# Giorgio Cipolloni

November 13, 2025

## General Information

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| Affiliation | Dipartimento di Matematica, Universitá di Roma Tor Vergata |
| Address | Via della Ricerca Scientifica, 1, 00133 Roma RM, Italia |
| Position | Assistant Professor |
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## Positions

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| 2025–Current | **Assistant Professor**, *Universitá di Roma Tor Vergata* |
| 2024–2025 | **Assistant Professor**, *University of Arizona* |
| 2021–2024 | **Research Fellow**, *Princeton Center for Theoretical Sciences (PCTS) and Department of Mathematics*, Princeton University |
| 2021 | **Postdoc**, *IST Austria*, Erdős Group |

## Education

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|---|---|
| 2021 | **PhD student**, *IST Austria*, Erdős Group<br>**PhD Thesis Advisor:** Prof. László Erdős<br>**Title:** Fluctuations in the spectrum of random matrices |
| 2017 | **Master Degree**, *Univeristy of Rome Tor Vergata*, Dept. of Mathematics, Rome<br>**Master Thesis Advisor:** Prof. Carlangelo Liverani<br>**Title:** Deterministic walks<br>**Grade:** 110/110 Summa cum laude |
| 2015 | **Bachelor's Degree**, *Univeristy of Rome Tor Vergata*, Dept. of Mathematics, Rome<br>**Thesis Advisor:** Prof. Carlo Sinestrari<br>**Title:** Equazioni di Hamilton-Jacobi e problemi di controllo ottimale<br>**Grade:** 110/110 Summa cum laude |
| 2012 | **High School Diploma**, *Liceo Scientifico M. Vitruvio Pollione*, Avezzano, Italy<br>**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 Relat. 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.
    Comm. Pure Appl. Math., 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.
    Comm. Math. Phys., 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.
    J. Funct. Anal., 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.
    Ann. 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 Relat. 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.
Comm. Math. Phys., 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.
Comm. Math. Phys., 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.
Phys. Rev. Lett., 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.
Lett. Math. Phys., Vol. 113, No. 103 (2023).
Erratum & Addendum in Lett. Math. Phys., Vol. 114, No. 18 (2024).
**arXiv version:** arXiv:2210.10729.

22. **Mesoscopic Central Limit Theorem for non-Hermitian Random Matrices**
with László Erdős, and Dominik Schröder.
Probab. Theory Relat. 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.
J. Func. Anal., 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).
    J. Stat. Phys., 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.
    Accepted to Ann. inst. Henri Poincaré (B) Probab. Stat. (2025).
    **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.
    Adv. Theor. Math. Phys., 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.
    Accepted to Ann. Probab. (2025).
    **Preprint:** arXiv:2404.17512.

33. **Maximum of the Characteristic Polynomial of I.I.D. Matrices**
    with Benjamin Landon.
    Comm. Pure Appl. Math. (2025).
    **arXiv version:** 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.
    Probab. Theory Relat. Fields (2025).
    **arXiv version:** 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.
    J. Func. Anal., Vol. 290, Iss. 1 (2026).
    **arXiv version:** arXiv:2411.16572.

39. **Decorrelation transition in the Wigner minor process**
    with Zhigang Bao, László Erdős, Joscha Henheik, and Oleksii Kolupaiev.
    Probab. Theory Relat. Fields (2025).
    **arXiv version:** 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.
41. **Optimal Delocalization for Non–Hermitian Eigenvectors**
    with Benjamin Landon (2025).
    **Preprint:** arXiv:2509.15189.
42. **Numerical Radius of Non-Hermitian Random Matrices**
    with Zhigang Bao (2025).
    **Preprint:** arXiv:2510.02667.

## 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, awards, and habilitations

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|---|---|
| 2025 | **Italian National Habilitation for Full Professor (Professore I fascia) in Mathematical Physics (ASN, Settore concorsuale: 01/A4)** |
| 2025 | **Italian National Habilitation for Full Professor (Professore I fascia) in Analysis, Probability, and Mathematical Statistics (ASN, Settore concorsuale: 01/A3)** |
| 2024 | **Italian National Habilitation for Associate Professor (Professore II fascia) in Mathematical Physics (ASN, Settore concorsuale: 01/A4)** |
| 2024 | **Italian National Habilitation for Associate Professor (Professore II fascia) in Analysis, Probability, and Mathematical Statistics (ASN, Settore concorsuale: 01/A3)** |
| 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* |

## Professional Memberships

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| Since 2025 | **Member of Unione Matematici Italiani (UMI)** |
| Since 2025 | **Member of the International Association of Mathematical Physics (IAMP)** |

## Supervision

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| 2025 | **Member of the Ph.D. thesis committee of John Jeongsoo Park**, *University of Arizona* |
| 2025 | **Supervised 1 Undergraduate Student (Van Carlos Higgs)**, *University of Arizona* |
| 2022-2023 | **Co-supervised 1 PhD student (Nicoló Grometto)**, *Princeton University* |

## Talks and Lectures

### Invited Lectures

2025 **Random Matrix Theory and Numerical Linear Algebra**, *University of Washington*

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

### Invited talks at conferences and workshops

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

2025 **American Mathematical Society Meeting**, *Session "Integrability and Randomness"*, Tulane University, New Orleans

2025 **Log-gases in Caeli Australia**, *Matrix Center, Creswick, Australia*

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 In Statistics, Mathematics and Applications Seminar**, *(Online)*

2025 **Probability Seminar**, *University of Rome Tor Vergata*

2025 **Probability Seminar**, *Politecnico di Milano*

2025 **Mathematical Physics Seminar**, *Politecnico di Milano*

2025 **Probability Seminar**, *Universitá la Sapienza*

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

2026 **Co-instructor, Mathematical Physics 2**, *University of Roma Tor Vergata*

2026 **Co-instructor, Mathematical Physics 1**, *University of Roma Tor Vergata*

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

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

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

2023 **Instructor, 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

2025 **Mathematical Perspectives in Scientific Modeling**, *University of Rome Tor Vergata*

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:

Acta Mathematica, 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), Foundations of Computational Mathematics, International Journal of Mathematics for Industry (IJMI), 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.

### Referee for the institutions:

Swiss National Science Foundation.

### 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 (ESI Vienna, 2026).
6) "Log-correlated fields and SPDEs", co-organized with Tommaso Rosati (tentatively at Villa Mondragone, Rome 2026).

### Seminar organizing:

1) Princeton Center for Theoretical Science (PCTS) seminars (2022–2023).
2) Probability seminars, Princeton University (2023–2024).
3) Mathematical Physics seminars, Princeton University (2023–2024).
4) Probability and Mathematical Physics seminars, University of Arizona (2024–2025).
5) Seminário de Probabilidade e Mecânica Estatística (Online) (2024–2025).
6) Probability seminars, Universitá di Roma Tor Vergata (2025–).
7) Mathematical Physics seminars, Universitá di Roma Tor Vergata (2025–).

## Outreach

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| 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

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| ○ Italian | Mother tongue |
| ○ English | Fluent |