

CEREMADE

Université Paris-Dauphine

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CURRICULUM VITÆ

Résumé

Personal data :

Born on Dec. 29, 1965, in Lille, France

French nationality, divorced, with 3 children

Personal address: 37 bis rue Schnapper, F-78100 Saint-Germain-en-Laye

Training :

Since Nov. 1992

CNRS Research Fellow at CEREMADE, University of Paris-Dauphine (full-time permanent research position)

Education :

1988-1992

Ph.D. at the University of Paris-Dauphine,
“Mathematical analysis of models from Quantum Mechanics”
Advisor: P.-L. Lions

Sept. 1985–Sept. 1989

Scholarship at the Ecole Normale Supérieure of Fontenay-Saint-Cloud

1988-1989

DEA of Applied Nonlinear Analysis, at the University of Paris IX-Dauphine.

July 1987

French “**Agrégation de Mathématiques**”

June 1986

Bachelor of mathematics and **Master of pure mathematics** at the University of Paris 6-Jussieu

June 1983

Scientific **Baccalaureate**, with highest honors.

Distinctions :

Ph. D. Thesis Prize “Eugénie de Rosemont” (dec. 1994).

List of Publications

Published papers :

- [1] C. Bardos, I. Catto, N.J. Mauser & S. Trabelsi, *Global-in-time existence of solutions to the multiconfiguration time-dependent Hartree-Fock equations: A sufficient condition*, Applied Mathematics Letters (2008), doi:10.1016/j.aml.2007.12.033, to appear.
- [2] E. Cancès, I. Catto, Y. Gati & C. Le Bris, *Well-posedness of a multiscale model for concentrated suspensions*, Multiscale Model. Simul., 4 (4), pp. 1041-1058 (2006)
- [3] E. Cancès, I. Catto & Y. Gati, *Mathematical analysis of a nonlinear parabolic equation arising in the modelling of non-newtonian flows*, SIAM J. Math. Anal., 37 (1), pp. 60–82 (2005)
- [4] I. Catto, P. Exner & Ch. Hainzl, *Enhanced binding revisited for a spinless particle in non-relativistic QED*, J. Math. Phys., 45 (11), pp. 4174–4185 (2004)
- [5] R.D. Benguria, I. Catto, J. Dolbeault & R. Monneau, *Oscillating minimizers of a fourth order problem invariant under scaling*, J. Differential Equations, 205 (1), pp. 253–269 (2004)
- [6] I. Catto & Ch. Hainzl, *The self-energy of one electron in non relativistic QED*, J. Funct. Anal., 207 (1), pp. 68–110 (2004)
- [7] I. Catto, C. Le Bris & P.-L. Lions, *On some periodic Hartree-type models for crystals*, Ann. Inst. H. Poincaré Anal. Non Linéaire, 19 (2), pp. 143–190 (2002)
- [8] I. Catto, C. Le Bris & P.-L. Lions, *On the thermodynamic limit for Hartree-Fock type models*, Ann. Inst. H. Poincaré Anal. Non Linéaire, 18 (6), pp. 687–760 (2001)
- [9] I. Catto, C. Le Bris & P.-L. Lions, *Sur la limite thermodynamique pour des modèles de type Hartree et Hartree-Fock [On the thermodynamic limit for Hartree and Hartree-Fock type models]*, C. R. Acad. Sci. Paris Sér. I Math., 327, pp. 259-266 (1998) .
- [10] I. Catto, C. Le Bris & P.-L. Lions, *Limite thermodynamique pour des modèles de type Thomas-Fermi [Thermodynamic limit for Thomas-Fermi type models]*, C. R. Acad. Sci. Paris Sér. I Math., 322, pp. 357-364 (1996)
- [11] I. Catto & P.-L. Lions, *Binding of atoms and stability of molecules in Hartree and Thomas-Fermi type theories. Part 4: Binding of neutral systems for the Hartree model*, Comm. Partial Differential Equations, 18 (7 & 8), pp. 1149–1159 (1993)
- [12] I. Catto & P.-L. Lions, *Binding of atoms and stability of molecules in Hartree and Thomas-Fermi type theories. Part 3: Binding of neutral subsystems*, Comm. Partial Differential Equations, 18 (1 & 2), pp. 305–354 (1993)
- [13] I. Catto & P.-L. Lions, *Binding of atoms and stability of molecules in Hartree and Thomas-Fermi type theories. Part 2: Stability is equivalent to the binding of neutral*

subsystems, Comm. Partial Differential Equations, 18 (3 & 4), pp. 381–429 (1993)

