

Jorge Garza-Vargas

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POSITIONS

California Institute of Technology

CMI postdoctoral fellow, sponsored by Joel Tropp.

Pasadena, CA

January 2023 – Present

EDUCATION

University of California, Berkeley

Ph.D. from the Mathematics Department.

Berkeley, CA

Aug. 2017 – Dec. 2022

Universidad Nacional Autónoma de México

Bachelor of Science in Mathematics.

Mexico City

Aug. 2012 – May 2017

PAPERS ACCEPTED FOR PUBLICATION

- J. Banks, J. Garza-Vargas, N. Srivastava, *Global Convergence of Hessenberg Shifted QR I: Exact Arithmetic*. To appear in Foundations of Computational Mathematics
- J. Banks, J. Garza-Vargas, A. Kulkarni, N. Srivastava, *Overlaps, Eigenvalue Gaps, and Pseudospectrum Under Real Ginibre and Absolutely Continuous Perturbations*. To appear in Annales de l'Institut Henri Poincaré, Probability and Statistics.
- J. Banks, J. Breuer, J. Garza-Vargas, E. Seelig, B. Simon, *A Useful Formula for Periodic Jacobi Matrices on Trees*. Proceedings of the National Academy of Science, Vol. 121, No.23, 2024.
- B. Au, J. Garza-Vargas, *Spectral Asymptotics for Contracted Tensor Ensembles*. Electronic Journal of Probability, Vol. 28, 2023.
- J. Garza-Vargas, A. Kulkarni, *Spectra of Infinite Graphs via Freeness with Amalgamation*. Canadian Journal of Mathematics, Vol. 75, Issue 5, 1633-1684, 2023.
- O. Arizmendi, J. Garza-Vargas, D. Perales, *Finite Free Cumulants: Multiplicative Convolutions, Genus Expansion and Infinitesimal Distributions*. Transactions of the American Mathematical Society, Vol. 376, 4383-4420, 2023.
- J. Banks, J. Garza-Vargas, S. Mukherjee, *Point Spectrum of Periodic Operators on Universal Covering Trees*. International Mathematics Research Notices, Vol. 2022, Issue 22, 17713–17744, 2022.
- J. Banks, J. Garza-Vargas, A. Kulkarni, N. Srivastava, *Pseudospectral Shattering, the Sign Function, and Diagonalization in Nearly Matrix Multiplication Time*. Published as extended abstract in FOCS 2020, invited to SICOMP Special Issue for FOCS 2020. Full version in Foundations of Computational Mathematics, 2022 Aug 24:1-89.
- J. Garza-Vargas, D.V. Voiculescu, *Boolean Extremes and Dagum Distributions*. Indiana University Mathematics Journal, Vol. 70, Issue 2, 595-603, 2021.
- J. Garza-Vargas, A. Kulkarni, *The Lanczos Algorithm Under Few Iterations: Concentration and Location of the Output*. SIAM Journal on Matrix Analysis and Applications, Vol. 41, Issue 3, 1312-1346, 2020.
- J. Garza-Vargas, I. Hubard, *Politopality of Maniplexes*. Discrete Mathematics, Vol. 341, Issue 7, 2068-2079, 2018.

PREPRINTS

- C. F. Chen, J. Garza-Vargas, J.A. Tropp, R. van Handel, *A new approach to strong convergence*, arXiv:2405.16026, Preprint.
- J. Banks, J. Garza-Vargas, N. Srivastava, *Global Convergence of Hessenberg Shifted QR III: Approximate Ritz Values via Shifted Inverse Iteration*, arXiv:2205.06804, Submitted.
- J. Banks, J. Garza-Vargas, N. Srivastava, *Global Convergence of Hessenberg Shifted QR II: Numerical Stability*, arXiv:2205.06810. Submitted.

AWARDS

- Friedman Memorial Prize in Applied Mathematics, 2022, UC Berkeley Mathematics Department.
- Outstanding Math Graduate Student Instructor Award, 2020, UC Berkeley Mathematics Department.
- Sotero Prieto Award, 2018, Mexican Mathematical Society.

- College Competitions: International Mathematical Competition 2013, 2015 (Silver medals), Iberoamerican Mathematical Competition 2012, 2013, 2014 (Silver, Bronze, and Gold medals) .
- Math Olympiads: IMO 2011, 2012 (Bronze medals), Asian Pacific Mathematical Olympiad 2012 (Gold medal), Iberoamerican Mathematical Olympiad 2011 (Silver medal), Central American and Caribbean Mathematical Olympiad 2009 (Gold medal).

