

CURRICULUM VITAE MARILENA LIGABÒ

Current position:

Associate Professor in Mathematical Physics at University of Bari.

Academic record:

- December 27, 2018 - December 27, 2021: Assistant Professor (RTD b) in Mathematical Physics at University of Bari;
- October 1, 2015 - December 27, 2018: Assistant Professor (RTD a) in Mathematical Physics at University of Bari;
- May 12, 2014 - May 11, 2015: Postdoctoral position at Polytechnic of Bari;
- September 1, 2012 - August 31, 2013: : Postdoctoral position at University of Bologna;
- July 2, 2012: Ph.D in Mathematical Physics.

Recent research topics:

- Quantum Zeno effect and product formulae
- Classical and quantum tomography
- Weyl-Wigner formalism in quantum mechanics
- Semiclassical limit and asymptotic limit of quantum dynamics
- Boundary conditions
- Quantum combinatorial designs
- Open quantum systems
- Perturbation theory for Schrödinger operators
- Random matrix theory
- Elasticity and Thermo-elasticity

Publications:

1. P. Facchi, M. Ligabò, S. Pascazio: “On the inversion of the Radon transform: standard versus M^2 approach”, *Journal of Modern Optics* **57**, p. 239-243, (2010)
2. P. Facchi, M. Ligabò: “Quantum Zeno effect and dynamics”, *Journal of Mathematical Physics* **51**, 022103, (2010)
3. P. Facchi, S. Graffi, M. Ligabò: “The classical limit of the quantum Zeno effect”, *Fast Track Communication Journal of Physics A: Mathematical Theoretical* **43**, 032001, (2010)

4. P. Facchi, M. Ligabò: “Classical and quantum aspects of Tomography”, AIP Conference Proceedings: XVIII International Fall Workshop on Geometry and Physics **1260**, p. 3-34, (2010)
5. A. Figalli, M. Ligabò, T. Paul: “Semiclassical limit for mixed states with singular and rough potentials”, Indiana University Mathematics Journal **61** no. 1, p. 193-222, (2012)
6. P. Facchi, M. Ligabò, S. Solimini: “Tomography: mathematical aspects and applications”, Physica Scripta **90**, 074007 (10pp), (2015)
7. M. Ligabò: “Torus as phase space: Weyl quantization, dequantization and Wigner formalism”, Journal of Mathematical Physics **57**, 082110 (2016)
8. A. Bianchi, G. Cristadoro, M. Lenci, M. Ligabò: “Random walks in a one-dimensional Lévy random environment”, Journal of Statistical Physics **163** no. 1, pp 22-40 (2016)
9. G. M. Coclite, G. Florio, M. Ligabò, F. Maddalena: “Nonlinear waves in adhesive strings”, SIAM Journal on Applied Mathematics, **77**, No. 2, pp. 347-360 (2017)
10. P. Facchi, M. Ligabò: “Large-time limit of the quantum Zeno effect”, Journal of Mathematical Physics **58**, 032103 (2017)
11. P. Facchi, G. Garnero, M. Ligabò: “Quantum fluctuation relations”, International Journal of Geometric Methods in Modern Physics **14**, No. 8, 1740002 (20 pages) (2017)
12. F. D. Cunden, P. Facchi, M. Ligabò, P. Vivo: “Universality of the third-order phase transition in the constrained Coulomb gas”, Journal of Statistical Mechanics: Theory and Experiment **2017**, 053303, (2017)
13. P. Facchi, M. Ligabò, K. Yuasa: “On the derivation of the GKLS equation for weakly coupled systems”, Open Systems and Information Dynamics **24** , 1740017 (2017)
14. P. Facchi, G. Garnero, M. Ligabò: “Self-adjoint extensions and unitary operators on the boundary”, Letters in Mathematical Physics **108**, pp 195-212 (2018)
15. P. Facchi, G. Garnero, M. Ligabò: “Quantum cavities with alternating boundary conditions”, Journal of Physics A: Mathematical Theoretical **51**, 105301, (2018)
16. F. D. Cunden, P. Facchi, M. Ligabò, P. Vivo: “Universality of the weak pushed-to-pulled transition in systems with repulsive interactions”, *Letter to* Journal of Physics A: Mathematical Theoretical **51**, 35LT01, (2018)
17. F. D. Cunden, P. Facchi, M. Ligabò, P. Vivo: “Third-order phase transition: random matrices and screened Coulomb gas with hard walls”, Journal of Statistical Physics **175**, (2019);
18. G. M. Coclite, G. Florio, M. Ligabò, F. Maddalena: “Adhesion and debonding in a model of elastic string”, Computers & Mathematics with Applications **78**, (2019);
19. P. Facchi, M. Ligabò, D. Lonigro: “The Friedrichs-Lee model and its singular coupling limit”, Proceeding **12**, 17, (2019);
20. D. Burgarth, P. Facchi, M. Ligabò, D. Lonigro: “Hidden non-Markovianity in open quantum systems”, Phys. Rev. A **103**, 012203 (2021);
21. P. Facchi, M. Ligabò, D. Lonigro: “Spectral properties of the singular Friedrichs-Lee Hamiltonian”, Journal of Mathematical Physics **62**, 032102 (2021);
22. G. M. Coclite, G. Devillanova, G. Florio, M. Ligabò, F. Maddalena: “Thermo-elastic waves in a model with nonlinear adhesion”, Nonlinear Analysis **232**, 113265 (2023);
23. F. D. Cunden, M. Ligabò, T. Monni: “Random matrices associated to Young diagrams”, Random Matrices: Theory and Application **12**, 2350009 (2023);
24. F. D. Cunden, P. Facchi, M. Ligabò: “The semiclassical limit of a quantum Zeno dynamics”, Letters in Mathematical Physics **103** (2023);

