Giorgio Cipolloni

April 4, 2025

General Information

Affiliation	Department of Mathematics, University of Arizona
Address	1064 E Lowell St, Tucson, AZ 85719
Position	Assistant Professor
E-mail	gcipolloni@arizona.edu
Telephone	+1 609–933–9368
ORCID:	https://orcid.org/0000-0002-4901-7992
Webpage	https://giorgiocipolloni.github.io

Positions

2024–Current **Assistant Professor**, *University of Arizona*

2021–2024 **Research Fellow**, *Princeton Center for Theoretical Sciences (PCTS) and Department of Mathematics*

2021 **Postdoc**, *IST Austria*, Erdős Group

Education

2021 **PhD student**, *IST Austria*, Erdős Group
PhD Thesis Advisor: Prof. László Erdős
Title: Fluctuations in the spectrum of random matrices

2017 **Master Degree**, *Univeristy of Rome Tor Vergata*, Dept. of Mathematics, Rome
Master Thesis Advisor: Prof. Carlangelo Liverani
Title: Deterministic walks
Grade: 110/110 Summa cum laude

2015 **Bachelor's Degree**, *Univeristy of Rome Tor Vergata*, Dept. of Mathematics, Rome
Thesis Advisor: Prof. Carlo Sinestrari
Title: Equazioni di Hamilton-Jacobi e problemi di controllo ottimale
Grade: 110/110 Summa cum laude

2012 **High School Diploma**, *Liceo Scientifico M. Vitruvio Pollione*, Avezzano, Italy
Grade: 100/100

Research Interests

- Mathematical Physics
- Spectral Analysis of Schrödinger Operators
- Stochastic Analysis and Disordered Systems
- Random Matrices
- Random Graphs

Grants, awards, and habilitations

2024 **Italian National Habilitation for Associate Professor in Mathematical Physics (ASN, Settore concorsuale: 01/A4)**

2024 **Italian National Habilitation for Associate Professor in Analysis, Probability, and Mathematical Statistics (ASN, Settore concorsuale: 01/A3)**

2023 **Assistant Professor (tenure-track) offers from Cornell University, Rice University, University of Texas Austin**

2017-2019 **Marie Sklodowska-Curie scholarship**

2018 **Prize for outstanding master thesis in Mathematics**, *University of Rome Tor Vergata*

2013-2015 **Prize for outstanding students**, *University of Rome Tor Vergata*

Participation in funded research projects

1. **Member** of ERC Advanced Grant No. 338804
P.I.: László Erdős, Institute of Science and Technology Austria, Austria
2. **Collaborator** in ERC Advanced Grant No. 101020331
P.I.: László Erdős, Institute of Science and Technology Austria, Austria
3. **Collaborator** in NSF research grant DMS#2054851
P.I.: Paul Bourgade, New York University, USA
4. **Collaborator** in NSF research grant DMS#2337795
P.I.: Jiaoyang Huang, University of Pennsylvania, USA
5. **Collaborator** in NSF research grant DMS#2348202
P.I.: Paul Bourgade, New York University, USA

Professional Memberships

Since 2025 **Member of the International Association of Mathematical Physics (IAMP)**

Supervision

2025 **Supervised 1 Undergraduate Student (Van Carlos Higgs)**, *University of Arizona*

2022-2023 **Co-supervised 1 PhD student (Nicoló Grometto)**, *Princeton University*

Research visits

Oct. 2025 **Gran Sasso Science Institute**, *Invited by Serena Cenatiempo (1 week)*

Mar. 2025 **New York University**, *Invited by Paul Bourgade (1 week)*

Dec. 2024 **Institute of Science and Technology Austria**, *Invited by László Erdős (1 week)*

Dec. 2024 **Oxford University**, *Invited by Louis-Pierre Arguin (3 days)*

May. 2024 **Institute of Science and Technology Austria**, *Invited by László Erdős (1 week)*

Dec. 2023 **New York University**, *Invited by Paul Bourgade (1 week)*

Dec. 2022 **Institute of Science and Technology Austria**, *Invited by László Erdős (1 week)*

Dec. 2022 **Erlangen University**, *Invited by Torben Krüger (1 week)*

Publications

1. **Fluctuations for differences of linear eigenvalue statistics for sample covariance matrices** with László Erdős.

