Louis Garrigue

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Positions

Feb 2023 –	**Tenure track**, *Cergy's university*, laboratory "analysis, geometry and modeling"
Oct 2022 – Jan 2023	**Postdoc**, *university of Stuttgart*, in the team of Benjamin Stamm
2020 – 2022	**Postdoc**, *École des ponts, Cermics*, in the team of Eric Cancès

Education

2017 – 2020	**Doctorate in mathematical quantum physics**, *university Paris-Dauphine*, supervised by Mathieu Lewin, on mathematical aspects of Density functional theory
2016 – 2017	**Master's degree in fundamental mathematics**, *university Paris-Diderot*
2014 – 2016	**Master's degree in theoretical physics**, *École normale supérieure*, Paris
2012 – 2017	**Student and civil servant at the École normale supérieure**, *Paris*

Preprints

[10] L. Garrigue, B. Stamm. On reduced basis methods for eigenvalue problems, and on its coupling with perturbation theory (arxiv:2408.11924), preprint (2024).

Publications

[9] G. Dusson, L. Garrigue, B. Stamm. A multipoint perturbation formula for eigenvalue problems (arxiv:2305.08151), ESAIM: Mathematical Modelling and Numerical Analysis (2025).

[8] L. Garrigue. Mixed state representability of entropy-density pairs (arxiv:2203.16441), Journal of Mathematical Physics (2024).

[7] E. Cancès, L. Garrigue, D. Gontier. A simple derivation of moiré-scale continuous models for twisted bilayer graphene (arxiv:2206.05685), Physical Review B (2023).

[6] E. Cancès, L. Garrigue, D. Gontier. Second-order homogenization of periodic Schrödinger operators with highly oscillating potentials (arxiv:2112.12008), SIAM Journal on Mathematical Analysis (2022).

[5] L. Garrigue. Building Kohn-Sham potentials for ground and excited states (arxiv:2101.01127), Archive for Rational Mechanics and Analysis (2022).

[4] L. Garrigue. Some properties of the potential-to-ground state map in quantum mechanics (arxiv:2012.04054), Communications in Mathematical Physics (2021).

[3] L. Garrigue. Unique continuation for many-body Schrödinger operators and the Hohenberg-Kohn theorem. II. The Pauli Hamiltonian (arxiv:1901.03207), Documenta Mathematica (2020).

[2] L. Garrigue. Hohenberg-Kohn theorems for interactions, spin and temperature (arxiv:1906.03191), Journal of Statistical Physics (2019).

[1] L. Garrigue. Unique continuation for many-body Schrödinger operators and the Hohenberg-Kohn theorem (arxiv:1804.07564), Mathematical Physics, Analysis and Geometry (2018).

Contributed talks

Workshops

May, 2026	**Recent developments in mathematical physics and related fields**, *Hagen, Germany*
Sep 15, 2025	**Quantissima-sur-Oise**, *Cergy, France*
Jun 17, 2025	**N-body GDR, physicists workshop**, *Nancy, France*
Mar 14, 2025	**Workshop "Mathematical Methods in Quantum Chemistry"**, *Oberwolfach, Germany*
Dec 6, 2024	**Workshop on Foundations and Extensions of DFT**, *Oslo, Norway*
Sep 20, 2024	**Workshop Mathematical and numerical analysis of electronic structure models**, *Stuttgart, Germany*
Jul 4, 2024	**International congress on mathematical physics**, *Strasbourg, France*
May 9, 2024	**Workshop on material modeling**, *Benguerir, Morocco*
Feb 1, 2023	**Quantum dynamics GDR, 15th workshop**, *Rennes, France*
Dec 13, 2022	**Mathematical physics seminar**, *Stuttgart, Germany*
Sep 26, 2022	**Conference Aspect'22, Asymptotic Analysis & Spectral Theory**, *Oldenburg, Germany*
Aug 17, 2022	**92nd annual meeting of the International association of applied mathematics and mechanics**, *Aachen, Germany*
Jun 21, 2022	**Workshop at the Center for Advanced Study**, *Oslo, Norway*
Jan 12, 2022	**Quantum N-body problem GDR, 3rd workshop**, *online*
Aug 6, 2021	**International congress on mathematical physics**, *Geneva, Switzerland*
Jun 14, 2021	**Workshop on multiscale problems in mathematical physics**, *Angers, France*
Sep 15, 2020	**Conference Algorithms in Quantum Molecular Dynamics, workshop**, *CIRM, Marseille, France*
Oct 24, 2019	**Workshop on The analysis of complex quantum systems**, *CIRM Marseille, France*
Sep 22, 2019	**Workshop on Density functionals for many-particle systems**, *university of Singapore*
Jan 28, 2019	**Workshop on SeminarOptimal transport methods in Density functional theory**, *Banff research station, Canada*
Jul 20, 2018	**Young researchers symposium of ICMP**, *Montréal, Canada*, satellite event of the International congress of mathematical physics
Jul 9, 2018	**Workshop on DFT with magnetic potentials**, *Oslo, Norway*
	Seminars
Nov 27, 2023	**Seminar analysis and PDE**, *Cergy, France*
Apr 15, 2023	**Seminar of the physics laboratory**, *Cergy, France*
Jan 24, 2023	**Seminar PDE and mathematical physics**, *Bordeaux, France*
Dec 13, 2022	**Mathematical physics seminar**, *Stuttgart, Germany*
Dec 8, 2022	**PDE seminar**, *Besançon, France*
Apr 11, 2022	**Seminar of mathematical physics**, *Fourier institute, Grenoble, France*
Mar 21, 2022	**Seminar of mathematical physics**, *Mathematics institute of Bourgogne, Dijon*
Mar 7, 2022	**Seminar of spectral theory**, *Institut Henri Poincaré, Paris*
Sep 17, 2021	**Seminar on mathematical modelling, analysis and simulation of molecular systems (MOANSI)**, *online*
Mar 31, 2021	**Seminar of mathematical physics of the Centre for theoretical physics**, *Toulon, France*