25. P. Facchi, M. Ligabò: “Stability of the gapless pure point spectrum of self-adjoint operators” *Journal of Mathematical Physics* **65**(3), 032102 (2024);
26. D. Burgarth, P. Facchi, R. Hillier, M. Ligabò: “Taming the Rotating Wave Approximation”, *Quantum* **8** (2024);
27. G. Angelone, P. Facchi, M. Ligabò: “Classical echoes of quantum boundary conditions” accepted by *Journal of Physics A: Mathematical Theoretical* (2024);
28. F. D. Cunden, M. Ligabò, M. C. Susca: “Truncated quantum observables and their semiclassical limit”, submitted (2024).

Research projects:

- Coordinator of the local unit of the project PRIN 2022 ”The charm of integrability: from nonlinear waves to random matrices”, P.I. Tamara Grava (SISSA);
- National Center for HPC, Big Data and Quantum Computing, Spoke 10;
- Partenariato Esteso 04 National Quantum Science and Technology Institute (NQSTI), Spoke 1;
- 2022 - 2024: Participant to the project “A Holistic approach for the assessment of environment and human health risk due to Pollution in a transitional water system”, Horizon Europe Seeds funded by University of Bari;
- 2018-2019: Principal Investigator of the project “Modelli fisici e metodi matematici” funded by University of Bari;
- Principal Investigator of four INdAM projects: Progetto Giovani GNFM 2019, 2016, 2014, 2013.

Organization of scientific meetings:

- Coordinator of the organizing and scientific committee of the INdAM intensive period 2023 “Puglia Summer Trimester 2023 on Singularities, Asymptotics, Limiting Models”, University of Bari (webpage: <https://sites.google.com/view/pst2023/home>);
- Member of the organizing committee of “Wascom 2023”, University and Polytechnic of Bari (webpage: <https://wascom2023.altervista.org/>);
- Member of the organizing and scientific committee of “One day Workshop on Applied Mathematics”, University and Polytechnic of Bari, editions 2022, 2019, 2018 (webpage: <https://sites.google.com/site/coclitegm/home/iv-one-day-workshop-on-applied-mathematics-2022>);
- Member of the organizing and scientific committee of “XMaths Workshop”, University of Bari, editions 2022, 2021 (webpage: <https://xmathsworkshop.weebly.com/history.html>);
- Organizer of the Mathematical Physics seminars at University of Bari.

Visiting periods:

- 2011: Centre de Mathématiques Laurent Schwartz (CMLS), Ecole polytechnique Paris, France;
- 2009: Waseda University, Tokyo, Japan.