Random Matrices: Theory and Applications Vol. 9, No. 3 (2020).
arXiv version: arXiv:1806.08751.

2. **Cusp universality for random matrices II: The real symmetric case**
with László Erdős, Torben Krüger, and Dominik Schröder.
Pure Appl. Anal. Vol. 1, No. 4, 615–707 (2019).
arXiv version: arXiv:1811.04055.
3. **Edge Universality for non-Hermitian Random Matrices**
with László Erdős, and Dominik Schröder.
Probab. Theory and Related Fields Vol. 179, 1–28 (2021).
arXiv version: arXiv:1908.00969.
4. **Optimal Lower Bound on the Least Singular Value of the Shifted Ginibre Ensemble**
with László Erdős, and Dominik Schröder.
Prob. Math. Physics Vol. 1, No. 1, 101–146 (2020).
arXiv version: arXiv:1908.01653.
5. **Central Limit Theorem for Linear Eigenvalue Statistics of non-Hermitian Random Matrices**
with László Erdős, and Dominik Schröder.
Communications on Pure and Applied Mathematics Vol. 76, Iss. 5, 946–1034 (2023).
arXiv version: arXiv:1912.04100.
6. **Fluctuation Around the Circular Law for Random Matrices with Real Entries**
with László Erdős, and Dominik Schröder.
Electron. J. Probab. Vol. 26, 1–61 (2021).
arXiv version: arXiv:2002.02438.
7. **Eigenstate Thermalization Hypothesis for Wigner Matrices**
with László Erdős, and Dominik Schröder.
Communications in Mathematical Physics, Vol. 388, 1005–1048 (2021).
arXiv version: arXiv:2012.13215.
8. **Functional Central Limit Theorems for Wigner Matrices**
with László Erdős, and Dominik Schröder.
Ann. Appl. Probab. Vol. 33, No. 1, 447–489 (2023).
arXiv version: arXiv:2012.13218.
9. **Thermalisation for Wigner matrices**
with László Erdős, and Dominik Schröder.
Journal of Functional Analysis Vol. 282, Iss. 8 (2022).
arXiv version: arXiv:2102.09975.
10. **Normal fluctuation in quantum ergodicity for Wigner matrices**
with László Erdős, and Dominik Schröder.
Ann. Probab. Vol. 50, No. 3, 984–1012 (2022).
arXiv version: arXiv:2103.06730.
11. **On the condition number of the shifted real Ginibre ensemble**
with László Erdős, and Dominik Schröder.
SIAM Journal on Matrix Analysis and Applications Vol. 43, Iss. 3, 1469–1487 (2022).
arXiv version: arXiv:2105.13719.
12. **Density of small singular values of the shifted real Ginibre ensemble**
with László Erdős, and Dominik Schröder.
Annales Henri Poincaré. Vol. 23, No. 11, 3981–4002 (2022).
arXiv version: arXiv:2105.13720.
13. **Quenched universality for deformed Wigner matrices**
with László Erdős, and Dominik Schröder.

Probab. Theory and Related Fields Vol.185, 1183–1218 (2023).
arXiv version: arXiv:2106.10200.

