M408D, Department of Mathematics, UT Austin