

# CORENTIN LÉNA

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## Current Position

Postdoctoral researcher in the *Research group in Analysis*,  
Department of Mathematics, University of Stockholm.

## Address

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## Education

- 2013** PhD in Mathematics, Paris-Saclay University (Orsay).  
Title: *Contributions à l'étude des partitions spectrales minimales (Contributions to the study of spectral minimal partitions)*.  
Advisors: Virginie Bonnaillie-Noël and Bernard Helffer.
- 2010** Master of Mathematics, Paris-Saclay University (Orsay),  
Specialization *Partial Differential Equations and Scientific Computing*.
- 2009** Agrégation de mathématiques (french national competitive exam for the teaching of mathematics), 23rd rank, option *Modelization and Scientific Computing*.
- 2008** Admission to the ENS Cachan, third year of the mathematics cursus.
- 2007** Bachelor of Mathematics, Paris-Saclay University (Orsay).

## Experience

- Since 2018** Postdoctoral researcher in the *Research group in Analysis* at the University of Stockholm.
- 2017-2018** Postdoctoral researcher in the *Group of Mathematical Physics* at the University of Lisbon.
- 2015-2017** Postdoctoral researcher in the Department of Mathematics *Giuseppe Peano*, University of Turin.
- 2013-2014** ATER (temporary research and teaching assistant) in the Department of Mathematics of Orsay, Paris-Saclay University.

## Research

### Research interests

Partial differential equations, spectral theory and numerical analysis:

- magnetic Schrödinger operator, Aharonov-Bohm magnetic potentials;
- spectral geometry, nodal domains, Pleijel's theorem;
- shape optimization, spectral minimal partitions;
- quantum graphs.

## Published and accepted papers

1. C. Léna. Pleijel's nodal domain theorem for Neumann and Robin eigenfunctions. *ArXiv e-prints*, December 2016. arXiv:1609.02331. To appear in *Ann. Inst. Fourier (Grenoble)*.
2. L. Abatangelo, V. Felli, L. Hillairet and C. Léna. Spectral stability under removal of small capacity sets and applications to Aharonov-Bohm operators. *ArXiv e-prints*, November 2016. arXiv:1611.06750. To appear in *J. Spectr. Theory*.
3. L. Abatangelo, V. Felli and C. Léna. On Aharonov-Bohm operators with two colliding poles. *Adv. Nonlinear Stud.*, 17(2):283–296, 2017.
4. V. Bonnaillie-Noël and C. Léna. Spectral minimal partitions for a family of tori. *Exp. Math.*, 26(4):381–395, 2017.
5. C. Léna. Examples of spectral minimal partitions. *Rend. Semin. Mat. Univ. Politec. Torino*. 74(3-4):9–18, 2016.
6. C. Léna. Courant-sharp eigenvalues of the three-dimensional square torus. *Proc. Amer. Math. Soc.*, 144(9):3949–3958, 2016.
7. C. Léna. Courant-sharp eigenvalues of a two-dimensional torus. *C. R. Math. Acad. Sci. Paris*, 353(6):535–539, 2015.
8. C. Léna. Eigenvalues variations for Aharonov-Bohm operators. *J. Math. Phys.*, 56(1):011502, 18 pp., 2015.
9. V. Bonnaillie-Noël and C. Léna. Spectral minimal partitions of a sector. *Discrete Contin. Dyn. Syst. Ser. B*, 19(1):27–53, 2014.

## Preprints

1. L. Abatangelo, V. Felli and C. Léna. Eigenvalue variation under moving mixed Dirichlet–Neumann boundary conditions. *ArXiv e-prints*, April 2018. arXiv:1804.10569.
2. C. Léna. On the parity of the number of nodal domains for an eigenfunction of the Laplacian on tori. *ArXiv e-prints*, July 2015. arXiv:1504.03944.

## Selected talks

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|-------------------------|--|
| <b>25 May 2018</b>      | Eigenvalue problems with mixed boundary conditions. Spectral theory and geometry day - Thespege, Orléans.                                  |
| <b>30 November 2017</b> | Spectral minimal partitions on quantum graphs. Final conference - Discrete and Continuous Models in the Theory of Networks. ZiF, Bielefeld |
| <b>19 June 2017</b>     | Generalizations of Pleijel's nodal domain theorem. Conference - Geometric Spectral Theory, Neuchâtel.                                      |
| <b>4 April 2017</b>     | Generalizations of Pleijel's nodal domain theorem. Seminar of the Group of Mathematical Physics of the University of Lisbon.               |
| <b>22 March 2017</b>    | Spectral estimates for punctured domains and Aharonov-Bohm operators. Seminar on spectral theory and geometry, Neuchâtel.                  |

- 7 March 2017** Review of spectral minimal partitions. Meeting of the ZIF co-operation group *Discrete and Continuous Models in the Theory of Networks*, Bielefeld.
- 10 October 2016** Singular perturbations of Dirichlet eigenvalues, with application to Aharonov-Bohm operators. Seminar, Milan (Milano-Bicocca).
- 5 May 2016** Examples of spectral minimal partitions. Conference - Bruxelles-Torino talks in PDE's, Turin (University of Turin).
- 7 March 2016** Nodal patterns for the Laplacian on flat tori. Conference - Variational Perspectives, Turin (Turin Polytechnic School).
- 6 October 2015** Nodal patterns of the Laplacian on thin domains. Conference - Asymptotic Analysis and Spectral Theory, Orsay.
- 25 September 2015** The Courant-sharp property for flat tori. Conference - Calculus of variations and PDEs, Chambéry.
- 25 June 2015** On the number of nodal domains for flat tori. SMS - Geometric and Computational Spectral Theory, Montréal (UQÀM).
- 22 May 2015** Eigenvalues variation for Aharonov-Bohm operators. Workshop - Magnetic fields and semi-classical analysis, Rennes.
- 12 February 2015** Minimal partitions of flat tori. Winter school on spectral theory and shape optimization problems for elliptic PDEs, Milan (Milano-Bicocca).
- 13 October 2014** Partitions minimales d'un tore plat. Workshop on the calculus of variation, Paris (Paris-Dauphine University).
- 19 March 2014** Valeurs propres des opérateurs d'Aharonov-Bohm. PDE and Mathematical Physics Seminar, Bordeaux.
- 5 February 2014** Eigenvalues variations for Aharonov-Bohm operators. Annual meeting of the GDR DynQua, Roscoff.

## Teaching

- 2014/2016** TIPE jury panel (research projects evaluation in a national competitive exam for prospective engineering students).
- 2014** Tutorial classes in mathematics, Paris-Saclay University. Calculus, first and second semester of the first year, for mathematics students.
- 2010–2014** Tutorial classes, Polytech Paris-Sud, Orsay. Calculus for engineering student.

## Professional memberships and activities

Member of the *Société Mathématique de France* (SMF) and the *European Mathematical Society* (EMS).

Reviewer for *MathSciNet*.

## Public outreach

- 2016**      Introductory lecture *Can one hear the shape of a drum* for the Mathematics PhD Seminars at the University of Turin.
- 2013**      Hosting of *Math en Jeans* events at Paris-Saclay University (mathematic research groups of high-school students).
- 2012/2014**      Information on mathematical careers and education, *Salon de l'Éducation*, Paris.

## Languages

Native French speaker. Fluent in English and Italian.