14. **On the Spectral Form Factor for Random Matrices**
with László Erdős, and Dominik Schröder.
Communications in Mathematical Physics Vol. 401, 1665–1700 (2023).
arXiv version: arXiv:2109.06712.
15. **Optimal multi-resolvent local laws for Wigner matrices**
with László Erdős, and Dominik Schröder.
Electron. J. Probab. Vol. 27, 1–38 (2022).
arXiv version: arXiv:2112.13693.
16. **Rank-uniform local law for Wigner matrices**
with László Erdős, and Dominik Schröder.
Forum of Mathematics, Sigma. Vol. 10 (2022).
arXiv version: arXiv:2203.01861.
17. **Directional Extremal Statistics for Ginibre Eigenvalues**
with László Erdős, Dominik Schröder, and Yuanyuan Xu.
J. Math. Phys. Vol. 63, Iss. 10 (2022). Editor's Pick.
arXiv version: arXiv:2206.04443.
18. **On the rightmost eigenvalue of non-Hermitian random matrices**
with László Erdős, Dominik Schröder, and Yuanyuan Xu.
Ann. Probab. Vol. 51, No. 6, 2192–2242 (2023).
arXiv version: arXiv:2206.04448.
19. **Dynamical Localization for Random Band Matrices up to $W \ll N^{1/4}$**
with Ron Peled, Jeffrey Schenker, and Jacob Shapiro.
Communications in Mathematical Physics Vol. 405, No. 82 (2024).
arXiv version: arXiv:2206.05545.
20. **Entanglement Entropy of Non-Hermitian Eigenstates and the Ginibre Ensemble**
with Jonah Kudler-Flam.
Physical Review Letters Vol.130, Iss. 1 (2023).
arXiv version: arXiv:2206.12438.
21. **Ruminations on Matrix Convexity and the Strong Subadditivity of Quantum Entropy**
with Michael Aizenman.
Letters in Mathematical Physics Vol. 114, No. 18 (2023).
Erratum & Addendum in Letters in Mathematical Physics Vol. 113, No. 103 (2024).
arXiv version: arXiv:2210.10729.
22. **Mesoscopic Central Limit Theorem for non-Hermitian Random Matrices**
with László Erdős, and Dominik Schröder.
Probab. Theory and Related Fields Vol. 188, 1131–1182 (2024).
arXiv version: arXiv:2210.12060.
23. **Precise asymptotics for the spectral radius of a large random matrix**
with László Erdős, and Yuanyuan Xu.
J. Math. Phys. Vol. 65, Iss. 6 (2024).
arXiv version: arXiv:2210.15643.
24. **Fluctuations of eigenvector overlaps and the Berry conjecture for Wigner matrices**
with Lucas Benigni.
Electron. J. Probab. Vol. 29, 1–19 (2024).
arXiv version: arXiv:2212.10694.
25. **Optimal Lower Bound on Eigenvector Overlaps for non-Hermitian Random Matrices**

with László Erdős, Joscha Henheik, and Dominik Schröder.
Journal of Functional Analysis Vol. 287, Iss. 4 (2024).
arXiv version: arXiv:2301.03549.

