# Thomas DUYCKAERTS
# Curriculum Vitae

November 2020


Département de Mathématiques
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Date of Birth: December 14th, 1976
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## Positions

**Starting Sept. 2011:** Full professor (first class since Sep. 2015) at *Université Sorbonne Paris Nord* (formerly Paris 13 University), France.
**2005-2011:** *Maître de conférences* (assistant professor) at Cergy-Pontoise University (France).
**2004-2005:** Post-doctoral fellow at *Universidad Autónoma* in Madrid (supervisor: Enrique Zuazua).

## Education and diploma

**Nov. 2010:** Habilitation thesis: *Dynamique des équations dispersives non-linéaires.*
**2000-2004:** PhD thesis: *Étude haute fréquence de quelques problèmes singuliers d'évolution*, at Paris 11 University (advisor: Nicolas Burq). Defended november 5th, 2004.
**1999-2000:** *agrégation* of mathematics (teaching exam).
**1998-1999:** *DEA* (Master of advanced study) of numerical analysis and partial differential equation at Paris 11 University. Master thesis under the supervision of Nicolas Burq.
**1997-2001:** Student at *École Normale Supérieure* in Paris.

## Research interests

Partial differential equations, including:

- Nonlinear dipersive equations: well-posedness, blow-up, asymptotic behaviour, classification of solutions.
- Linear dispersive and parabolic equations: propagation of singularities, stability, control, spectral theory.

## Grants

**2016-present:** Junior member of the *Institut Universitaire de France.*
**2012-2016:** Member of the French ANR grant Scheq. Coordinator: Valeria Banica.
**2012-present:** Member of ERC (European Research Council) advanced grant ***BLOWDISOL****: blow-up, dispersion and solitons. Principal investigator: Frank Merle.*
**2010-2015:** Member of junior ERC grant ***Dispeq****: Qualitative study of nonlinear dispersive equations. Principal investigator: Nikolay Tzvetkov.*
**2007-2010:** Member of the French ANR (national research agency) grant ***Ondes Non Lin****: Blow-up, interaction and dispersion for nonlinear waves equations..*
**2007-2010:** Member of the French ANR grant ***ControlFlux****: Control of partial differential equations in fluid mechanics.*
**2004-2005:** Post-doc member of the European research networks *Smart Systems* and *HYKE.*

## PhD Students

**From Oct 2020:** Abdon Moutinho (joint with Jacek Jendrej).
**Sep 2016-Nov 2020:** Oussama Landoulsi.
**Sep 2014-Sep 2017:** Yang Lang (joint with Frank Merle).
**Sep 2014-Dec 2018:** Giuseppe Negro (joint with Keith Rogers)
**Sep 2011-Sep 2014:** Lysianne Hari (joint with Clotilde Fermanian-Kammerer).

## Honours

**Sept 2016-present:** Member of the *Institut Universitaire de France.*
**Sept-Dec 2015:** Invited professor at the MSRI (Berkeley) for the program *New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems.*
**Sept. 2015:** National promotion to a first class professor.
**2008:** Price of the best article 2008 in the journal *Annales de l'IHP, analyses non-linéaires* for the article *On the optimality of the observability inequalities for parabolic and hyperbolic systems with potentials.* with Xu Zhang and Enrique Zuazua.

