Marcello [iD] Malagutti
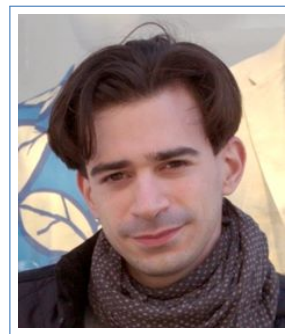
Curriculum Vitae

Department of Mathematics
University of Bologna
P.zza di Porta S. Donato 5, Bologna 40126, Italy
✉ *marcello.malagutti2@unibo.it*

Personal information

First name	Marcello
Last name	Malagutti
Place and date of birth	Castel San Pietro Terme (Bologna, Italy), March 11, 1996
Nationality	Italian
Position	Research Fellow
Affiliation	Department of Mathematics, UCL - Univeristy College London
E-mail	m.malagutti@ucl.ac.uk

Education

Nov. 2020–Oct. 2023   **PhD student in Mathematics**, *University of Bologna*, Italy
(*First position in the winners ranking of the admission application*)
Thesis: *Spectral Asymptotic Properties of Semi-Regular Non-Commutative Harmonic Oscillators*
Advisor: Prof. Alberto Parmeggiani
Reviewers: Prof. Jared Wunsch, Prof. Sandro Coriasco
Examination Boards: Prof. Masato Wakayama, Prof. Michael Ruzhansky, Prof. Massimo Cicognani
Doctoral dissertation defense: December 18, 2023

September 2018–June 2020   **Master Degree in Mathematics**, *University of Bologna*, Italy
Thesis: C^m *Solutions of linear Equations with Continuous Semialgebraic Coefficients*
Advisor: Prof. Alberto Parmeggiani
Final mark: 110/110 *summa cum laude*
(Average exam score: 29.86 out of 30)

September 2015–June 2018   **Bachelor of Science in Mathematics**, *University of Bologna*, Italy
Thesis: *Continuous solutions of differential equations*
Advisor: Prof. Alberto Parmeggiani
Final mark: 110/110 *summa cum laude*
(Average exam score: 29.62 out of 30)

2015–2020   **Fellow**, *Collegio Superiore, University of Bologna*, Italy
Note: "Collegio Superiore" is an institute of excellence of the University of Bologna. Admission and permanence are based exclusively on merit.

2018–2020   **Second Level University Diploma**, *Collegio Superiore, University of Bologna*, Italy

2015–2018 **First Level University Diploma**, *Collegio Superiore, University of Bologna*, Italy

Appointments

From 2023/11 **Research Fellow**, *University College London*, UK

Visits

16 April–15 July, 2022 **PHD Exchange Student**, *Ghent Analysis & PDE Center - Ghent University*, Belgium
Invited by Prof. Michael Ruzhansky.
Activities: Studies and research in *spectral analysis* and *non-commutative analysis*.

Scientific Interests

Mathematics Harmonic analysis, Phase-space analysis, Microlocal analysis,
Geometrical analysis of PDEs, Spectral theory, Scattering theory,
Real semialgebraic geometry

Mathematical Physics Quantum field theory, Quantum mechanics

Publications and Preprints

1. M. Malagutti, A. Parmeggiani. *Spectral Quasi-Clustering Estimates for Certain Semiregular Systems*. Submitted preprint (2023)

2. M. Malagutti. *On the Spectral Zeta Function of Second Order Semiregular Non-Commutative Harmonic Oscillators*. Bulletin des Sciences Mathématiques (2023-06) doi: 10.1016/j.bulsci.2023.103286 (Preprint ArXiv:2302.09063v2)

3. M. Malagutti, A. Parmeggiani. *Semiregular Non-Commutative Harmonic Oscillators: Some Spectral Asymptotic Properties*. To be published in a volume of the series "Research Perspectives Ghent Analysis and PDE Center" belonging to the Springer/Birkhäuser Trends in Mathematics (2024)

4. M. Malagutti. *Second Order Semiregular Non-Commutative Harmonic Oscillators: The Spectral Zeta Function*. To be published in a volume of the series "Research Perspectives Ghent Analysis and PDE Center" belonging to the Springer/Birkhäuser Trends in Mathematics (2023)

5. M. Malagutti, A. Parmeggiani. *Spectral Asymptotic Properties of Semiregular Non-Commutative Harmonic Oscillators*. Submitted preprint (2022)