26. **Gaussian fluctuations in the Equipartition Principle for Wigner matrices**
with László Erdős, Joscha Henheik, and Oleksii Kolupaiev.
Forum of Mathematics, Sigma. Vol. 11 (2023).
arXiv version: arXiv:2301.05181.
27. **Non-Hermitian Hamiltonians Violate the Eigenstate Thermalization Hypothesis**
with Jonah Kudler-Flam.
Phys. Rev. B Vol. 109 (2024). Editor's pick.
arXiv version: arXiv:2303.03448.
28. **The Dissipative Spectral Form Factor for I.I.D. Matrices**
with Nicoló Grometto (2023).
Journal of Statistical Physics Vol. 191, No. 21 (2024).
arXiv version: arXiv:2306.16262.
29. **Eigenstate thermalisation at the edge for Wigner matrices**
with László Erdős, and Joscha Henheik (2023).
Preprint: arXiv:2309.05488.
30. **Universality of extremal eigenvalues of large random matrices**
with László Erdős, and Yuanyuan Xu (2023).
Preprint: arXiv:2312.08325.
31. **Out–of–time-ordered correlators for Wigner matrices**
with László Erdős, and Joscha Henheik.
Advances in Theoretical and Mathematical Physics Vol. 28, 2025-2083 (2024).
arXiv version: arXiv:2402.17609.
32. **On the spectral edge of non-Hermitian random matrices**
with Andrew Campbell, László Erdős, and Hong Chang Ji (2024).
Accepted to Annals of Probability.
Preprint: arXiv:2404.17512.
33. **Maximum of the Characteristic Polynomial of I.I.D. Matrices**
with Benjamin Landon (2024).
Accepted to Communications on Pure and Applied Mathematics.
Preprint: arXiv:2405.05045.
34. **Matrix Concentration Inequalities and Free Probability II. Two–sided Bounds and Applications**
with Afonso S. Bandeira, Dominik Schröder, and Ramon Van Handel (2024).
Preprint: arXiv:2406.11453.
35. **Fluctuations for non-Hermitian dynamics**
with Paul Bourgade, Jiaoyang Huang (2024).
Preprint: arXiv:2409.02902.
36. **Non–Hermitian spectral universality at critical points**
with László Erdős, and Hong Chang Ji (2024).
Preprint: arXiv:2409.17030.
37. **Eigenvector decorrelation for random matrices**
with László Erdős, Joscha Henheik, and Oleksii Kolupaiev (2024).
Preprint: arXiv:2410.10718.
38. **Optimal decay of eigenvector overlap for non-Hermitian random matrices**
with László Erdős, and Yuanyuan Xu (2024).
Preprint: arXiv:2411.16572.

39. **Decorrelation transition in the Wigner minor process**
with Zhigang Bao, László Erdős, Joscha Henheik, and Oleksii Kolupaiev (2025).
Preprint: arXiv:2503.06549.
40. **Law of fractional logarithm for random matrices**
with Zhigang Bao, László Erdős, Joscha Henheik, and Oleksii Kolupaiev (2025).
Preprint: arXiv:2503.18922.

Proceedings

1. **Edge Universality for non-Hermitian Random Matrices**
Oberwolfach Rep. 16 (2019), no. 4, pp. 3480–3481.
2. **Fluctuations in the Spectrum of non-Hermitian i.i.d. Matrices**
J. Math. Phys. 63, 053503 (2022).

Talks

Invited conference and workshop talks

2025 **The Lush World of Random Matrices**, *ZiF Center, Bielefeld (Upcoming)*

2025 **Log-gases in Caeli Australia**, *Matrix Center, Melbourne (Upcoming)*

2025 **Minicourse at the Second Conference on Random Matrix Theory and Numerical Linear Algebra**, *University of Washington (Upcoming)*

2024 **XX Brunel-Bielefeld Workshop on Random Matrix Theory**, *Brunel University*, London

2024 **Random Matrices and Scaling Limits**, *Institute Mittag–Leffler*, Djursholm, Sweden

2024 **Recent developments in disordered systems**, *Hausdorff Center for Mathematics*, Bonn

2024 **Random Matrices and Related Topics in Jeju**, *Jeju Island*, South Korea

2024 **American Mathematical Society Meeting**, *Session "Spectral Theory and Quantum Systems"*, Washington DC

2023 **Canadian Mathematical Society Meeting**, *Session "The many facets of random matrix theory"*, Montreal

2023 **High Dimensional Statistics and Random Matrices**, *Island of Porquerolles*, France

2021 **Matrices et graphes aléatoires (MEGA)**, *Institute Henri Poincaré (Online)*

