

Riccardo Walter Maffucci

Curriculum Vitae incluso Elenco Titoli

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University of Coventry, CV1 2JH, UK

Born: 06/07/1988 in Salford, Greater Manchester, UK.

Languages: English (native), Italian (native), French (B1/B2), Spanish (B1/B2), German (A1/A2).

## ELENCO TITOLI

### **Organizzazione o partecipazione come relatore a convegni di carattere scientifico in Italia o all'estero**

- "Third Italian number theory meeting", Scuola Normale Superiore, Pisa, Italy. Funded by SNS, Pisa. Title of my talk: "About nodal sets of eigenfunctions of the Laplacian on the torus". dal 21-09-2015 al 24-09-2015
- Invited Speaker at "First Italian Meeting on Probability and Mathematical Statistics", Torino, Italy. Funded by the conference organisation. Title of my talk "Distribution of nodal intersections for random waves". dal 19-06-2017 al 22-06-2017
- Invited Speaker at "2ND NUMBER THEORY MEETING" Torino. My talk was entitled: "Arithmetic Random Waves and Lattice Points on Spheres". dal 26-10-2017 al 27-10-2017
- Local Organiser of the International Conference "Random Waves in Oxford". The event brought together researchers interested the geometric properties of random waves and related problems in Probability Theory, Number Theory and Differential Equations. dal 18-06-2018 al 22-06-2018
- Invited Speaker at Groups, Arithmetic & Algebraic Geometry Seminar at EPFL, Switzerland. Stay and trip funded by EPFL. Title of my talk: "Lattice point congruences and arithmetic". dal 11-06-2019 al 11-06-2019
- Invited Speaker at "Second Italian Meeting on Probability and Mathematical Statistics", Salerno, Italy. Funded by the conference organisation. Title of my talk "Intermediate and small scale limiting theorems for random fields". dal 17-06-2019 al 20-06-2019
- Invited Speaker. International Conference in Rennes, France, "Random nodal domains and related topics". Funded by the conference organisation. Title of my talk: "Persistence Probability and Nodal Intersections for Arithmetic Random Waves". dal 09-09-2019 al 13-09-2019
- Invited Speaker at Rome Tor Vergata. Title of the talk: "Distribution of nodal intersections for random waves". Stay and trip funded by Rome Tor Vergata. The seminar is part of the Excellence Project [Math@TOV](#). dal 05-05-2022 al 05-05-2022
- Invited Speaker at "Third Italian Meeting on Probability and Mathematical Statistics", Bologna, Italy. Funded by the conference organisation. Title of my talk "Distribution of nodal intersections for random waves". dal 13-06-2022 al 16-06-2022

### **Direzione o partecipazione alle attività di un gruppo di ricerca caratterizzato da collaborazioni a livello nazionale o internazionale**

- ERC Starting Grant held by Prof. Igor Wigman, King's College London. I was a PhD student in the group of Prof. Igor Wigman. dal 01-02-2014 al 30-09-2017
- EPSRC grant "Random Fractals" ref. EP/M002896/1, held by Prof. Dmitry Belyaev. Postdoctoral Research Assistant, Mathematical Institute, University of Oxford. Funded by EPSRC grant "Random Fractals" ref. EP/M002896/1, held by Prof. Dmitry Belyaev. Duties: To conduct research towards the aims and objectives of EPSRC grant "Random Fractals". To attend regular meetings and collaborate with Dr. Belyaev and other members of the team on the aims and objectives of the project. Write up research findings for publication. To present the research findings at seminars and international conferences. dal 02-10-2017 al 30-09-2019

- Funding from Swiss National Science Foundation project 200021\_184927 "Optimal configurations in multidimensional spaces", held by Prof. Maryna Viazovska, Fields Medalist 2022. Postdoctoral Position, EPFL, Switzerland. dal 01-10-2019 a 31-12-2022
- Responsabilit  scientifica per progetti di ricerca internazionali e nazionali, ammessi al finanziamento sulla base di bandi competitivi che prevedano la revisione tra pari London Mathematical Society. Research in Pairs (Scheme 4) Ref n. 41735 Grant Holder: Riccardo Walter Maffucci Support of collaborative research with Prof. Maurizia Rossi Research was carried out at University of Oxford, and Paris Descartes. I applied for, and obtained the maximum amount of funding GBP 1200. dal 25-06-2018 al 27-07-2018
- London Mathematical Society Undergraduate Research Bursary [GBP 1,440] per un progetto di ricerca estivo con uno studente del secondo anno della laurea, Martin Ort n Ramirez, University of Oxford. Come supervisore del progetto ho fatto domanda e ottenuto i fondi. Lo studente ha poi pubblicato la ricerca su Monatshefte fur Mathematik. dal 01-06-2019 al 30-09-2019