6. M. Malagutti. *Regularity and Semialgebraicity of Solutions of Linear Equations Systems*. To be published in Bruno Pini Mathematical Analysis Seminar (issue 2023)

7. M. Malagutti. *Semialgebraic and Continuous Solution of Linear Equation with Semialgebraic Coefficients*. (Preprint ArXiv:2202.05815) (2023)

Scholarships

Nov. 2020–Oct. 2023 **PhD Scholarship**, *University of Bologna*, Italy

2015–2020	**Five-year *Collegio Superiore* Scholarship**, *University of Bologna*, Italy (2650 Euro/year, exemption from tuition fees, lodging)

Teaching Activities

Academic year 2022-23	**Teaching assistant**, *Analisi Superiore e PDE (Higher Analysis and PDEs)*, *Master degree in Mathematics*, University of Bologna Study support for students (12 hours)
Academic year 2022-23	**Teaching assistant**, *Analisi Superiore (Higher Analysis)*, *Master degree in Mathematics*, University of Bologna Weekly exercises, study support for students, collaboration in exams running (24 hours)
Academic year 2021-22	**Teaching assistant**, *Numeri Primi e Crittografia (Prime Numbers and Cryptography)*, *Project "Scientific Degree Plan"*, University of Bologna Lectures, tutorials, collaboration in tests running (10 hours)
Academic year 2022-23	**Teaching assistant**, *Analisi Superiore e PDE (Higher Analysis and PDEs)*, *Master degree in Mathematics*, University of Bologna Study support for students (12 hours)
Academic year 2021-22	**Teaching assistant**, *Analisi Superiore (Higher Analysis)*, *Master degree in Mathematics*, University of Bologna Weekly exercises, study support for students, collaboration in exams running (12 hours)
Academic year 2021-22	**Teaching assistant**, *Numeri Primi e Crittografia (Prime Numbers and Cryptography)*, *Project "Scientific Degree Plan"*, University of Bologna Lectures, tutorials, collaboration in tests running (10 hours)
Academic year 2020-21	**Teaching assistant**, *Analisi Superiore II (Higher Analysis II)*, *Master degree in Mathematics*, University of Bologna Study support for students (12 hours)
Academic year 2020-21	**Teaching assistant**, *Analisi Superiore I (Higher Analysis I)*, *Master degree in Mathematics*, University of Bologna Study support for students (12 hours)
Academic year 2018-19	**Teaching support activity**, *Analisi Matematica II (Calculus II)*, *Bachelor degree in Mathematics*, University of Bologna Weekly exercises, study support for students (100 hours)

Research Talks

● Seminars Talks

May 25, 2023	**Invited seminar at "Seminari Bruno Pini"**, *Department of Mathematics - Univeristy of Bologna*, Italy Title: *Regularity and Semialgebricity of Solution of System of Linear Equations*
April 1, 2022	**Invited seminar at "Ghent Analysis & PDE Center - Friday weekly seminars"**, *Ghent University*, Belgium, *(on-line)* Title: *Spectral Properties of a Class of Semiregular Pseudodifferential Systems*

May 18, 2021	**Invited seminar at "Ghent Methusalem Junior Seminar (Spring 2021)"**, *Ghent Analysis & PDE Center - Ghent University*, Belgium, *(on-line)* Title: *A Crash Introduction to Non-Commutative Harmonic Oscillators (NCHOs)*

● Conference Talks

Jan. 29-Feb. 2, 2024	**Invited talk at "Pseudo-Differential Operators and Related Topics"**, *Ghent University*, Belgium
January 24-26, 2024	**Invited talk at "Symposium in Harmonic & Complex Analysis, Microlocal & Geometrical Analysis and Applications, for PhD students"**, *Department of Mathematics - Univeristy of Bologna*, Italy
September 18-22, 2023	**Invited talk at "More Anomalies in Partial Differential Equations (MAIn PDES)"**, *"Centro Residenziale Universitario di Bologna", Castle of Bertinoro (FC)*, Italy Title: *Asymptotic spectral properties of certain semiregular global systems*
August 20-25, 2023	**Invited talk at "10th International Congress on Industrial and Applied Mathematics - ICIAM 2023 Tokyo"**, *Waseda University, Tokyo*, Giapan, *(on-line)* Title: *On the Spectral Zeta Function of Second Order Semiregular Non-Commutative Harmonic Oscillator*