## Memberships and services

**From 2016-2020:** Member of the *Conseil national des universités, section 25* (French national council in pure mathematics).
**From Oct. 2014:** Head of the *Comité d'experts* (committee supervising hiring committees) in pure mathematics at Paris 13 University.
**From Oct. 2014:** In charge alternatively of the Master of Mathematics and of the second year of this Master (research option) at Paris 13 University.
**From Sep. 2013:** Coorganizer of the PDE seminar at Paris 13 University.
**May 2013 to May 2017:** Member of the Conseil d'institut (administrative council) and the Conseil scientifique (Scientific Council) at Institut Galile (scientific component of Paris 13 University).
**From Sep. 2011:** Member of the joint *HDR commission* (committe supervising habilitation thesis) for parisian universities.
**From Sep.2011:** Member of the PhD thesis committee of the department of mathematics of Paris 13 University.
**Sep. 2007-Sep.2010:** In charge of the *agrégation* (national teaching exam) training at the University of Cergy-Pontoise.
**2007-2010:** In charge of the mathematics research library at the University of Cergy-Pontoise.
**2005-2010:** Coorganizer of the seminar "Geometry, PDE and Mathematical Physics" at the University of Cergy-Pontoise.
**Hiring committes:** - Professor positions: Nancy University (2019), *Université Pierre et Marie Curie* (2018), Evry University (2018), Paris-Sud Orsay University (2017).
- *Maîtres de conférences* (assistant professors) positions: Paris 13 University (2012, 2013), Versailles Saint-Quentin University (2009), Lille 1 University (2009), Cergy-Pontoise University (2008, 2010)
**Thesis committees:** Member of the PhD thesis committees of David Parlongue (2012, Paris 13 U.), Mohamad Darwich (2013, University of Tours), Farah Abou Shakra (2013, Paris 13 U.), Cécile Huneau (2014, ENS/Paris 13 U.) and Asma Azaiez (2014, Paris 13 U.), Victor Chabu (2016, Créteil U.), Aiman Mbarek (2017, Cergy-Pontoise U.), Yakine Bahri (2016, Ecole Polytechnique), Annalaura Stingo (2018, Paris 13 U.), Guillaume Klein (2018,

Strasbourg U.), Carlos Esteve (2019, Paris 13 U.), Abdelwahab Bensouilah (2019, Lille U.), Elek Csobo (2019, TU Delft).

Referee for the PhD thesis of Yakine Bahri, Abdelwahab Bensouilah, Mohamad Darwich and Guillaume Klein.

**Editorial responsabilities:** Associate editor for the journal *Mathematical control and related fields*.

**Referee's reports:** Advances in Mathematics, American Journal of Mathematics, Asymptotic Analysis, Collectanea Mathematica, Communication in Mathematical Physics, Communication in Partial Differential Equations, Communication in Pure and Applied Mathematics, Comptes Rendus de l'Académie des Sciences, Discrete and Continuous Dynamical Systems, Duke Mathematical Journal, Indiana University Mathematical Journal, Inventiones, Journal of Differential Equations, Journal of the European Mathematical Society, Journal of Functional Analysis, Journal de l'Institut Mathématique de Jussieu, Journal of Mathematical Physics, Mathematische Annalen, Mathematical Models and Methods in Applied Sciences, Michigan Mathematical Journal, Nonlinearity, SIAM Journal of Control and Optimization, System and Control Letters, Transaction of the American Mathematical Society, for Zürich Lecture Notes collection and for Mathreviews.

## Events organized

**Oct 2019:** One-week conference *Control and Dynamics of PDE* at Strasbourg University. Coorganizers: Raphaël Côte and Yannick Privat.

**June 2019:** Three days conference *Quantum resonances and related topics* in the honour of André Martinez at the IHP (Paris). Coorganizers Setsuro Fujie, Alain Grigis, Oana Ivanovici, Thierry Ramond, Takuya Watanabe.

**May 2019:** One-day workshop *Nonlinear Partial Differential Equations* (University of Cergy-Pontoise). Coorganizers Frank Merle and Jianwei Yang.

**July 2017:** One-week conference *Fluid, Dispersion and Blow-up* at the IHP (Paris). Coorganizers: Asma Azaiez, Anne-Laure Dalibard, Jean-Marc Delort, Nader Masmoudi and Hatem Zaag.

**June 2016:** One-week conference on *nonlinear waves* at the IHES. Coorganizers: Frank Merle and Jérémie Szeftel.

**Nov. 2009:** One-day workshop *dispersive waves* at the University of Cergy-Pontoise. Coorganizers: Merle and Nikolay Tzvetkov.

**2009:** Semester *Partial differential equations* (University of Cergy-Pontoise, Paris 13 University).

**Feb. 2009:** One-day workshop *Dynamics of nonlinear dispersive PDEs* at the University of Cergy-Pontoise. Coorganizer: Valeria Banica.

**Nov. 2006:** One-day workshop *Nonlinear dispersive equations* at the University of Cergy-Pontoise.

**Nov. 2005:** One-day workshop *On qualitative properties of nonlinear waves* at the University of Cergy-Pontoise. Coorganizer Frank Merle).