Mar 3, 2021	**Seminar of the laboratory of mathematics of the university of Bourgogne**, *Dijon, France*
Sep 15, 2020	**Seminar of the laboratory**, *Marseille, France*
Nov 21, 2019	**Seminar on Lie theory, geometry and analysis**, *université de Lorraine, Metz, France*
Apr 18, 2019	**PDE seminar of the laboratory of mathematics of Versailles**, *France*

Teaching

Feb 2023 –	**Tutorials and lectures**, *CY Cergy Paris university*
Oct 2022 – Jan 2023	**Tutorials of exercices**, *university of Stuttgart* Master's degree course "Numerical methods for eigenvalue problems"
Oct 2022 – Jan 2023	**Students seminar**, *university of Stuttgart* Supervision of two coding and theoretical projects for bachelor's degree students
Feb 2022 – Jun 2022	**Personal projects**, *École des ponts* Presentation and management of a numerical project, coded by the students (first year, equivalent to L3)
Sep 2017 – Jun 2020	**Tutorials of exercices**, *university Paris-Dauphine* Sessions of exercices in analysis (L2), linear algebra (L1) and optimization (M1)
Sep 2017 – Jun 2020	**Physics for all**, *École normale supérieure* Three lectures for the class "Physics for all", addressed to students of the ENS in humanities. Notes at akrajenbrink.weebly.com/teaching.html
2016 – 2017	**Oral interrogations**, *college Stanislas*, in mathematics, to train students for competitive examinations for entrance in grandes écoles

Supervision of students

Oct 2025 – Sep 2028	**PhD in mathematics**, *Jean Lopes*
May 2025 – Sep 2025	**Research internship**, *Jean Lopes, Master's degree at Sorbonne*
Jun-Jul, 2024	**Research internship**, *Guillaume Guers, Ensta's student in first year of master's degree*

Organisation of scientific events

Jan 31-fev 2, 2024	**Quantum dynamics GDR, 16th meeting**, *Cergy, France*, with L. Bruneau, C. Rojas-Molina, A. Shirikyan and M. Wrochna

Participation to conferences

May 27-29, 2026	**Recent developments in mathematical physics and related fields**, *Hagen, Germany*
Sep 1-19, 2025	**Quantissima-sur-Oise**, *Cergy, France*
Jun 16-18, 2025	**N-body GDR, physicists meeting**, *Nancy, France*
Mar 9-14, 2025	**Mathematical Methods in Quantum Chemistry**, *Oberwolfach, Germany*
Fev 4-6, 2025	**Quantum dynamics GDR, 17th meeting**, *Angers, France*
Dec 2-6, 2024	**Workshop on Foundations and Extensions of DFT**, *Oslo, Norway*
Nov 6-8, 2024	**Hands-on training on Quantum Computation for Quantum Chemistry**, *Montpellier, France*
Sep 16-20, 2024	**Mathematical and numerical analysis of electronic structure models (Manuel)**, *Stuttgart, Germany*

