Curriculum vitae: David Gontier

Tél. : +33 7 60 46 19 31
E-mail : gontier@ceremade.dauphine.org
Web page : https://www.ceremade.dauphine.fr/~gontier

French
Born on October 30, 1988 at Paris
Married (one child)

Maître de Conférence at Université Paris-Dauphine

Short Curriculum

2016-... • Maître de conférence at University Paris-Dauphine.
2015-2016 • **Post-doc** at ETH Zürich, under the supervision of Habib Ammari.
2012-2015 • **PhD** at CERMICS (École des Ponts ParisTech):
- title: *Contributions mathématiques aux calculs de structures électroniques*
- under the supervision of Éric Cancès.

2008-2012 • Student at École Normale Supérieure de Paris:
- **Master 2** in Mathematics (Master ANEDP, University Paris 6).
- **Master 2** in Informatics (Master MPRI, University Paris 7).

Distinctions

2015 - *Prix de thèse* at University Paris-Est
2006 - *Concours générale* in mathematics (2^{nd} accessit)
- International Mathematical Olympiads, Ljubljana (mention)

Fundings obtained

2019: PICS (12.000€, with S. Lahbabi)
2018: PEPS-INSMI (1.500€, with S. Lahbabi)
2017: PEPS-INSMI (1.500€, with A. Levitt)

Others

2020-...: Member (elected) at the Scientific Council of University Paris-Dauphine.
2019-...: Member (nominated) at CNU (*Conseil National des Universités*).

Publication List

- D. Gontier, M. Lewin, and F.Q. Nazar. "The nonlinear Schrödinger equation for orthonormal functions: I. Existence of ground states". In: *accepted in Arch. Rat. Math. Anal.* (2021).
- R.L. Frank, D. Gontier, and M. Lewin. "The nonlinear Schrödinger equation for orthonormal functions: II. Application to Lieb-Thirring inequalities". In: *accepted in Commun. Math. Phys.* (2021).
- D. Gontier. "Edge states in ordinary differential equations for dislocations". In: *J. Math. Phys.* 61 (4 2020).
- É. Cancès, V. Ehrlacher, D. Gontier, A. Levitt, and D. Lombardi. "Numerical quadrature in the Brillouin zone for periodic Schrödinger operators". In: *Numer. Math.* (2020).
- D. Gontier and S. Lahbabi. "The reduced Hartree-Fock model with self-generated magnetic fields". In: *J. Math. Phys.* 60 (8 2019).
- D. Gontier and M. Lewin. "Spin symmetry breaking in the translation-invariant Hartree-Fock uniform electron gas". In: *SIAM J. Math. Anal.* 51 (4 2019), pp. 3388–3423.
- D. Gontier, C. Hainzl, and M. Lewin. "Lower bound on the Hartree-Fock energy of the electron gas". In: *Phys. Rev. A* 99 (5 2019), p. 052501.