## Selected invited talks

**Feb. 2020:** Florida International University (Miami). Colloquium of the department of Mathematics.

**Jan. 2020:** Sorbonne Université (Paris). Seminar of the functional analysis group.

**June 2019:** University of Bergen (Norway). Conference: *Dispersive wave and related topics*, in the honour of Gilles Lebeau.

**May 2019:** Fields Institute (Toronto). Workshop on *Nonlinear Dispersive Partial Differential Equations and Inverse Scattering.*

**May 2019:** American University of Beirut (Lebanon). Seminar of the Mathematics Department.

**Sept 2018:** IHP (Paris). Conference *Analyse des EDP : prolongement unique, stabilisation, contrle et proprits dispersives* in honour of Luc Robbiano.

**July 2018:** Florianopolis (Brazil). ICM Satellite Meeting *Nonlinear Dispersive Equations.*

**Mar. 2018:** Nancy (France). *Journée jeunes EDPistes* (conference for young PDE analysts).

**Oct. 2018:** Toulouse (France). Conference *Nonlinear wave guides and related topics.*

**Nov. 2017:** London analysis seminar.

**Oct. 2017:** Beijing (China). 3 hours research mini-course at the Institute of Applied Physics and Computational Mathematics.

**June 2017:** CIRM (Marseille, France). *French-American Conference on Nonlinear Dispersive PDEs.*

**March 2017:** Paris-Sud University. *Numerical analysis and PDE seminar.*

**Feb. 2017:** University of North Carolina, USA. Principal speaker for a *PDE/Analysis school.*

**Dec. 2016:** Pisa, Italy. 6 hours research mini-course at the University of Pisa.

**Sept. 2016:** Wolfgang Pauli Institute, Vienna, Austria. Workshop *Recent progress on the qualitative properties of nonlinear dispersive equations and systems*

**Oct. 2015:** MSRI, Berkeley. Workshop *New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems*

**Jan. 2015:** Evry University. *Analysis Seminar.*

**Sep. 2014:** University of Chicago. Conference in honor of Carlos Kenig.

**June 2014:** CIRM (Marseille, France). Workshop *Schrödinger equation and applications.*

**July 2014:** Hausdorff Institute for Mathematics, Bonn (Germany). *Workshop on real analysis.*

**Apr. 2014:** ETH University (Zürich, Switzerland). *Analysis Seminar.*

**Oct. 2013:** Nice University (France). Workshop of the ERC advanced grant *blow up, dispersion and solitons.*

**Aug. 2013:** Mathematisches Forschungsinstitut Oberwolfach (Germany). Workshop *Nonlinear Waves and Dispersive Equations.*

**June 2013:** Kansas State University. NSF/CBMS Regional Conference in the Mathematical Sciences on *The Global Behavior of Solutions to Critical Nonlinear Wave Equations.*

**June 2013:** Ecole Polytechnique (Palaiseau, France). *Critical waves* working group.

**Oct. 2012:** University of Basel (Switzerland). Basel-Fribourg-Zurich *analysis* seminar.

**Oct. 2012:** Paris, *Nonlinear analysis and PDE* joint seminar Paris 6 University/Paris 7 University.

**July 2012:** BICMR, Beijing. *Dynamics of nonlinear dispersive and fluid mechanics equations*, Sino-French Summer Institute of Mathematics.