Jul 8-12, 2024	**Workshop on 2d quantum systems**, *Roscoff, France*
Jul 1-6, 2024	**21th International congress on mathematical physics**, *Strasbourg, France*
May 27-31, 2024	**Paris-Saclay conference in Analysis and PDE**, *Saclay, France*
May 9-10, 2024	**Workshop on material modeling**, *Benguerir, Morocco*
Jan 31-fev 2, 2024	**Quantum dynamics GDR, 16th meeting**, *Cergy, France*
Nov 22-24, 2023	**GDR TeQ, first meeting**, *Montpellier, France*
Jul 3-7, 2023	**26th general congress of the Société Française de Physique, subseminar on quantum technologies**, *Paris, France*
Jun 26-28, 2023	**Frontiers in mathematical physics**, *CY Cergy Paris Université, France*
Jun 12-14, 2023	**"Precision many-body physics" workshop**, *Collège de France, Paris, France*
Feb 1-3, 2023	**Quantum dynamics GDR, 15th meeting**, *Rennes, France*
Jan 9-13, 2023	**Workshop The analysis of relativistic quantum system**, *Cirm, Marseille*
Sep 26-30, 2022	**Conference Aspect'22, Asymptotic Analysis & Spectral Theory**, *Oldenburg, Germany*
Sep 21-23, 2022	**Workshop of the Collaborative research center (CRC) on "sparsity and singular structures"**, *Aachen, Germany*
Aug 15-19, 2022	**92nd annual meeting of the International association of applied mathematics and mechanics**, *Aachen, Germany*
Jun 20-24, 2022	**Workshop at the Center for Advanced Study**, *Oslo, Norway*
Mar 28 - Apr 1, 2022	**Advancing quantum mechanics with mathematics and statistics, workshop 1: multiscale approaches in quantum mechanics**, *IPAM UCLA, Los Angeles*
Feb 23-25, 2022	**Quantum dynamics GDR, 14th meeting**, *Toulouse, France*
Jan 10-13, 2022	**Quantum N-body problem GDR, 3rd meeting**, *online*
Sep 16-17, 2021	**Moansi annual meeting**, *online*
Aug 25-27, 2021	**Solid Math 2021**, *École des ponts, France*
Oct 27-29, 2021	**Congress of young researchers in applied mathematics**, *École polytechnique, France*
Aug 2-7, 2021	**International congress on mathematical physics and Young researchers symposium**, *Geneva, Switzerland*
Jun 14-16, 2021	**Seminar on multiscale problems in mathematical physics**, *Angers, France*
May 17-28, 2021	**SIAM conference on mathematical aspects of material science**, *Bilbao, Spain, online*
Mar 10-12, 2021	**Quantum dynamics GDR, 13th meeting**, *Dijon, France, online*
Feb 8-12, 2021	**Quantum N-body problem GDR, 2nd meeting**, *online*
Sep 14-18, 2020	**Algorithms in Quantum Molecular Dynamics**, *Cirm, Marseille, France*
Sep 2-4, 2020	**New horizons in density functional theory**, *online, Faraday discussions workshop*
Feb 5-7, 2020	**Quantum dynamics GDR, 12th meeting**, *Strasbourg, France*
Jan 8-10, 2020	**Quantum N-body problem GDR, 1st meeting**, *Lille, France*
Oct 21-25, 2019	**The analysis of complex quantum systems : large Coulomb systems and related matters**, *CIRM Marseille, France*
Sep 23-27, 2019	**Density functionals for many-particle systems : mathematical theory and physical applications of effective equations**, *institute for mathematical sciences, university of Singapore*

May 27-31, 2019	**Souriau 2019**, *University Paris-Diderot, France*, Conference in honour of Jean-Marie Souriau
Feb 13-15, 2019	**Quantum dynamics GDR, 11$^{\text{th}}$ meeting**, *Bordeaux, France*
Jan 28- Feb 1$^{\text{st}}$, 2019	**Optimal transport methods in Density functional theory**, *Banff research station, Canada*
Jul 20-28, 2018	**International congress on mathematical physics and Young researchers symposium**, *Montréal, Canada*
Jul 9-13 2018	**Seminar on DFT with magnetic potentials**, *Oslo, Norway* Entitled "Do electron current densities determine all there is to know ?"
Feb 19-24, 2018	**Mathematical Challenges in Quantum Mechanics**, *Sapienza university, Roma, Italy*, workshop and winter school
May 31$^{\text{th}}$-Jun 7$^{\text{th}}$, 2017	**Density functional theory meets Optimal transport**, *Jyväskylä, Finland*, workshop

Research interships

Jan – Feb 2016	**Vacuums of a supersymmetric theory**, *laboratory of theoretical physics of the ENS, Paris*, supervised by Jan Troost Seiberg-Witten theory and solving the structure of inequivalent vacuums of the supersymmetric $\mathcal{N} = 1^*$, $SU(4)$ theory.
Feb – Jul 2015	**Cosmology**, *Berkeley's laboratory of cosmology*, USA, supervised by Robert Cahn Development and implementation of the algorithm of the assigment of fibers of the telescope to sky objects for the DESI project.
Jun 2013	**Quantum electrodynamics in cavity**, *laboratory Kastler-Brossel ENS, Paris*, supervised by Igor Dotsenko Sampling quantum measurements after time reversal of a Rydberg atom/photon system.

Miscellaneous

2009	**French mathematical olympiad**, *highschool competition, second prize of the region Auvergne*
Reviewer for journals	**Communications in Mathematical Physics, Journal of Mathematical Physics, SIAM Journal on Applied Mathematics, Annales de l'Institut Henri Poincaré, Journal of Spectral Theory**
Coding	Julia, Python, C++, Javascript