2019 **Workshop on Random Matrices**, *MFO Oberwolfach*

2019 **From Many Body Problems to Random Matrices**, *BIRS Center*, Banff

Invited seminars

2025 **Probability Seminar**, *Universitá di Roma Tre (Upcoming)*

2025 **Probability Seminar**, *Universitá la Sapienza (Upcoming)*

2025 **Probability Seminar**, *University of Colorado Boulder*

2025 **Bielefeld–Melbourne–Seoul Random Matrix Seminar (Online)**

2025 **Probability Seminar**, *University of Edinburgh (Online)*

2024 **Probability Seminar**, *University of Warwick*

2024 **Probability Seminar**, *Duke University*

2024 **Probability and Statistical Mechanics Seminar**, *SPMES (Online)*

2024 **Mathematics Seminar Series**, *Great Bay University (Online)*
2024 **Probability and Mathematical Phsyics Seminar**, *University of Arizona*
2024 **High Energy Theory Seminar**, *City College*, City University of New York
2023 **Probability Seminar**, *HKUST*, Hong Kong (Online)
2023 **Probability and Analysis Seminar**, *Bilkent University*, Ankara (Online)
2023 **Mathematical Physics and Probability Seminar**, *Gran Sasso Science Institute (GSSI)*, L'Aquila
2023 **Probability Seminar**, *University of Toronto*
2023 **Probability Seminar**, *Universitá di Roma Tre*
2023 **Mathematical Physics Seminar**, *SISSA,Trieste*
2023 **Probability Seminar**, *CMSA, Harvard University*
2023 **Probability Seminar**, *University of Minnesota/Leigh University (Online)*
2023 **Probability Seminar**, *Brown University*
2023 **High Energy Theory Seminar**, *Princeton University*
2023 **Probability Seminar**, *CUNY*
2022 **Probability Seminar**, *University of Erlangen*
2022 **Analysis, PDE & Probability Seminar**, *KIAS (Online)*
2022 **Mathematics Colloquium**, *Cornell University*
2022 **Mathematics Colloquium**, *University of Arizona*
2022 **Mathematics Colloquium**, *UT Austin (Online)*
2022 **Mathematics Colloquium**, *Rice University*
2022 **Mathematical Physics Seminar**, *UT Austin*
2022 **Probability Seminar**, *Courant Institute*, New York University
2022 **Probability Seminar**, *Cornell University*
2022 **Probability Seminar**, *University of California San Diego*
2022 **Probability Seminar**, *Tulane University*
2022 **Spectral Theory Seminar**, *Rice University*
2022 **Probability and Statistical Physics Seminar**, *University of Chicago*
2022 **Penn/Temple Probability Seminar**, *University of Pennsylvania*
2021 **Probability Seminar**, *Princeton University*
2021 **Mathematical Physics Seminar**, *Princeton University*
2021 **Probability Seminar**, *Universitá di Roma Tre*
2021 **Queen Mary Postgraduate Seminar**, *Queen Marry (Online)*
2021 **Stanford Probability Seminar**, *Stanford University (Online)*
2021 **QLunch Seminar**, *University of Copenhagen (Online)*
2020 **Mathematical Physics Learning Seminar**, *University of Connecticut (Online)*
2020 **Disordered Systems Group Seminar**, *King's College (Online)*
2020 **Oberseminar Stochastics**, *University of Bonn (Online)*
2020 **Random Matrix Seminar**, *KTH (Online)*
2020 **Probability Seminar**, *University of California Los Angeles (Online)*

2020 **UniMelb-Bielefeld RMT Seminar (Online)**

2017 **Dynamical Systems seminar**, *University of Vienna*

Contributed conference talks

2024 **ICMP (International Congress on Mathematical Physics)**, *Contributed Talk, Session Probability & Random Structures, Strasbourg*

2021 **ICMP (International Congress on Mathematical Physics)**, *Contributed Talk, Session Probability & Random Structures, Geneva*

2019 **Randomness in Physics and Mathematics: From Stochastic Processes to Networks**, *ZiF Center*, Bielefeld

Teaching Experience

2025 **Linear Algebra and its Applications (MATH 313, Section 6)**, *University of Arizona*

2025 **Linear Algebra and its Applications (MATH 313, Section 5)**, *University of Arizona*

