

# Paolo Rinaldi

## Curriculum vitae

Institute for Applied Mathematics  
Universität Bonn  
Endenicher Allee, 60 (Bonn - Germany)  
✉ rinaldi@iam.uni-bonn.de

Last Update: June 2022

### Personal Data

Birth San Giovanni Bianco (BG), 27/05/1994  
Nationality Italian  
Spoken Italian (mother tongue), English  
Language

### Present Position

October 2021- **Research Associate**, *Universität Bonn*, Institute for Applied Mathematics, in the group of Prof. Massimiliano Gubinelli.

### Education

- Oct. 2018 - **Ph.D. in Mathematical Physics**, *Università degli studi di Pavia*, Supervisor: Prof. Claudio Dappiaggi, Thesis: "A Novel Perturbative Approach to Stochastic Partial Differential Equations" Date of Defense: 14/01/2022.
- 7 may 2019 **Second Level Diploma**, *IUSS, institute for advanced study in Pavia*, Grade: Excellent, Supervisors: Prof. Claudio Dappiaggi, Dr. Nicolò Drago.  
Thesis: Diffusive Processes from an Algebraic Quantum Field Theory Viewpoint
- Oct. 2016 - **Master's Degree in Physics**, *Università degli studi di Pavia*, Summa Cum Laude,  
Sept. 2018 Supervisors: Prof. Mauro Carfora, Prof. Claudio Dappiaggi, Dr. Nicolò Drago.  
Thesis: Ricci Flow From Euclidean Renormalization Group Techniques, Date of Defense: September 27, 2018, Awarded with the **Grazioli Prize 2018** at the Istituto Lombardo
- 20 october 2016 **First Level Diploma**, *IUSS, institute for advanced study in Pavia*, Grade: Excellent,  
Supervisor: Dr. Claudio Dappiaggi.  
Thesis:  $C^*$ - and von Neumann Algebras: Structural Aspects of the Observables of a Quantum System
- Oct. 2013 - **Bachelor's Degree in Physics**, *Università degli studi di Pavia*, Summa Cum Laude,  
Jul. 2016 Supervisor: Dr. Claudio Dappiaggi.  
Thesis: Criteri per l'Identificazione di Osservabili in Meccanica Quantistica (Transl: Criteria for the Identification of the Observables in Quantum Mechanics), Date of Defense: July 21, 2016
- 2013-2018 **Alumnus**, *Almo Collegio Borromeo*, Pavia, Italy.
- 2013-2018 **Fellow**, *IUSS*, Institute for Advanced Study in Pavia, Italy.
- 2013 **Maturità Scientifica (High School Diploma)**, *Istituto Superiore D.M. Turolfo*, Zogno (BG, Italy), mark 100/100.

---

## Scientific Interests

Mathematical (Algebraic) Quantum Field Theory, Renormalization, General Relativity  
Physics

Pure Stochastic PDEs, Microlocal Analysis, Geometric Analysis  
Mathematics

---

## Honors, Prizes and Scholarships

- June. 2020 **Premio Luigi Berzolari 2020**, *University of Pavia*, Pavia, Prize for the best master thesis of mathematical argument.
- Jul. 2019 **Miglior Laureato in Fisica**, *Award for the best Physics student (graduation) of the academic year 2017/2018*, University of Pavia, Pavia.
- Feb. 2019 **Grazioli Prize**, *Istituto Lombardo Accademia di Scienze e Lettere*.
- 2018 **Winner of a Ph.D. position (with scholarship) in Physics**, *Department of Physics*, University of Pavia.
- 2018 **Winner of a Ph.D. position (with scholarship) in Mathematics**, *Department of Mathematics*, University of Genoa, *refused*.
- 2017 **Mons. Giuseppe Angelini Prize**, *Associazione Alunni Almo Collegio Borromeo*, Pavia.
- 2013-2018 **Five-years IUSS Scholarship**, *Five years scholarship granted by the IUSS (Institute for Advanced Study in Pavia) to the best students of the University of Pavia*, subject to annual reconfirmation.