**Formale attribuzione di incarichi di insegnamento o di ricerca (fellowship) presso qualificati atenei e istituti di ricerca esteri o sovranazionali Supervision of Master and Bachelor Research Projects.**

- Master students: Br tsch (2022), Delitroz (2022), Gaspoz (2022). Bachelor students: Petit de Guibert (2022), Willems (2022), Montavon (2021), Tomas (2021), Ortiz Ramirez (2018). dal 01-06-2018 a oggi
- Lincoln College Oxford Stipendiary Lecturer You are employed by the Rector and Scholars of the College of the Blessed Mary and All Saints, Lincoln in the University of Oxford, commonly called Lincoln College as a corporate body. You are responsible to the Senior Tutor, who is your formal line manager in College for issues relating to employment law. You will report to the Senior Fellow in Mathematics, Professor Vella, on issues relating to teaching arrangements. dal 01-10-2018 al 31-05-2019
- Mission d'enseignement MATH-360 - Graph theory Section de Math matiques EPFL SB SMA-GE MA A2 393 (B timent MA) Station 8 1015 Lausanne Mati re : Graph theory Heures d'enseignement : 28.00 heures de cours 28.00 heures d'exercices Plan d' tudes : Data Science, Math matiques Bachelor semestre 5 dal 01-09-2020 al 21-02-2021
- Mission d'enseignement MATH-360 - Graph theory Section de Math matiques EPFL SB SMA-GE MAA2 393 (B timent MA) Station 8 1015 Lausanne Mati re : Graph theory Heures d'enseignement : 28.00 heures de cours 28.00 heures d'exercices Plan d' tudes : Data Science, Math matiques Bachelor semestre 5 dal 01-09-2021 al 20-02-2022
- Tor Vergata incarico di collaborazione occasionale per lo svolgimento di una collaborazione scientifica dal titolo "Geometria dei campi aleatori" dal giorno 02/05/2022 al giorno 07/05/2022 fondi Math@ToV di cui   responsabile il Prof. Domenico Marinucci dal 02-05-2022 al 07-05-2022
- Mission d'enseignement MATH-360 - Graph theory Section de Math matiques EPFL SB SMA-GE MAA2 403 (B timent MA) Station 8 1015 Lausanne Mati re : MATH-360 - Graph theory Heures d'enseignement : 28.00 heures de cours 28.00 heures d'exercices Plan d' tudes : Data Science, Math matiques Bachelor semestre 5 dal 01-09-2022 al 19-02-2023
- University of Coventry. Lecturer and Module leader for Number theory and Cryptography (3<sup>rd</sup> year); dal 01-01-2024 al 30-04-2024
- University of Coventry. Lecturer for Advanced algebra (3<sup>rd</sup> year); dal 01-09-2023 al 31-01-2024
- University of Coventry. Lecturer and Module leader for Discrete mathematics (2<sup>nd</sup> year); dal 01-01-2024 al 30-04-2024
- University of Coventry. Lecturer for Probability (1<sup>st</sup> year); dal 01-01-2023 al 30-04-2023
- University of Coventry. Lecturer for Numerical analysis (1<sup>st</sup> year); dal 01-01-2023 al 30-04-2023
- University of Coventry. Lecturer for Mathematical skills for computing professionals (1<sup>st</sup> year); dal 01-05-2024 al 30-09-2024

- University of Coventry. Module leader for Project (3<sup>rd</sup> year); responsabile delle Lauree Triennali di tutti gli studenti di Matematica, Fisica, e Statistica; dal 01-09-2023 al 30-04-2024.