Conferences Attendance

May 27-31, 2024	**Paris-Saclay conference in Analysis and PDE**, *Laboratoire de Mathématiques d'Orsay - Paris*, France
December 15, 2023	**The Paris-London Analysis Seminar**, *Institut Henri-Poincaré - Paris*, France
November 28-29, 2023	**Workshop on Global and Microlocal Analysis**, *Department of Mathematics - Univeristy of Bologna*, Italy
October 10-14, 2023	**ICMAM Latin America Satellite Conference on Analysis and PDE 2023**, *Supported by ISAAC (International Society for Analysis, its Applications and Computation)*, On-line Conference
July 24-28, 2023	**OAW-Operators, Asymptotics, Wave**, *(London Mathematical Society)*, University of Bath, UK
July 03-04, 2023	**Sub-Riemannian Geometry Harmonic Analysis, PDEs and Applications**, *University of Bologna*, Italy
June 12-16, 2023	**Harmonic Analysis, PDEs, and GMT in Bilbao 2023**, *University of the Basque Country*, Spain
October 17-19, 2022	**Workshop on Fourier Analysis, Linear PDEs, and Related Topics**, *Jointly organised by UFPR("Università federale del Paraná", Panama) and ICMC-USP ("Università federale del Paraná', San Paolo, Brazil)*, *((Web Seminar))* Celebrating the 75th birthday of Adalberto Bergamasco.
May 23-27, 2022	**Conference 100 UMI - 800 UniPD**, *University of Padua & UMI*, Italy
May 18-20, 2022	**Trends in Calculus of Variations and PDEs**, *Jointly organised by University of Sussex (UK) and Ghent Analysis & PDE Centre, UGent*, *(On-line Conference on Zoom)*

May 13, 2022	**Belgium PhD day 2022**, *University of Liege*, Belgium, (with UGent travel grant)
September 16-18, 2021	**Recent Advances in Global Analysis and PDEs**, *Department of Mathematics - Univeristy of Bologna*, Italy A meeting in honour of Bruno Franchi
February 26-27, 2021	**Recent Progress in Geometric Analysis and PDE**, *College of Science and Technology - Temple University*, Philadelphia, Pennsylvania (US) *(on-line)*
July 7-8, 2020	**International Conference on Pseudo-differential Operators**, *Ghent Analysis & PDE Center - Ghent University*, Belgium, *(on-line)*
May 25-27, 2020	**Variational and PDE problems in Geometric Analysis, III** , *University of Bologna*, Italy, *(on-line)*
November 28-29, 2019	**Two days on CalcVar&PDEs**, *University of Bologna*, Italy, (Workshop)

Schools, Courses and Seminars Attendance

• Schools

November 20-24, 2023	**Oberwolfach Seminar on "Scattering Resonances in Quantum Mechanics, General Relativity and Hyperbolic Dynamics"**, *MFO - Mathematisches Forschungsinstitut Oberwolfach*, Germany
August 22-31, 2022	**Summer school on "Singularities in Science and Engineering"**, *Ghent Analysis & PDE Center - Ghent University*, Belgium, *(on-line)*
July 14-10, 2022	**Summer school on physical sensing & processing – IV edition: "Quantum Sensing, Information Processing and Computing"**, *Department of Physics & Astronomy – University of Bologna*, Italy
January 13-17, 2020	**Winter school on "Integrable Systems and Representation Theory"**, *University of Bologna*, Italy, *(on-line)*
December 16-18, 2019	**Junior Math Days**, *SISSA*, Trieste, Italy (With SISSA travel grant for Master students)

• Courses

March 20–April, 6, 2023	**"Introduction to dispersive equations and nonlinear problems"** *(Prof. Serena Federico)*, *Department of Mathematic - Univesity of Bologna*, Italy (Course for PhD students: 15 hours)
Nov. 21–Jan. 21, 2022	**"Mathematics of quantunm spin systems"** *(Prof. A.Lucia)*, *Department of Mathematic - Univesity of Bologna*, Italy (Course for PhD students: 16 hours)
November 22-24, 2022	**"Spectral theory of differential operators: what's it all about and what is its use"** *(Prof. D.Vassiliev)*, *Ghent Analysis & PDE Center - Ghent University*, Belgium (Mini-course on Spectral Asymptotic)
June 30-July 1, 2022	**"Harmonic analysis on Symmetric Spaces"** *(Prof. A.Fotiadis)*, *Ghent Analysis & PDE Center - Ghent University*, Belgium (Mini-course)