MENTORING AND TEACHING

Teaching

- Main instructor for ACM270 (An introductory course in free probability), Caltech, Spring term 2024.
- T.A. for Math 202A (Introduction to Analysis and Topology), UC Berkeley, Fall term 2022.
- T.A. for Math 202B (Introduction to Analysis and Topology), UC Berkeley, Spring term 2019.
- T.A. for Math 54 (Linear algebra and differential equations), UC Berkeley, Fall term 2018.
- T.A. for Math 1B (Calculus), UC Berkeley, Spring term 2018.
- T.A. for Math 1A (Calculus), UC Berkeley, Fall term 2017.

Mentoring

- Mentor for Berkeley's Directed Reading Program, Fall of 2022.
- Mentor for Berkeley Connect in Mathematics, 2019-2021.
- Mentored two Berkeley undergraduate Honor's Thesis (2020 and 2021).
- Coach in Number Theory for the teams that represent Mexico in the international math Olympiads, 2013-2017.
- Academic coordinator of the math Olympiad in Mexico City, 2012-2015.

INVITED TALKS

- UC Irvine, Probability and Combinatorics Seminar, June 2024.
- Southern California Probability Symposium, April 2024.
- UC Berkeley, Probability Seminar, March 2024.
- Princeton University, Probability Seminar, March 2024.
- CU Boulder, Probability Seminar, February 2024.
- Duke University, Probability Seminar, February 2024.
- UCSD, Functional Analysis Seminar, January 2024.
- University of Washington, Applied Math Seminar, December 2023.
- Fields Institute, Workshop on Operator Algebras and Applications: Free Probability, Toronto, November 2023.
- ISM, NC Probability Theory, Random Matrix Theory and their Applications, Tokyo, November 2023.
- MIT, Numerical Linear Algebra Seminar, October 2023.
- Wabash Modern Analysis Seminar, October 2023.
- Hebrew University of Jerusalem, Analysis Seminar, June 2023.
- FOCM, Workshop on Random Matrices, Paris, June 2023.
- Summer School on Random Matrix Theory and Its Applications (Lecturer), Ohio State University, May 2023.
- UC Irvine, Probability and Combinatorics Seminar, April 2023.
- University of Virginia, Probability Seminar, April 2023.
- University of Virginia, Operator Theory Seminar, April 2023.

- Banff International Research Station, Perspectives on Matrix Computations: TCS Meets NLA, March 2023.
- UCLA, Functional Analysis Seminar, March 2023.
- Caltech, CMX Student/Postdoc Seminar, February 2023.
- LA Probability Forum, February 2023.
- JMM, Workshop on Perspectives on Eigenvalue Computation, January 2023.
- JMM, Special Session on Advances in Operator Algebras, January 2023.
- International Workshop on Operator Theory and its Applications, Special Session on Noncommutative Probability, Operator Algebras, and Operator Theory, Krakow, 2022.
- Rocky Mountain Math Consortium Summer School, Free Probability, Random Matrices and Applications, 2022.
- UC Irvine, Combinatorics and Probability Seminar, Spring 2022.
- JMM, ILAS Special Session on The Interplay of Matrix Analysis and Operator Theory, 2022.
- CIRM, Random Tensors, Marseille, 2022.
- Ohio State Combinatorics and Probability Seminar, Spring 2022.
- Algebraic and Combinatorial Perspectives in the Mathematical Sciences, Spring 2022 (European Online Seminar).
- IPAM 2021 retreat for the Quantitative Linear Algebra program.
- UC Berkeley Probabilistic Operator Algebras Seminar, Fall 2021.
- Santa Clara University Mathematics Colloquium, Fall 2021.
- UCSD Functional Analysis Seminar, Fall 2021.
- Seminario de Probabilidad Hispanohablante, Fall 2020.
- UCSD Probability Seminar, Fall 2020.
- UC Berkeley Probability Seminar, Fall 2020.
- UC Berkeley Probabilistic Operator Algebras Seminar, Summer 2020.
- CIMAT, Guanajuato, MAPLe seminar, Summer 2020.
- IPAM 2019 retreat for the Quantitative Linear Algebra program.
- AMS Sectional Meeting, Special Session on Advances in Operator Algebras, Riverside, Winter 2019.
- West Coast Operator Algebras Seminar, Seattle, 2018.
- l'École de Recherche CIMPA, Settat, Marocco, 2017.