### **Specifiche esperienze professionali caratterizzate da attività di ricerca**

- PhD studies in the group of Prof. Igor Wigman, King's College London. I studied questions in number theory relating also to mathematical physics, probability theory, mathematical analysis. I published the results and presented them at national and international conferences. dal 01-10-2013 al 30-09-2017
- Postdoctoral Research Assistant, Mathematical Institute, University of Oxford. Funded by EPSRC grant "Random Fractals" ref. EP/M002896/1, held by Prof. Dmitry Belyaev. Duties: To conduct research towards the aims and objectives of EPSRC grant "Random Fractals". To attend regular meetings and collaborate with Dr. Belyaev and other members of the team on the aims and objectives of the project. Write up research findings for publication. To present the research findings at seminars and international conferences. I conducted research in collaboration with Prof. Belyaev, at the interface of Number Theory and Probability. dal 02-10-2017 al 30-09-2019
- Postdoctoral Position, EPFL, Switzerland. Research Group: Number Theory. Funding from Swiss National Science Foundation project 200021\_184927 "Optimal configurations in multidimensional spaces", held by Prof. Maryna Viazovska, Fields Medalist 2022. dal 01-10-2019 al 31-12-22
- Recensore per MathSciNet. Reviewer Number: 130844. Language: English, Italian. Mathematics Subject Classification 05C07 05C10 05C30 05C35 05C62 05C75 05C85 11D45 11D72 11P21 28C20 35P20 51M20 52B05 52B10 58C40 58J50 60B10 60D05 60F10 60G15 60G60 Interests Graph Theory (3-connected planar graphs), Algorithms, Number Theory (lattice points in specific regions, related sums), Probability (random fields). dal 20-09-2022 a oggi

01/2023-

**Teaching Fellow, University of Coventry, UK.**

09/2020-12/2022

**Lecturer in graph theory, EPFL, Switzerland.**

Teaching and organisation of teaching in Mathematics. Pastoral supervision of undergraduates. Setting exams and marking.

10/2019-12/2022

**Postdoctoral Fellow, EPFL, Switzerland.**

[CHF 81,900-86,400 per annum]. Funded by Swiss National Science Foundation project 200021184927 "Optimal configurations in multidimensional spaces", held by Prof. **Maryna Viazovska, Fields Medalist 2022.**

10/2018-09/2019

**Lecturer in pure mathematics, Lincoln College, University of Oxford.**

Teaching and organisation of teaching in Mathematics. Pastoral supervision of undergraduates. Taking part in the undergraduate admissions process.

10/2017-09/2019

**Postdoctoral Research Assistant, Mathematical Institute, University of Oxford.**

[£31,076 - £33,943 per annum]. Funded by EPSRC grant "Random Fractals" ref. EP/M002896/1, held by Prof. Dmitry Belyaev.

10/2013-09/2017

**Ph.D. King's College London, Department of Mathematics.**

Merit Scholarship for PhD programme, "Graduate Teaching Scholar" awarded by the Department of Mathematics [£16,296 per annum, available for four full years]. Advisor: Prof. Igor Wigman.

Thesis title

"Nodal lines and surfaces of arithmetic random waves".

### Publication list

- 1) M., "Nodal intersections of random eigenfunctions on the 2-dimensional torus"; *Monatshefte für Mathematik* 183(2):311-328, 2017.
- 2) M., "Nodal intersections for random waves against a segment on the 3-dimensional torus"; *Journal of Functional Analysis* 272(12):5218-5254.
- 3) Benatar and M., "Random waves on  $T^3$ : nodal area variance and lattice point correlations"; *International Mathematics Research Notices*, 2019(10):3032-3075, 2019.
- 4) M., "Nodal intersections for arithmetic random waves against a surface"; *Ann. Henri Poincaré* (2019) 20(11):3651-3691.
- 5) M., "Restriction of 3D arithmetic Laplace eigenfunctions to a plane"; *Electronic Journal of Probability* 25 (2020):1-17.
- 6) Belyaev and M., "Intermediate and small scale limiting theorems for random fields"; *Communications in Number Theory and Physics* Vol 16 (2022):1-34.
- 7) Belyaev and M., "Coupling of stationary fields with application to arithmetic waves"; *Stochastic Processes and their Applications*, 151(2022):436-450.
- 8) M., "On polyhedral graphs and their complements"; *Aequationes Mathematicae* (2022):1-15.
- 9) M., "Constructing certain families of 3-polytopal graphs"; *Journal of Graph Theory* (2022):1-18.
- 10) M., "Self-dual polyhedra of given degree sequence"; *Art Discrete Appl. Math.* 6 (2023), P1.04.
- 11) M. and Willems, "On smallest 3-polytopes of given graph radius"; *Discrete Mathematics* (346)5:113322 (2023).
- 12) M. and Rivera, "On the limiting behaviour of arithmetic toral eigenfunctions"; *Annales Institut Fourier* (2023), to appear.
- 13) Gaspoz and M., "Independence numbers of polyhedral graphs"; *Applied Mathematics and Computation*, Volume 462 (2024): 128349.
- 14) Delitroz and M., "On unigraphic polyhedra with one vertex of degree  $p-2$ "; *Results in Mathematics*, 79.2 (2024): 79.
- 15) M. and Rossi, "Asymptotic distribution of Nodal Intersections for ARW against a Surface"; *J. Math. Phys.* 65, 033503 (2024).
- 16) M., "Characterising 3-polytopes of radius one with unique realisation"; *Australas. J. Combin.*, to appear (2024).
- 17) M., "Rao's Theorem for forcibly planar sequences revisited"; *Discrete Mathematics*, to appear (2024).