---

## Preprints

- 2021 **C. Dappiaggi, PR, F. Sclavi**, “On a Microlocal Version of Young’s Product Theorem”, arXiv: 2104.12423 [math-ph].  
(submitted)
- 2021 **A. Bonicelli, C. Dappiaggi, PR**, “An Algebraic and Microlocal Approach to the Stochastic Non-Linear Schrödinger Equation”, arXiv: 2111.06320 [math-ph].  
(submitted)
- 2022 **C. Dappiaggi, PR, F. Sclavi**, “Besov Wavefront Set”, arXiv: 2206.06081 [math-ph].  
(submitted)

---

## Publications

- 2021 **C. Dappiaggi, N. Drago, PR, L. Zambotti**, “A Microlocal Approach to Renormalization in Stochastic PDEs”, *COMMUNICATIONS IN CONTEMPORARY MATHEMATICS*, <https://doi.org/10.1142/S0219199721500759>, arXiv: 2009.07640 [math-ph].
- 2021 **PR, F. Sclavi**, ‘Reconstruction Theorem for Germs of Distributions on Smooth Manifolds’, *JOURNAL OF MATHEMATICAL ANALYSIS AND APPLICATIONS*, Vol 501, Issue 2, <https://doi.org/10.1016/j.jmaa.2021.125215>, arXiv:2012.01261 [math-ph].

- 2020 **C. Dappiaggi, N. Drago, PR**, “The Algebra of Wick Polynomials of a Scalar Field on a Riemannian Manifold”, *REVIEWS IN MATHEMATICAL PHYSICS*, Vol. 32, No. 08 2050023, <https://doi.org/10.1142/S0129055X20500233>, arXiv: 1903.01258 [math-ph].
- 2020 **M. Carfora, C. Dappiaggi, N. Drago and PR**, “Ricci Flow from the Renormalization of Nonlinear Sigma Models in the Framework of Euclidean Algebraic Quantum Field Theory”, *COMMUNICATIONS IN MATHEMATICAL PHYSICS*, 374, 241–276 (2020) <https://doi.org/10.1007/s00220-019-03508-2>, arXiv:1809.07652 [math-ph].

## Talks

- 29 Nov. 2021 **An Algebraic and Microlocal Approach to the Stochastic Non-Linear Schrödinger Equation**, *Analytical Methods in Quantum and Continuum Mechanics*, Politecnico di Torino, Torino.
- 4 Nov. 2021 **A Microlocal Approach to Renormalization in Stochastic PDEs**, *Oberseminar Stochastik – Institute for Applied Mathematics*, Universität Bonn, Bonn, **(invited)**.
- 29 Jul. 2021 **A Microlocal Approach to Renormalization in Stochastic PDEs**, *Young Reseach Symposium – ICMP 2021*, Geneva, (online talk).
- 23 Feb. 2021 **A Microlocal Approach to Non-Linear Stochastic PDEs**, *Se mi narri di Matematica*, Dipartimento di Matematica - University of Pavia, **(Invited)**.
- 1 Oct. 2020 **Renormalizing Stochastic PDEs**, *Ph.D. Seminars*, Physics Department - University of Pavia.
- 29 Nov. 2019 **Ricci Flow from Euclidean Algebraic Quantum Field Theory**, *Mathematical Physics Seminar*, Institute of Mathematics - University of Würzburg, **(Invited)**.
- 8 Nov. 2019 **Ricci Flow from the Renormalization of Nonlinear Sigma Models in the Framework of Euclidean Algebraic Quantum Field Theory**, *MYR Meeting*, Math Young Researchers Meeting, Maths Department - University of Genova.
- 14 Oct. 2019 **A New Viewpoint on Singular Stochastic PDEs**, *Ph.D. Seminars*, Physics Department - University of Pavia.
- 6 Sept. 2019 **Ricci Flow from Nonlinear Sigma Models**, *XLIV Summer School on Mathematical Physics*, Gruppo Nazionale Fisica Matematica (GNFM), Ravello, Italy.
- 16 Apr. 2019 **The Algebra of Wick Polynomials of a Scalar Field on a Riemannian Manifold**, *Algebraic and Geometric Aspects in Quantum Field Theory*, Mathematical Institute, Universität Freiburg, Freiburg im Breisgau, Germany.
- 21 Feb. 2018 **Ricci Flow from Euclidean Algebraic Quantum Field Theory**, *43rd LQP Workshop*, Galileo Galilei Institute, Florence, Italy.

## Attended Workshops and Schools

- 24-25 June 2022 **46th LQP Workshop - Foundations and Constructive Aspects of QFT**, *Erlangen*.
- 29 Nov-3 Dec. 2021 **Analytical Methods in Quantum and Continuum Mechanics**, *Politecnico di Torino*, Torino.