- A. Bakhta, V. Ehrlacher, and D. Gontier. “Numerical reconstruction of the first band (s) in an inverse Hill’s problem”. In: *ESAIM: COCV* 26 (2020), p. 59.
- D. Gontier, A. Levitt, and S. Siraj-Dine. “Numerical construction of Wannier functions through homotopy”. In: *J. Math. Phys.* 60 (3 2019), p. 031901.
- H. Cornean, D. Gontier, A. Levitt, and D. Monaco. “Localised Wannier functions in metallic systems”. In: *Ann. Henri Poincaré* 20.4 (2019), pp. 1367–1391.
- H. Ammari, B. Fitzpatrick, D. Gontier, H. Lee, and H. Zhang. “Minnaert resonances for acoustic waves in bubbly media”. In: *Ann. Inst. H. Poincaré C* 35.7 (2018), pp. 1975–1998.
- H. Ammari, B. Fitzpatrick, D. Gontier, H. Lee, and H. Zhang. “Sub-wavelength focusing of acoustic waves in bubbly media”. In: *Proc. R. Soc. A* 473.2208 (2017), p. 20170469.
- H. Ammari, B. Fitzpatrick, D. Gontier, H. Lee, and H. Zhang. “A mathematical and numerical framework for bubble meta-screens”. In: *SIAM J. App. Math.* 77.5 (2017), pp. 1827–1850.
- D. Gontier and S. Lahbabi. “Supercell Calculations in the Reduced Hartree-Fock Model for Crystals with Local Defects”. In: *Appl. Math. Res. Express* (2016).
- É. Cancès, D. Gontier, and G. Stoltz. “A mathematical analysis of the GW^0 method for computing electronic excited energies of molecules”. In: *Rev. Math. Phys.* 28.04 (2016), p. 1650008.
- D. Gontier and S. Lahbabi. “Convergence rates of supercell calculations in the reduced Hartree- Fock model”. In: *ESAIM: Math. Model. Num. Anal.* 50.5 (2016), pp. 1403–1424.
- D. Gontier. “Pure-state N-representability in current-spin-density functional theory”. In: *Commun. Math. Sci.* 24.4 (2016), pp. 987–1003.
- D. Gontier. “Existence of minimizers for Kohn–Sham within the local spin density approximation”. In: *Nonlinearity* 28.1 (2014), p. 57.
- D. Gontier and M. Vetterli. “Sampling based on timing: Time encoding machines on shift-invariant subspaces”. In: *Appl. Comput. Harmon. Anal.* 36.1 (2014), pp. 63–78.
- D. Gontier. “N-representability in noncollinear spin-polarized density-functional theory”. In: *Phys. Rev. Lett.* 111.15 (2013), p. 153001.

Oral presentations

Conferences

- *The reduced Hartree-Fock model with self-generated magnetic fields*
  Density Functionals for Many-Particle Systems. (Singapour, September 2019).
- *Symmetry breaking in the reduced Hartree-Fock-Dirac model*
  Many-Body quantum systems. (Oberwolfach, September 2019).
- *Symmetry breaking in the Hartree-Fock jellium*
  Mean-field and other effective models in mathematical physics. (Fondation les Treilles, May 2019).
- *Méthode de super-cellules pour les cristaux*
  SMAI 2019. (Guidel plage, May 2019).
- *Symmetry breaking in the Hartree-Fock jellium*
  Optimal transport methods in Density Functional Theory. (Banff, January 2019).
- *Spin symmetry breaking in the Hartree-Fock electron gas*
  Franco-German Workshop on mathematical aspects in computational chemistry. (Aachen, September 2018).
- *Spin symmetry breaking in the Hartree-Fock electron gas*
  Solid Math. (Montréal, August 2018).
- *Localised Wannier functions in metallic systems*
  ICMP. (Montréal, July 2018).
- *Localised Wannier functions in metallic systems*
  Analytical & Numerical Methods in Quantum Transport. (Aalborg, May 2018).
- *Numerical methods for Brillouin zone integration*

Mathematical Methods in Quantum Chemistry. (Oberwolfach, March 2018).
- *Supercell method for the computation of energies of crystals*
2016-17 Warwick EPSRC Symposium: DFT and Beyond: Analysis and Computation. (Warwick, July 2017).
- *A mathematical study of the GW0 method for computing electronic excited states of molecules*
GDR DynQua. (Grenoble, February 2015).
- *A mathematical study of the GW0 method for computing electronic excited states of molecules*
Mathematical Methods in Quantum Molecular Dynamics. (Oberwolfach, June 2015).
- *Pure-state N-representability in current-spin-density-functional theory*
Fundamental Aspects of DFT. (Oslo, January 2015).
- *A mathematical study of the GW method: the irreducible polarizability*
Solid Math. (Trieste, June 2014).
- *A mathematical study of the GW method*
Theoretical and Numerical Aspects of Quantum Transport. (Aalborg, April 2014).
- *Existence of minimizers for Kohn-Sham within the Local Spin Density Approximation*
Mathematical and Numerical Analysis of Electronic Structure Models. (Berlin, April 2014).
- *N-representability in SDFT*
GDR-CoDFT. (Guidel, May 2013).