### Preprints

- 18) M., "On unigraphic 3-polytopes of radius one"; arXiv: 2207.02040.
- 19) M., "On the faces of unigraphic 3-polytopes"; arXiv: 2305.20012.
- 20) M., "On self-duality and unigraphicity for 3-polytopes"; arXiv: 2308.12853.
- 21) Cammarota, M., Marinucci, Rossi, "Correlation Structure and Resonant Pairs for Arithmetic Random Waves"; arXiv: 2312.13166.
- 22) M., "Classification and Construction of Planar, 3-Connected Kronecker Products"; arXiv: 2402.01407.
- 23) Hollowbread-Smith and M., "Generation of 3-connected, planar line graphs"; arXiv:2404.07819.

### Teaching

## Qualifications

**2023: National Scientific qualification as associate in the Italian higher education system.**

**2024: I passed the first two parts of PGCAPHE. I expect to become Fellow of the Advance Higher Education this year.**

2023-

Lecturer for:

1-Number theory and Cryptography (3<sup>rd</sup> year);

2-Advanced algebra (3<sup>rd</sup> year);

3-Discrete mathematics (2<sup>nd</sup> year);

4-Probability (1<sup>st</sup> year);

5-Numerical analysis (1<sup>st</sup> year).

6-Mathematical skills for computing professionals (1<sup>st</sup> year).

Lecturer in Graph theory, EPFL (2022, 2021, 2020).

Lecturer in Analysis, Lincoln College, University of Oxford (2018-19).

Teaching Assistant for:

Topics in complex analysis, EPFL.

Department of Mathematics, King's College London: Analysis I, Elementary Number Theory, Geometry I, Linear Algebra, Numbers and Functions, Probability and Statistics I, Rings and Modules.

Master students: Brütsch (2022), Delitroz (2022), Gaspoz (2022).

Bachelor students: Hollowbread-Smith (2023), Wheatley (2023), Petit de Guibert (2022), Willems (2022), Montavon (2021), Tomas (2021), Ortiz Ramirez (2018).

I am local organiser of the conference “Random Waves in Oxford”, 18-22 June 2018.

I founded the British Federation of Mathematical Games, and co-hosted the 2023 and 2024 British finals, at the University of Coventry.

## Study groups organised

Spring term 2020, “Trace formulas and semiclassical analysis”, EPFL.

Trinity Term 2018, “Lattice point problems, correlations and applications” at the Mathematical Institute, aimed at DPhil students and postdocs.

## Main grants and funding awarded

- ✓ Visiting Maurizia Rossi at Milano Bicocca, Italy, May 2024. Stay and trip funded by Milano Bicocca.
- ✓ Visiting Domenico Marinucci at Rome Tor Vergata, Italy, May 2022. Stay and trip funded by Rome Tor Vergata.
- ✓ LMS Grant “Research in Pairs” – scheme 4; February 2018. I was awarded £1,200 for a research project with Maurizia Rossi.
- ✓ 06/2019-09/2019 Supervisor of two student summer research projects, Oxford. Funded by LMS Undergraduate Research Bursary [£1,440].
- ✓ 01/2018- Research membership of common room at Wolfson College, Oxford.
- ✓ Oberwolfach workshop “Automorphic Forms and Arithmetic” August/September 2020.
- ✓ Summer school on Number Theory and Optimal configurations, EPFL, Switzerland, August 2020.
- ✓ “Workshop on Nodal Structures and their connections to Number Theory” in Oxford, UK, January 2020. Funded by the conference organisation.
- ✓ “Random nodal domains and related topics” conference in Rennes, France, September 2019. Funded by the conference organisation.
- ✓ “Second Italian Meeting on Probability and Mathematical Statistics”, Salerno, Italy, June 2019. Funded by the conference organisation.
- ✓ Visiting Maryna Viazovska at EPFL, Switzerland, June 2019. Stay and trip funded by EPFL.