Scientific communications:

- November 29, 2008: “Open problems in Quantum Mechanics“ (Bertinoro, Italy), title of the seminar “Quantum Zeno effect and dynamics”;
- February 12, 2009: “Meeting on Hyperbolic Equations - IperBA” (Bari, Italy), title of the seminar “Quantum Zeno effect and dynamics”;
- February 19, 2009: “Mathematical Methods in Quantum Mechanics” (Bressanone, Italy), title of the seminar “Quantum Zeno effect and dynamics”;
- May 25, 2009: Seminar at Waseda University (Tokyo, Japan), title of the seminar “Characterization of the quantum Zeno effect and dynamics”;
- May 27, 2009: Seminar at Gakushuin University (Tokyo, Japan), title of the seminar “Zeno product formulae”;
- May 29, 2009: Seminar at Research Center for Information Security (Tokyo, Japan), title of the seminar “Quantum dynamics and product formulae”;
- August 10, 2010: Summer School “Quantum theory from small to large scales” - Ecole de Physique (Les Houches, France), title of the seminar “The classical limit of the quantum Zeno effect”;
- February 18, 2011: “Mathematical Methods in Quantum Mechanics” (Bressanone, Italy), title of the seminar “Semiclassical limit for mixed states with singular and rough potentials”;
- July 19, 2012: Seminar at University of Bologna, title of the seminar “Quantization on the torus”;
- December 20, 2013: “XMaths Workshop 2013” (University of Bari, Italy), title of the seminar “Quantum maps on the torus”;
- May 15, 2014: “Assemblea Nazionale GNFM” (Montecatini, Italy), title of the seminar “Quantization on the torus”;
- November 19, 2014: Seminar at University of Bari, title of the seminar “Weyl-Wigner formalism of quantum mechanics”;
- September 11, 2015: “Italian Quantum Information Science Conference 2015” (Monopoli, Italy), title of the seminar “Weyl quantization, dequantization and Wigner transform for N-dimensional quantum systems”;
- February 1, 2017: “International Workshop on Mathematical Foundations of Quantum Mechanics and its applications”, Instituto de Ciencias Matematicas (Madrid, Spain), title of the seminar “Large time limit of the quantum Zeno effect”;
- May 5, 2017: “Assemblea Nazionale GNFM” (Montecatini, Italy), title of the seminar “Quantum boundary conditions”;
- February 22, 2018: “Mathematical Challenges in Quantum Mechanics”, (Università La Sapienza, Roma, Italy), title of the ”;
- July 16, 2021: “QKAM Workshop”, (online), title of the seminar “Stability of pure point spectrum”;
- October 5, 2022: “Zero-Range and Point-Like Singular Perturbations: For a Spillover to Analysis, PDE and Differential Geometry”, (Oberwolfach Research Institute for Mathematics, Germany), title of the seminar “Boundary conditions, product formulae and classical limit”;
- November 23, 2022: “Workshop on Singular Perturbations and Geometric Structures”, (SISSA, Trieste, Italy) , title of the seminar “Boundary conditions, product formulae and classical limit”;
- May 24, 2023: “Mathematical Physics in Quantum Technology: From Finite to Infinite Dimensions”, (International Center for Mathematica Science, Edinburgh, UK) , title of the seminar “Stability of the gapless pure point spectrum of self-adjoint operators”;

- June 6, 2023: “Wascom 2023”, (University of Bari, Italy), title of the seminar “Boundary conditions, product formulae and quantum Zeno dynamics”;
- September 9, 2023: “XXII Congresso dell’Unione Matematica Italiana 2023” (PISA, Italy), title of the seminar “The semiclassical limit of a quantum Zeno dynamics”;
- July 10, 2024: “INdAM Workshop Future Perspectives on Linear and Nonlinear Modelling of Contact-Type Perturbations” (Rome, Italy), title of the seminar “Truncated quantum observables and their semiclassical limit”.

Teaching activities (in italian):