Seminars

- *Edge States in ODE for dislocations*
Séminaire POEMS. (INRIA Saclay, Avril 2020).
- *Edge States in ODE for dislocations*
Séminaire EDP et Physique Mathématiques. (LAGA, University Paris XIII, Avril 2020).
- *The Hartree-Fock electron gas*
PDE and Mathematical Physics. (University of Zurich, November 2019).
- *The Hartree-Fock electron gas*
Séminaire ANEDP Orsay. (Université Paris-Saclay, June 2019).
- *The Hartree-Fock electron gas*
Oberseminar Analysis. (Munich, February 2019).
- *Bosons, fermions et processus ponctuel*
Escapade (Ceremade). (Paris-Dauphine, December 2018).
- *Minnaert resonance in bubbly media*
Matinée du Ceremade. (Paris-Dauphine, January 2018).
- *Minnaert resonance in bubbly media*
Séminaire Pierre-Louis Lions. (Collège de France, June 2017).
- *Supercell method for the computation of energies of crystals*
Young Researchers Workshop on Mathematical Models in Quantum Chemistry. (Paris 6, January 2017).
- *Méthode de supercellule pour la simulation de cristaux sans/avec défauts*
Séminaire CMAP. (École Polytechnique, April 2016).
- *Supercell calculations for the simulation of crystals with/without defects*
Séminaire POEMS. (INRIA Saclay, February 2016).
- *The supercell model for the simulation of crystals, with and without defects*
Séminaire équations non linéaire. (Paris 13, November 2015).
- *An introduction to quantum chemistry: the Hartree-Fock model*
PhD seminar of Marne-la-Vallée. (ESIEE, June 2014).
- *Complexity of a Sudoku*
PhD seminar of CERMICS/CEREA/IMAGINE. (CERMICS, March 2014).
- *Representability in non-collinear spin-polarized density functional theory*
Mathematical and Numerical Analysis of Electronic Structure Models. (IHP, July 2013).
- *Magnetic Schrödinger operators and magnetic density functional theory*
PhD seminar of CERMICS. (CERMICS, April 2013).

Organisation of conferences

- 2020: Solid Math 2020 (with É. Cancès, H. Cornean and G. Panati).
  cancelled due to Covid, expected to take place in 2021.
- 2019: Mini-symposium SMAI: *Étude numérique des opérateurs périodiques* (with A. Levitt).

Teaching

University

Name of the course	Year	Location	Responsible teacher
Méthodes numériques : optimisation (L3)	2020-2021	Dauphine University	DG
	2019-2020		DG
	2018-2019		DG
	2017-2018		DG
	2016-2017		A. Frouvelle
Review of PDEs (M2)	2020-2021	Dauphine University	DG
Algèbre 3 (L2)	2020-2021	Dauphine University	G. Legendre
Maths fondamentales (L2)	2020-2021	PSL University	DG
	2019-2020		DG
Calcul différentiel (L3)	2018-2019	Dauphine University	E. Bouin
	2018-2019		E. Bouin
	2017-2018		J. Féjoz
	2016-2017		J. Féjoz
Calcul différentiel (PSL, L2)	2018-2019	PSL University	É. Séré
	2017-2018		É. Séré
	2016-2017		É. Séré
Inverse Problems	2015-2016	ETH Zürich	R. Alaifari
Numerical Method for CSE	2015-2016	ETH Zürich	R. Hiptmair
Analysis 1	2014-2015	Ponts ParisTech	É. Cancès
Fonctions à plusieurs variables	2013-2014	ESIEE	DG
	2012-2013		DG

Other

- 12 hours mini-course (with A. Levitt) on numerical methods for condensed matter (Aalborg, Denmark, 2016)
- Summer School (with É. Cancès and G. Dusson, Roscoff, 2018)

Students

Postdoc: Faizan Nazar (with M. Lewin, 2017)
PhD: Adechola Kouande (with É. Séré, 2020-...)
Master 2: Adechola Kouande (2020)
Master 1: Solal Roussel (with D. Monaco, 2020), Majdouline Borji (with M. Lewin, 2018)
Licence: Lucas Perrin (2020), Léonie Papon (2019), Oscar Cosserat (2017)