Nov.24, 2021–Jan.13, 2022	**"The isoperimetric inequality outside convex sets"** *(Prof. N.Fusco)*, *Department of Mathematics - Technical University of Munich*, Germany (On-line course: 12 hours)
Nov.16, 2021–Jan.18, 2022	**"Random measures and multiplicative chaos"** *(Prof. Prof. A.Bufetov)*, *Department of Mathematic - Univesity of Bologna*, Italy (Course for PhD students: 30 hours)
May 27-June 7, 2021	**"An introduction to free boundary problems"** *(Prof. O.Savin)*, *Department of Mathematic - Univesity of Bologna*, Italy (Course for PhD students: 16 hours)
April, 2021	**"Combinatorics of Diagonal Coinvariants"** *(Prof. M.D'Adderio)*, *Department of Mathematic - Univesity of Bologna*, Italy (Course for PhD students: 10 hours)
Nov. 27-Dec. 18, 2020	**"Introduction to Free Boundary Problems"** *(Prof. G.Tortone)*, *Department of Mathematic - Univesity of Bologna*, Italy (Course for PhD students: 16 hours)
Octber 14-26, 2020	**"Fourier and Wavelets Analysis for Image Enhancement and Reconstruction"** *(Prof. D.Lazzaro)*, *Department of Mathematic - Univesity of Bologna*, Italy (Course for PhD students: 16 hours)
Sep. 29-Dec. 12, 2020	**"Hilber spaces of integer functions and point processes"** *(Prof. A.Bufetov)*, *Department of Mathematic - Univesity of Bologna*, Italy (Course for PhD students: 36 hours)

- ● Seminars

April 20, 2023	**"Non-equilibrium models for flow in porous media"** *(Prof. S.Pop)*, *Ghent Methusalem Colloquium at Ghent Analysis & PDE Center - Ghent University* , Belgium
March 13, 2023	**"Metrics on the phase space and well-posedness for degenerate Schrödinger equations"** *(Prof. J.Delgado)*, *Ghent Geometric Analysis Seminar at Ghent Analysis & PDE Center - Ghent University* , Belgium
January 30, 2023	**"Index theory via Lie groupoids"** *(Prof. C.Debord)*, *Ghent Geometric Analysis Seminar at Ghent Analysis & PDE Center - Ghent University* , Belgium
August-December, 2022	**"Ghent Methusalem Junior Seminar (Fall 2022)"**, *Ghent Analysis & PDE Center - Ghent University*, Belgium, *(on-line)*
October 31, 2022	**"Estimates for eigenfunctions of elliptic operators on compact manifolds and applications to control theory"** *(Prof. D.Cardona)*, *Ghent Geometric Analysis Seminar at Ghent Analysis & PDE Center - Ghent University* , Belgium
October 3-10, 2022	**"The integral in Noncommutative Geometry"** *(Prof. Gihyun Lee)*, *Ghent Geometric Analysis Seminar at Ghent Analysis & PDE Center - Ghent University* , Belgium
August 22, 2022	**"The infinity-Laplacian relative to vector fields"** *(Prof. J.Manfredi)*, *Department of Mathematics - Univeristy of Bologna*, Italy
July 28, 2022	**"The Alt-Phillips functional for negative powers"** *(Prof. D.De Silva)*, *Department of Mathematics - Univeristy of Bologna*, Italy