- 2-7 Aug. 2021 **International Congress on Mathematical Physics – ICMP 2021**, Geneva, (Online attendee).
- 29-31 Jul. 2021 **Young Research Symposium – ICMP 2021**, Geneva, (Online attendee).
- 12-16 Oct. 2020 **Higher Structures Emerging from Renormalisation**, Erwin Schrödinger Institute, Wien, Online Workshop.
- 17-19 June 2020 **45th LQP Workshop - Foundations and Constructive Aspects of QFT**, Online Workshop.
- 4-7 Dec. 2019 **Quantum Field Theory Meets Quantum Probability**, Department of Mathematics, University of Rome Tor Vergata.
- 8 Nov. 2019 **MYR Meeting**, Math Young Researchers Meeting, Maths Department - University of Genova.
- 25-26 Oct. 2019 **44th LQP Workshop - Foundations and Constructive Aspects of QFT**, Institute for Theoretical Physics, Göttingen.
- 02-14 Sept. 2019 **XLIV Summer School on Mathematical Physics**, Organized by Gruppo Nazionale Fisica Matematica (GNFM), Ravello, Italy.
- 20-24 May 2019 **Hypoelliptic Laplacian and Applications**, Mathematical Institute, Universität Freiburg, Freiburg im Breisgau, Germany.
- 15-18 Apr. 2019 **Algebraic and Geometric Aspects in Quantum Field Theory**, Mathematical Institute, Universität Freiburg, Freiburg im Breisgau, Germany.
- 20-22 Feb. 2019 **43rd LQP Workshop - Foundations and Constructive Aspects of QFT**, Galileo Galilei Institute, Firenze.

### Short Visits

- 24-30 Nov. 2019 **Dr. Nicolò Drago**, Institute of Mathematics, University of Würzburg.

### Teaching

- SS2022 **Assistant for the class of Stochastic Analysis V4F1**, (Prof. Massimiliano Gubinelli), Universität Bonn.
- 2020-2021 **Seminars on Complex Analysis (10 hours)**, for the class of *Mathematical Methods of Physics I* (Prof. Barbara Pasquini) of the B.Sc. in Physics, Università di Pavia.
- March 2020 **Introduction to Microlocal Analysis (10 hours)**, *Introduzione all'Analisi Microlocale*, Almo Collegio Borromeo, Pavia.
- 2019-2020 **Seminars on Spectral Theory and Distribution Theory (12 hours)**, for the class of *Mathematical Methods of Physics II* (Prof. Claudio Dappiaggi) of the B.Sc. in Physics, Università di Pavia.
- 2018-2019 **Seminars on Complex Analysis (12 hours)**, for the class of *Mathematical Methods of Physics I* (Prof. Barbara Pasquini) of the B.Sc. in Physics, Università di Pavia.

- 2018-2019 **Seminars on Spectral Theory and Distribution Theory (12 hours)**, for the class of *Mathematical Methods of Physics II* (Prof. Claudio Dappiaggi) of the B.Sc. in Physics, Università di Pavia.
- November 2018 **Course on Tensorial Calculus (10 hours)**, *Introduzione al Calcolo Tensoriale*, Almo Collegio Borromeo, Pavia.
- 2018-2021 **Tutor for the area of Mathematics and Physics**, *Academic assistance to students and seminars*, Almo Collegio Borromeo, Pavia.
- 2017-2018 **Tutor of Classical Mechanics**, *15 hours*, class of the B.Sc. in Physics, Università di Pavia.

---

### Thesis Co-Supervisor

- Sept. 2021 **Alberto Bonicelli**, *A Microlocal Approach to the Stochastic Non-Linear Schrödinger Equation*, Università di Pavia, MSc. in Physics, 110/110 cum laude, Co-supervisor, Awarded with the **Grazioli Prize 2021** at the Istituto Lombardo.
- 2021 **Diego Salvi**, *Algebraic Approach to Non-Linear  $\sigma$  Models at Second Order in Perturbation Theory*, Università di Pavia, MSc. in Physics, 110/110, Co-supervisor.
- Sept. 2020 **Nicolò Nuca**, *Processi di Diffusione ed Equazione di Fokker-Planck*, Università di Pavia, BSc. in Physics, 106/110, Co-supervisor.
- Sept. 2019 **Alberto Bonicelli**, *Geodesics motion on Riemannian manifolds from heat flow techniques*, Università di Pavia, BSc. in Physics, 110/110 cum laude, Co-supervisor.

---

### Research Projects

- 2019 **Progetto Giovani GNFM**, "*Factorization algebras vs AQFTs on Riemannian manifolds*", Principal Investigator: Dr. Marco Benini (Dipartimento di Matematica - Università di Genova), Funded by GNFM (Gruppo Nazionale Fisica Matematica).  
Role: Participant