**June 2011:** Hangzhou (China). *Hangzhou conference on Harmonic Analysis and PDE.*

**Apr. 2011:** Paris 13 University. *Nonlinear partial differential equations* seminar.

**Mar. 2011:** Bordeaux I University. *Mathematical physics and partial differential equations* seminar.

**Feb. 2011:** Paris 11 University. *Numerical analysis and partial differential equations* seminar.

**Nov. 2010:** Invited talks at the Hausdorff Institute for Mathematics (Bonn).

**Nov. 2010:** Institut Henri Poincaré (Paris). Conference on *Control of dispersive equations.*

**Nov. 2010:** Institut Henri Poincaré (Paris). *Spectral problems in mathematical physics* seminar.

**Sep. 2010:** CIRM (Marseille, France). *Asymptotic Regimes for Schrödinger equation* workshop.

**Sep. 2010:** Madrid, *London Mathematical Society Harmonic Analysis and PDEs Network* meeting.

**Jan. 2010:** Arizona State University. *Analysis Seminar.*

**Jan. 2010:** University of Chicago. *Calderón-Zygmund Analysis Seminar.*

**Nov. 2009:** Milano. *Three dispersive days* workshop.

**Nov. 2009:** Rennes I University. *Analysis seminar.*

**Oct. 2009:** Créteil University. *Partial differential equations* working group.

**Oct. 2009:** London. *Paris-London analysis seminar.*

**Oct. 2009:** Imperial college (London). *Working group on analysis.*

**Sep. 2009:** University of Oxford. *First Meeting on Asymptotics of Operator Semigroups.*

**Apr. 2009:** Henri Poincaré Institute (Paris). Congress on *Nonlinear waves and dispersion.*

**Feb. 2009:** Nantes University (France). *Analysis* seminar.

**Jan. 2009:** Ecole Polytechnique (Palaiseau, France). *X-EDP (partial differential equations)* seminar.

**Dec. 2008:** Laboratoire Jacques-Louis Lions (Paris). *Working group on control theory.*

**Nov. 2008:** Henri Poincaré Institute (Paris). *Spectral problems in mathematical physics* seminar .

**Oct. 2008:** Simion Stoilow Institut of Mathematics (Bucarest, Romania). *Workshop on Partial Differential Equations.*

**Oct. 2008:** Paul Sabatier University (Toulouse). *Seminar of the team Mathematics for Physics and Industry.*

**May 2008:** Elie Cartan Institute (Nancy University). *Partial differential equations and applications* seminar.

**Jan. 2008:** Paris 11 Orsay University. *Working group on partial differential equations.*

**Nov. 2007:** Rennes 1 University. *Partial differential equations* seminar.

**May 2007:** Ecole Normale Supérieure (Paris). *Partial differential equations and nonlinear analysis* seminar .

**Jan. 2007:** Evry University. *Analysis* seminar.

**May 2005:** Cergy-Pontoise University. *Analysis* seminar.

**Oct. 2005:** Paris 11 University. *Numerical analysis and partial differential equations* seminar.

**Mar. 2005:** École Normale Supérieure (Paris). *Partial differential equations* seminar.

**Mar. 2005:** Lille 1 University. *Numerical analysis and partial differential equations seminar.*

**Mar. 2004:** Paris 11 University. *Partial differential working group.*

**Jan. 2004:** École Polytechnique. *Analysis working group of the CMAT (Center of mathematics).*

## Publications


[1] Thomas Duyckaerts. Inégalités de résolvante pour l'opérateur de Schrödinger avec potentiel multipolaire critique. *Bull. Soc. Math. France*, 134(2):201–239, 2006.

[2] Valeria Banica and Thomas Duyckaerts. Weighted Strichartz estimates for radial Schrödinger equation on noncompact manifolds. *Dyn. Partial Differ. Equ.*, 4(4):335–359, 2007.

[3] Thomas Duyckaerts. Optimal decay rates of the energy of a hyperbolic-parabolic system coupled by an interface. *Asymptot. Anal.*, 51(1):17–45, 2007.