July 27-29, 2022	Seminar series - **"Regularity Theory for elliptic equation"** *(Prof. D.De Silva)*, *Department of Mathematics - Univeristy of Bologna*, Italy
June 20, 2022	**"Analytic microlocal analysis with exponential weights and some applications"** *(Prof. J.Sjostrand)*, *Ghent Methusalem Colloquium at Ghent Analysis & PDE Center - Ghent University* , Belgium
June 13, 2022	**"Analysis on non-compact manifolds and index theory"** *(Prof. V.Nistor)*, *Ghent Methusalem Colloquium at Ghent Analysis & PDE Center - Ghent University* , Belgium
May 30, 2022	**"A new approach to the hot spots conjecture"** *(Prof. J.Rohleder)*, *Ghent Methusalem Colloquium at Ghent Analysis & PDE Center - Ghent University* , Belgium
May 19, 2022	**"Geometric measure theory in Carnot groups and intrinsic submanifolds"** *(Prof. B.Franchi)*, *Department of Mathematics - Univeristy of Bologna*, Italy, *(on-line)*
April 20, 2022	**"Estimates for pseudodifferential operators in terms of the norms of Fourier multipliers"** *(Prof. E.Shargorodsky)*, *Ghent Methusalem Colloquium at Ghent Analysis & PDE Center - Ghent University*, Belgium
April 20, 2022	**"Convolution Equations on Lie Groups and Their Applications"** *(Prof. R.Duduchava)*, *Ghent Methusalem Colloquium at Ghent Analysis & PDE Center - Ghent University* , Belgium
March 17, 2022	**"Propagation of singularities in subelliptic PDEs"** *(Prof. C.Letrouit)*, *Department of Mathematics - Univeristy of Bologna*, Italy
February-June, 2022	**"Ghent Methusalem Junior Seminar (Spring 2022)"**, *Ghent Analysis & PDE Center - Ghent University*, Belgium, *(on-line and in person)*
January 27, 2022	**"On the regularity of solutions and of analytic vectors for 'sums of equations' "** *(Prof. G.Chinni)*, *Department of Mathematics - Univeristy of Bologna*, Italy, *(on-line)*
December 17, 2021	**"On pseudo-Heisenberg type Lie Algebra"** *(Prof. I.Markina)*, *Department of Mathematics - Univeristy of Bologna*, Italy, *(on-line)*
November 15, 2021	**"Some developments in preconditioning time-dependent PDE-constrained optimization problems and multiple saddle point systems"** *(Prof. J.Pearson)*, *Department of Mathematics, Univeristy of Bologna*, Italy, *(on-line)*
October 18, 2021	**"Halmos' invariant subspace problem and local spectral theory"** *(Prof. J.Gonzalez)*, *Department of Mathematics - Univeristy of Bologna*, Italy
October 28, 2021	**"Phase space analysis of wick operators on Bargman with application to discrete NLS"** *(Prof. L.Zanelli)*, *Department of Mathematics - Univeristy of Bologna*, Italy
August-December, 2021	**"Ghent Methusalem Junior Seminar (Fall 2021)"**, *Ghent Analysis & PDE Center - Ghent University*, Belgium *(on-line)*
April 29, 2021	**"Quotients and parameterizations"** *(Prof. L.Migliorini)*, *Department of Mathematics - Univeristy of Bologna*, Italy, *(on-line)*
February-June, 2021	**"Ghent Methusalem Junior Seminar (Spring 2021)"**, *Ghent Analysis & PDE Center - Ghent University*, Belgium, *(on-line)*

April 27-28, 2020	**Seminar series - "Mathematical Methods and Models in Machine Learning"**, *Department of Mathematics - Univeristy of Bologna*, Italy, *(on-line)*
June 27, 2019	**Lectio Magistralis - "Optimal mathematics"** *(Prof. A.Figalli)*, *"Accademia delle Scienze dell'Istituto di Bologna" - Univeristy of Bologna*, Italy
May 13-24, 2019	**Seminar series - "Topics in Global analysis"** *(Prof. G.Mendoza)*, *Department of Mathematics - Univeristy of Bologna*, Italy
April 17, 2019	**"Calculus, heat flow, optimal transport and curvature-dimension bounds in metric measure space"** *(Prof. L.Ambrosio)*, *Department of Mathematics - Univeristy of Bologna*, Italy
Dicember 21, 2018	**"The many faces of dispersive equations"** *(Prof. G.Staffilani)*, *Department of Mathematics - Univeristy of Bologna*, Italy
April, 2016	**Seminar series -"Green's functions in physics / Rotations and angular momentum in classical and quantum physics"** *(Prof. E.Ercolessi)*, *Collegio Superiore - Univeristy of Bologna*, Italy, (8 hours)

Languages

Italian	Mother tongue
English	Advanced C1

Computer Skill

Programming languages	Python, Java, C++
Operating Systems	MS Windows, macOS, Linux
Mathematical Software Packages	MatLab
Markup Languages	Latex