

# Louis Garrigue

*PhD student  
in mathematical physics*

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26 years



## Training

- September 2017 – august 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*.
- 2012 – 2017 **Student and civil servant at École normale supérieure**, *entré en 3/2*.

## Publications

- [2] L. Garrigue. Unique continuation for many-body Schrödinger operators and the Hohenberg-Kohn theorem. II. The Pauli Hamiltonian (arxiv:1901.03207), (2019) preprint
- [1] L. Garrigue. Unique continuation for many-body Schrödinger operators and the Hohenberg-Kohn theorem. (arxiv:1804.07564), published in *Mathematical Physics, Analysis and Geometry* (2018).

## Invited

- July 9 - 13<sup>th</sup> 2018 **Seminar on DFT with magnetic potentials**, *Oslo, Norway*.  
Entitled “Do electron current densities determine all there is to know ?”, organised by Andre Laestadius and supported by Norway's Centre for Advanced Study.

## Contributed talks

- April 18<sup>th</sup> 2019 **PDE seminar of the Laboratory of mathematics of Versailles**, *France*.  
Strong and measure unique continuation for many-body Schrödinger's equation.
- February 28<sup>th</sup> 2019 **Seminar of PhD students of the Institut de mathématiques de Bourgogne**, *Dijon, France*.  
Hohenberg-Kohn theorems.
- January 28<sup>th</sup> 2019 **Optimal transport methods in Density functional theory**, *Banff research station, Canada*.  
Unique continuation for the Hohenberg-Kohn theorem.
- September 19<sup>th</sup> 2018 **Seminar of PhD students of Cermics**, *Marne-la-Vallée, France*.  
The central role of the one-body density in quantum mechanics.
- July 20<sup>th</sup> 2018 **Young researchers symposium of ICMP**, *Montréal, Canada*, satellite event of the International congress of mathematical physics.  
Contributed talk on unique continuation for many-body Schrödinger operators and the Hohenberg-Kohn theorem.
- April 12<sup>th</sup> 2018 **Seminar of PhD students in mathematics of the university Paris-Dauphine**, *France*.  
The central role of the one-body density in quantum mechanics.

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## Participation to seminars and summer schools

- April 22 - 26, 2019 **From quantum to classical**, *CIRM Marseille, France*, SMF session “États de la recherche”, organised by Stéphane Nonnenmacher and Julien Sabin.
- February 13 - 15, 2019 **Quantum Dynamics GDR, 11<sup>th</sup> meeting**, *Bordeaux, France*, organised by Vincent Bruneau, Rafik Imekraz, Laurent Michel and Nicolas Popoff.
- January 28 - february 1<sup>st</sup>, 2019 **Optimal transport methods in Density functional theory**, *Banff research station, Canada*, organised by Paola Gori-Giorgi, Mathieu Lewin and Brendan Pass.
- July 20-28, 2018 **International congress on mathematical physics and Young researchers symposium**, *Montréal, Canada*, organised by the International association of mathematical physics.
- July 16-19, 2018 **Summer school on current topics in mathematical physics**, *Fields Institute, Toronto, Canada*, lectures by Roland Bauerschmidt, David Damanik, Jeremy Quastel and Laure Saint-Raymond.
- April 16-18, 2018 **Mini-school on mathematics in electronic structure theory**, *university Sorbonne Jussieu, Paris*, lectures by Tony Lelièvre and Eric Cancès.
- February 19-24, 2018 **Mathematical Challenges in Quantum Mechanics**, *Sapienza university, Roma, Italy*, workshop and winter school.
- July 17-21, 2018 **Summer School on Current Topics in Mathematic Physics**, *Zürich university, Switzerland*, lectures by Antti Knowles, Mathieu Lewin, Alessandro Giuliani and Robert Seiringer.
- May 31<sup>th</sup> 2017 – June 7<sup>th</sup> **Density functional theory meets Optimal transport**, *Jyväskylä, Finland*, workshop organised by Paola Gori-Giorgi, Tapio Rajala and Augusto Gerolin.

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## Teaching

- September 2017 – June 2020 **Tutorials of exercices**, *university Paris-Dauphine*. Sessions of exercices in analysis (L2) and linear algebra (L1) for students of the university
- Semptember 2017 – June 2020 **Physics for all**, *École normale supérieure*. Three lectures for the class “Physics for all”, addressed to students of the ENS in humanities. Special relativity II (applications), cosmology, particle and high energy physics. Notes at [akrajenbrink.weebly.com/teaching.html](http://akrajenbrink.weebly.com/teaching.html)
- 2016 – 2017 **Oral interrogations**, *college Stanislas*, in mathematics, to train students for competitive examinations for entrance in grandes écoles.

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## Research interships

- January – february 2016 **Vaccums 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 vaccums of the supersymmetric  $\mathcal{N} = 1^*$ ,  $SU(4)$  Yang-Mills theory.
- February – july 2015 **Cosmology**, *Berkeley’s laboratory of cosmology*, supervised by Robert Cahn. Development and implementation of the algorithm of the assignement of fibers of the telescope to sky objects for the DESI project (dark energy spectroscopic survey), continued and used in the experiment. First light in 2019.
- May – june 2014 **Machine learning**, *start-up Akheros, Paris*, supervised by Philippe Baumard. Construction and implementation of an unsupervised system for detecting behavioral incongruities using continuous time bayesian networks.
- June 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 in cavity.

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## Miscellaneous

- July – august **Internship in a consular scientific service**, *Consulate General of France in San Francisco*, with Philippe Perez.  
2015 Meetings with researchers of Berkeley laboratories in climate science. Redaction of reports on Californian climatology research for the Cop 21.
- 2009 **French mathematical olympiad**, *second prize of the region Auvergne*.
- 2008 **Highschool diploma in aeronautics**, *Clermont-Ferrand*.
- English Fluent
- Coding C++, Python, OCaml, Matlab, Mathematica
- Village I grew up in Chanat-la-Mouteyre, Auvergne