- ✓ “Second Italian number theory meeting - Torino”, Turin, Italy, October 2017. Funded by Università degli studi di Torino and Politecnico di Torino.
- ✓ “30th Journées Arithmétiques”, University of Caen, France; 03-07 July 2017. Funded by the conference organisation and by competitive “Graduate school conference fund scheme”, King's College London.
- ✓ “Conference on Statistical Topology of Random Manifolds: Theory and Applications (smr 2861)”, ICTP Trieste, Italy; July 2016. I was awarded €520 by SISSA Trieste.
- ✓ “Third Italian number theory meeting”, Scuola Normale Superiore, Pisa, Italy; September 2015. By SNS, Pisa.
- ✓ Summer school “Counting arithmetic objects”, CRM Montreal, Canada; June-July 2014. Funded by CRM.
- ✓ “London-Paris number theory seminar”, University of Paris 6, France; November 2013. Funded by the LMS.

### **Selected invited talks**

- Invited speaker at (PMS)<sup>2</sup>, Milano Bicocca, May 2024.
- Invited speaker at Warwick Number Theory Seminar, 2 October 2023.
- Invited speaker at Third Italian meeting on probability and mathematical statistics, Università degli studi di Bologna, Italy; June 2022.
- Invited speaker at Università Roma Tor Vergata, 5 May 2022.
- Invited speaker at Random nodal domains and related topics, conference in Rennes, France; September 2019.
- Invited speaker Groups, Arithmetic & Algebraic Geometry Seminar at EPFL, Switzerland; June 2019.
- Invited speaker at Second Italian meeting on probability and mathematical statistics, Università degli studi di Salerno, Italy; 17-20 June 2019.
- Invited speaker at Second Italian number theory meeting - Torino, Università degli studi di Torino - Politecnico di Torino, Italy; October 2017.
- Invited speaker at Oxford number theory junior seminar, UK; October 2017.
- Invited speaker at First Italian meeting on probability and mathematical statistics, Università degli studi di Torino - Politecnico di Torino, Italy; June 2017.
- Invited speaker at York number theory seminar, University of York, UK; February 2017.

### Degrees

Master's Degree in Mathematics, obtained on 11/10/2012. Graduation mark: 110/110 cum laude. 2010-2012, Università degli Studi di Torino. Mathematical, Physical and Natural Sciences Faculty.

Degree in Mathematics, obtained on 15/07/2010. Graduation mark: 110/110 cum laude. 2007-2010, Università degli Studi di Torino. Mathematical, Physical and Natural Sciences Faculty.

### Merit Scholarship 2007-2010

Fourth place nationwide out of 40 competitive scholarships [€4000 per year for three years] awarded by Istituto Nazionale di Alta Matematica (INdAM), open to all first-year undergraduates of a Mathematics Degree in an Italian university. Scholarship extended for the second and third years (the condition was: weighed mean of marks over 27/30, and no mark less than 24/30).

### Other working experiences

Invigilator for class tests at King's College London 2013-2017

This included managing exam sessions for undergraduates. In some sessions I was the only invigilator in the room, acting as Chief Invigilator.

Mentor for Mathematical Olympiad, Turin 2007-2013

Mentor of high schools Liceo “Copernico” and Liceo Scientifico “Gobetti” as a project of the “Mathesis” Association, for the Mathematical Olympiad.

Revision of the publication “Quaderno di Matematica” [“Mathematical Handbook”] of the “Mathesis”

Association, Turin 2010

Writing new parts and revising the contents and form for the second edition of the said publication, which is used as reading and reference for the Mathematical Olympiad training courses.

DATA 24/05/2024