[4] Thomas Duyckaerts. A singular critical potential for the Schrödinger operator. *Canad. Math. Bull.*, 50(1):35–47, 2007.
[5] Thomas Duyckaerts, Justin Holmer, and Svetlana Roudenko. Scattering for the non-radial 3D cubic nonlinear Schrödinger equation. *Math. Res. Lett.*, 15(6):1233–1250, 2008.
[6] Thomas Duyckaerts and Frank Merle. Dynamics of threshold solutions for energy-critical wave equation. *Int. Math. Res. Pap. IMRP*, pages Art ID rpn002, 67, 2008.
[7] Thomas Duyckaerts, Xu Zhang, and Enrique Zuazua. On the optimality of the observability inequalities for parabolic and hyperbolic systems with potentials. *Ann. Inst. H. Poincaré Anal. Non Linéaire*, 25(1):1–41, 2008.
[8] Valeria Banica, Rémi Carles, and Thomas Duyckaerts. On scattering for NLS: from Euclidean to hyperbolic space. *Discrete Contin. Dyn. Syst.*, 24(4):1113–1127, 2009.
[9] Thomas Duyckaerts, Clotilde Fermanian Kammerer, and Thierry Jecko. Degenerated codimension 1 crossings and resolvent estimates. *Asymptot. Anal.*, 65(3-4):147–174, 2009.
[10] Thomas Duyckaerts and Frank Merle. Dynamic of threshold solutions for energy-critical NLS. *Geom. Funct. Anal.*, 18(6):1787–1840, 2009.
[11] Thomas Duyckaerts and Frank Merle. Scattering norm estimate near the threshold for energy-critical focusing semilinear wave equation. *Indiana Univ. Math. J.*, 58(4):1971–2001, 2009.
[12] Thomas Duyckaerts and Svetlana Roudenko. Threshold solutions for the focusing 3d cubic schrödinger equation. *Rev. Mat. Iberoam.*, 26(1):1–56, 2010.
[13] Valeria Banica, Rémi Carles, and Thomas Duyckaerts. Minimal blow-up solutions to the mass-critical inhomogeneous NLS equation. *Comm. Partial Differential Equations*, 36(3):487–531, 2011.
[14] Thomas Duyckaerts, Carlos Kenig, and Frank Merle. Universality of blow-up profile for small radial type II blow-up solutions of the energy-critical wave equation. *J. Eur. Math. Soc. (JEMS)*, 13(3):533–599, 2011.
[15] Thomas Duyckaerts, Frank Merle, and Svetlana Roudenko. Maximizers for the Strichartz norm for small solutions of mass-critical NLS. *Annali della Scuola Normale Superiore di Pisa. Classe di scienze*, 10(2):427–476, 2011.
[16] Thomas Duyckaerts, Carlos Kenig, and Frank Merle. Profiles of bounded radial solutions of the focusing, energy-critical wave equation. *Geom. Funct. Anal.*, 22(3):639–698, 2012.
[17] Thomas Duyckaerts, Carlos Kenig, and Frank Merle. Universality of the blow-up profile for small type II blow-up solutions of the energy-critical wave equation: the nonradial case. *J. Eur. Math. Soc. (JEMS)*, 14(5):1389–1454, 2012.
[18] Thomas Duyckaerts and Luc Miller. Resolvent conditions for the control of parabolic equations. *J. Funct. Anal.*, 263(11):3641–3673, 2012.
[19] Thomas Duyckaerts, Carlos Kenig, and Frank Merle. Classification of radial solutions of the focusing, energy-critical wave equation. *Cambridge Journal of Mathematics*, 1(1):75–144, 2013.
[20] Thomas Duyckaerts, Carlos Kenig, and Frank Merle. Scattering for radial, bounded solutions of focusing supercritical wave equations. *Int. Math. Res. Not. IMRN*, 2014(1):224–258, 2014.
[21] Valeria Banica and Thomas Duyckaerts. Global existence, scattering and blow-up for the focusing NLS on the hyperbolic space. *Dyn. Partial Differ. Equ.*, 12(1):53–96, 2015.
[22] Thomas Duyckaerts, Carlos E. Kenig, and Frank Merle. Profiles for bounded solutions of dispersive equations, with applications to energy-critical wave and Schrödinger equations. *Commun. Pure Appl. Anal.*, 14(4):1275–1326, 2015.
[23] Thomas Duyckaerts and Svetlana Roudenko. Going beyond the threshold: scattering and blow-up in the focusing NLS equation. *Comm. Math. Phys.*, 334(3):1573–1615, 2015.
[24] Kaïs Ammari, Thomas Duyckaerts, and Armen Shirikyan. Local feedback stabilisation to a non-stationary solution for a damped non-linear wave equation. *Mathematical Control and Related Fields*, 6(1):1–25, 2016.
[25] Thomas Duyckaerts, Alain Grigis, and André Martinez. Resonance widths for general helmholtz resonators with straight neck. *Duke Math. J.*, 165(14):2793–2810, 2016.
[26] Thomas Duyckaerts, Carlos Kenig, and Frank Merle. Concentration-compactness and universal profiles for the non-radial energy critical wave equation. *Nonlinear Anal., Theory Methods Appl., Ser. A, Theory Methods*, 138:44–82, 2016.
[27] Thomas Duyckaerts, Carlos Kenig, and Frank Merle. Global existence for solutions of the focusing wave equation with the compactness property. *Annales de l'Institut Henri Poincare (C) Non Linear Analysis*, 33(6):1675 – 1690, 2016.
[28] Thomas Duyckaerts, Carlos Kenig, and Frank Merle. Solutions of the focusing nonradial critical wave equation with the compactness property. *Ann. Sc. Norm. Super. Pisa Cl. Sci. (5)*, 15:731–808, 2016.
[29] Thomas Duyckaerts, Alain Grigis, and André Martinez. Excited resonance widths for helmholtz resonators with straight neck. To appear in J. Spectr. Theory. arXiv:1709.00894, 2017.

