Giorgio Cipolloni

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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

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

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 (2022).
    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 (2022).
    Accepted to Electronic Journal of Probability (2024).
    Preprint: 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 (2024).
Accepted to Advances in Theoretical and Mathematical Physics (2024).
Preprint: arXiv:2402.17609.
32. **On the spectral edge of non-Hermitian random matrices**
with Andrew Campbell, László Erdős, and Hong Chang Ji (2024).
Preprint: arXiv:2404.17512.
33. **Maximum of the Characteristic Polynomial of I.I.D. Matrices**
with Benjamin Landon (2024).
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.

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).

Grants and awards

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*

Invited Talks

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

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

2024 **Mathematics Seminar Series**, *Great Bay University (Online)*

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

2024 **Probability and Mathematical Phsyics Seminar**, *University of Arizona*

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

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

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

2024 **High Energy Theory Seminar**, *City College*, City University of New York

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

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*

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

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)*

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

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

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

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

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

Teaching Experience

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*

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

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

Workshop organizing:

1) "Mathematical Challenges in Quantum Mechanics", co-organized with Michael Aizenman, Bruno Nachtergaele, Simone Warzel, and Jacob Shapiro.
2) "Physics for Neural Networks", co-organized with William Bialek, Boris Hanin, and Francesca Mignacco.
3) "Random Physics", co-organized with Jonah Kudler–Flam, Samuel A. Leutheusser, Gautam Satishchandran, and Edward Witten.
4) "Facets of entanglement", co-organized with Michael Aizenman, Dmitry Abanin, Bruno Nachtergaele, Simone Warzel, and Jacob Shapiro.

Seminar organizing:

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

Language Skills

- Italian — Mother tongue
- English — Fluent