- A. A. 2011-2012: Esercitatrice per il corso di “Geometria e Algebra”, corso di laurea in Ingegneria Gestionale, Politecnico di Bari;
- A. A. 2012-2013: Docente a contratto per il corso “Elementi di Matematica per l’Economia” (Modulo 2), corso di laurea in Economia Aziendale, Università degli Studi di Bologna;
- A. A. 2015-2016, 2019-2020, 2020-2021: Esercitatrice del corso di “Fisica Matematica 2” per il Corso di Laurea in Matematica dell’Università degli Studi di Bari;
- A. A. 2015-2016: Titolare del corso di “Elementi di Matematica” per il Corso di Laurea in Farmacia dell’Università degli Studi di Bari;
- A. A. 2015-2016, 2016-2017: Esercitatrice del corso di “Matematica con elementi di probabilità e statistica” per il Corso di Laurea in Scienze Biologiche dell’Università degli Studi di Bari;
- A. A. 2016-2017, 2017-2018: Titolare del corso di “Meccanica Analitica” per il Corso di Laurea in Fisica dell’Università degli Studi di Bari;
- A. A. 2017-2018: “Precorso di Analisi Matematica” per i corsi di Laurea in Ingegneria, Politecnico di Bari;
- A. A. 2018-2019: Esercitatrice del corso di “Analisi Matematica” per il Corso di Laurea in Informatica e Tecnologie Per il Software dell’Università degli Studi di Bari;
- A. A. 2019-2020: Titolare del corso di “Analisi Matematica” per il Corso di Laurea in Informatica e Tecnologie Per il Software dell’Università degli Studi di Bari;
- A. A. 2019-2020: corso di dottorato “Quantum mechanics in phase space” per il corso di Dottorato in Fisica dell’Università degli Studi di Bari;
- A. A. 2020-2021, 2021-2022, 2022-2023, 2023/2024: Titolare del corso di “Analisi Matematica” per il Corso di Laurea in Informatica dell’Università degli Studi di Bari;
- A. A. 2021-2022, 2022-2023 : Titolare del corso di “Metodi Matematici della Fisica” per il Corso di Laurea Magistrale in Matematica dell’Università degli Studi di Bari;
- A.A. 2021-2022, 2022-2023: Titolare del corso di “Aspetti Matematici della di Meccanica Quantistica” per il Corso di Laurea Triennale e Magistrale in Matematica dell’Università degli Studi di Bari;
- A.A. 2023-2024: Titolare del corso di “Fisica Matematica 1” per il Corso di Laurea Triennale in Matematica dell’Università degli Studi di Bari.

Supervision of students:

- Ayesha Ali, Ph.D student in Mathematics (ongoing);
- Tommaso Monni, Ph.D student in Mathematics (nov 2021-nov 2022);

- Maria Caterina Susca, master degree student in Mathematics (2023);
- Francesca Perrone, bachelor degree student in Mathematics (2023)
- Giacomo Cappiello, master degree student in Mathematics (2022);
- Marica De Lucia, master degree student in Mathematics (2021);
- Ettore Modestino Antonio Ramon Cristofaro, master degree student in Physics (2021);
- Ettore Modestino Antonio Ramon Cristofaro, bachelor degree student in Physics (2018);
- Dario Alberto Fiorillo, master degree student in Mathematics (2017);
- Francesco Sasso, master degree student in Mathematics (2015).

Institutional responsibilities:

- Referee of the Ph.D thesis of Noè Angelo Caruso - SISSA, Trieste (2019);
- Member of the Adjudication Committee for the PhD Disputation of Noè Angelo Caruso - SISSA, Trieste (2019);
- Member of the Adjudication Committee for the PhD Disputation of Giulia Vescovo - SISSA, Trieste (2019);
- Member of the academic board of the Ph.D Program in Informatics and Mathematics, University of Bari (XXXVII, XXXVIII, XXXIV cycles);
- Member of the MUR register of scientific experts REPRISE;
- Coordinator of the Mathematical Physics research group composed by 1 RTDB (Fabio Deelan Cunden), 1 RTDA (Davide Lonigro), 1 Researcher (Arcangelo Labianca), 1 PhD student (Ayesha Ali);
- Coordinator of the national research activity A1.8 Quantum Resources in PNRR Partenariato Esteso 04 National Quantum Science and Technology Institute (NQSTI);
- Member of the commission for admission to the PhD program in Computer Science and Mathematics of the University of Bari (XXXVIII cycle)
- Member of the commission for two RTD a) positions, Mathematics Department, University of Bari (2023);
- Member of the commission for one RTT position, Mathematics Department, Sapienza University of Rome (2023);
- Member of the commission for one RTD a) position, Mathematics Department, University of Pisa (2024);
- Member of the resources commission and of the teaching commission of the Mathematics Department of the University of Bari.

Other scientific activities:

- Referee for Annales Henri Poincare, Reviews in Mathematical Physics, Indiana University Mathematics Journal, Reports on Mathematical Physics, The European Physical Journal Plus, Journal of Applied Mathematics and Physics;
- Member of the editorial committee for a INdAM-Springer series book on the topics developed during the INdAM Intensive Trimester "Puglia Summer Trimester 2023 on Singularity, Asymptotics and Limiting Models".

Career breaks : From September 27, 2018 to March 15, 2019 maternity leave.

Bari, August 8, 2024

Marilena Ligabò