[30] Thomas Duyckaerts, Hao Jia, Carlos Kenig, and Frank Merle. Soliton resolution along a sequence of times for the focusing energy critical wave equation. *Geometric and Functional Analysis*, 27(4):798–862, 2017.

[31] Thomas Duyckaerts, Hao Jia, Carlos Kenig, and Frank Merle. Universality of blow up profile for small blow up solutions to the energy critical wave map equation. *Int. Math. Res. Not. IMRN*, 2018(22):6961–7025, 05 2017.

[32] Thomas Duyckaerts and Tristan Roy. Blow-up of the critical Sobolev norm for nonscattering radial solutions of supercritical wave equations on $\mathbb{R}^3$. *Bull. Soc. Math. France*, 145(3):503–573, 2017.

[33] Thomas Duyckaerts and Jianwei Urbain Yang. Blow-up of a critical Sobolev norm for energy-subcritical and energy-supercritical wave equations. *Anal. PDE*, 11(4):983–1028, 2018.

[34] Thomas Duyckaerts, Carlos Kenig, and Frank Merle. Scattering profile for global solutions of the energy-critical wave equation. *J. Eur. Math. Soc. (JEMS)*, 21(7):2117–2162, 2019.

[35] Bérangère Delourme, Thomas Duyckaerts, and Nicolas Lerner. On integrals over a convex set of the wigner distribution. *Journal of Fourier Analysis and Applications*, 26(1):1–40, 2020.

## Accepted papers

[36] Wei Dai and Thomas Duyckaerts. Uniform a priori estimates for positive solutions of higher order lane-emden equations in $\mathbb{R}^n$. arXiv:1905.10462, to appear in Publicaciones Mathemàtiques, 2019.

[37] Thomas Duyckaerts, Carlos Kenig, and Frank Merle. Decay estimates for nonradiative solutions of the energy-critical focusing wave equation. arXiv:1912.07655, to appear in J. Geom. Anal., 2019.

[38] Thomas Duyckaerts, Carlos Kenig, and Frank Merle. Exterior energy bounds for the critical wave equation close to the ground state. arXiv:1912.07658, to appear in Comm. Math. Phys., 2019.

[39] Thomas Duyckaerts and Jianwei Urbain Yang. Scattering to a stationary solution for the superquintic radial wave equation outside an obstacle. arXiv:1910.00811, 2019, to appear in Ann. Inst. Fourier (Grenoble).

## Proceedings

[40] Thomas Duyckaerts. Estimates on non-uniform stability for bounded semigroups. In *Operator semigroups meet complex analysis, harmonic analysis and mathematical physics. Proceedings of the conference, Herrnhut, Germany, June 3–7, 2013*, pages 133–146. Cham: Birkhäuser/Springer, 2015.

## Preprints

[41] Thomas Duyckaerts, Carlos Kenig, and Frank Merle. Soliton resolution for the critical wave equation with radial data in odd space dimensions. arXiv:1912.07664, 2019.

[42] Wei Dai and Thomas Duyckaerts. Self-similar solutions of energy-supercritical focusing wave equations in all dimensions. arXiv:2004.08802, 2020.

[43] Thomas Duyckaerts and David Lafontaine. Scattering for critical radial Neumann waves outside a ball. arXiv:2004.08576, 2020.