2024 **The mystery of universality in random matrices**, *GSSI*, L'Aquila

2023 **Calculus (MAT103)**, *Princeton University*

2023 **Linear Algebra (MAT202)**, *Princeton University*

2020-2021 **Teaching assistant "Selected Topics in Analysis and Applications"**, *IST Austria*

2020 **Teaching assistant "Random Matrices"**, *IST Austria*

2017 **Teaching assistant "Calculus 2 for chemistry"**, *University of Rome Tor Vergata*

Participation in Conferences, Workshops, and Schools

2024 **Universality and Integrability in KPZ**, *Columbia University*, New York

2022 **Random media & large deviations**, *Courant Institute*, New York University

2022 **Random Matrices and Random Landscapes**, *Ascona*

2020 **Random Matrices and Their Applications**, *New York (Online)*

2019 **Dynamical Systems: From Geometry to Mechanics**, *Rome*

2018 **XIX International Congress of Mathematical Physics**, *Montreal*

2018 **EMS-IAMP Summer School in Mathematical Physics**, *Ischia*

2018 **Budwiser Seminars**, *Budapest*

2017 **Summer School in Mathematical Physics**, *Ravello*

2016 **Summer School in Mathematical Physics**, *Ravello*

Service work

Editorial Activities

2025- Associate Editor for Journal of Mathematical Physics (JMP).

Reviewing activities:

Annales de l'Institut Henri Poincaré (B) Probabilités et Statistiques (AIHP), Annals of Applied Probability (AAP), Annales Henri Poincaré (AHPO), Annals of Probability (AoP), Annals of Statistics (AoS), Astérisque, Bernoulli Journal (BEJ), Communications in Mathematical Physics (CIMP), Electronic Communications in Probability (ECP), Electronic Journal of Probability (EJP), Journal of Functional Analysis (JFA), Journal of Mathematical Physics (JMP), Journal of Physics A: Mathematical and Theoretical,

Journal of Statistical Physics (JSP), Mathematical Reviews, Nature Physics, Nature Communications, Letters in Mathematical Physics (LMP), Probability Theory and Related Fields (PTRF), Random Matrices: Theory and Applications (RMTA), Reports on Progress in Physics.

Conference organizing:

1) "Mathematical Challenges in Quantum Mechanics", co-organized with Michael Aizenman, Bruno Nachtergaele, Simone Warzel, and Jacob Shapiro (Princeton University, 2023).
2) "Physics for Neural Networks", co-organized with William Bialek, Boris Hanin, and Francesca Mignacco (Princeton University, 2023).
3) "Random Physics", co-organized with Jonah Kudler–Flam, Samuel A. Leutheusser, Gautam Satishchandran, and Edward Witten (Princeton University, 2024).
4) "Facets of entanglement", co-organized with Michael Aizenman, Dmitry Abanin, Bruno Nachtergaele, Simone Warzel, and Jacob Shapiro (Princeton University, 2025).
5) "Random matrices and operators", co-organized with Paul Bourgade and Nathanaël Berestycki (tentatively at ESI Vienna, 2026).
6) "Rocky Mountains Probability School", co-organized with Adrian Gonzalez Casanova and Sunder Sethuraman (tentatively at the University of Wyoming, 2027).

Seminar organizing:

1) Princeton Center for Theoretical Science (PCTS) seminars (2022–2023).
2) Probability seminars at Princeton University (2023–2024).
3) Mathematical Physics seminars at Princeton University (2023–2024).
4) Probability and Mathematical Physics seminars at the University of Arizona (2024–).

Outreach

2024 **Center of Recruitment and Retention of Mathematics Teachers Community Game Night**, *University of Arizona*

2024 **Research presentation (The mystery of Universality in Random Matrices) to senior undergraduates**, *Princeton University*

2023 **Mentorship Pair with undergraduate Sophia Huellstrunk**, *Princeton University*

2022 **Interview for students' newspaper on working abroad**, *Liceo Scientifico M. Vitruvio Pollione*, Avezzano (AQ)

Language Skills

- Italian — Mother tongue
- English — Fluent