[14] I. Catto & P.-L. Lions, *Binding of atoms and stability of molecules in Hartree and Thomas-Fermi type theories. Part 1: A necessary and sufficient condition for the stability of general molecular systems*, Comm. Partial Differential Equations, 18 (7 & 8), pp. 1149–1159 (1993)

[15] I. Catto, *On some vector-valued non linear variational problems: variations on the Skyrme-Hartree-Fock model in Nuclear Physics*, Differential Integral Equations, 6 (2), pp. 291–318 (1993)

[16] I. Catto, C. Le Bris & P.-L. Lions, *La stabilité des molécules et la liaison des atomes pour des modèles de type Thomas-Fermi ou Hartree [Stability of molecules for Thomas-Fermi or Hartree type models]*, C. R. Acad. Sci. Paris Sér. I Math., 311, pp. 193–198 (1990)

Research books :

[17] I. Catto, C. Le Bris & P.-L. Lions, *MATHEMATICAL THEORY OF THERMODYNAMIC LIMITS : THOMAS-FERMI TYPE MODELS*, Oxford Mathematical Monographs, The Clarendon Press, Oxford University Press, New York (1998).

Book chapters :

[18] I. Catto, C. Le Bris & P.-L. Lions, *Recent mathematical results on the quantum modeling of crystals*. In: “Mathematical Models and Methods for *ab initio* Quantum Chemistry”, M. Defrancesci & C. Le Bris Ed., Lecture Notes in Chemistry Vol. 74, pp. 95–119, Springer-Verlag, Berlin (2001).

Proceedings :

[19] *Mini-Workshop: Multiscale and Variational Methods in Material Science and Quantum Theory of Solids*, I. Catto, I. V. Chenchiah, I. Veselic and J. Zimmer Editors, Oberwolfach reports, EMS Publishing House, Volume 4, Issue 1, 2007, pp. 371–416.

[20] I. Catto & P.-L. Lions, *Hartree and Thomas-Fermi type models and the binding of molecular systems*, dans : “Non Linear Variational Problems and Partial Differential Equations (Isola d’Elba, 1990)”, A. Marino and M. K. V. Murthy Ed., Pitman Res. Notes Math. Ser. Vol. 320, pp. 95–119, Longman Sci. Tech., Harlow (1995)

Other publications :

[21] I. Catto, *Some remarks on Hartree-type models in Nuclear Physics*, In: Ph.D. thesis: “Analyse mathématique de modèles de la Mécanique Quantique”, Université Paris-Dauphine (1992).

Working papers :

[22] R. Benguria, I. Catto & J. Dolbeault, *A variational approach to sharp constants in interpolation inequalities for derivatives of functions on the line and on the circle*

[23] C. Bardos, I. Catto, N. Mauser & S. Trabelsi, *Setting and Analysis of the Multiconfiguration Hartree–Fock equations*

Talks

International conferences

- *2007 Workshop on Mathematical Issues in Complex Fluids*, Beijing International Center for Mathematical Research (BICMR), Beijing, Chine, 15–19 octobre 2007 (invited conference)
- *One day workshop on nonlinear PDE's and applications to Biology and Physics*, Centro de Modelamiento Matematico, Universidad de Chile, Santiago de Chili, 19 juillet 2007 (invited conference)
- Minisymposion DMV-GDM-2007 on *Mathematical Models of Complex Quantum Systems*, Berlin, 25–30 mars 2007 (invited conference)
- *Qmath9*, Giens, France, September 12–16, 2004 (contributed talk)
- *Partial Differential Equations in Applied Mathematics*, Satellite conference of AMAM, Nice, France, February 6–7, 2003 (invited conference)
- *Relativistic Quantum Coulomb Systems*, Santiago de Chile, August 26–30, 2002 (invited conference)
- UAB 2002 *International conference on differential equations and mathematical physics*, Birmingham, Alabama, March 26–30, 2002
- QMath8 *Mathematical Results in Quantum Mechanics*, Taxco, Mexico, December 10–14, 2001(invited conference)
- *Euroconference on Asymptotic Methods and Applications in Kinetic and Quantum-Kinetic Theory*, Granada, Spain, September 17–21, 2001
- CVGMT *Workshop in Nonlinear Differential Equations*, Bergamo, Italy, July 9–13, 2001
- Minisymposia “Mathematics applied to Quantum Chemistry: Theoretical, computational and experimental aspects”, ICIAM'99, Edinbourg, July 4–9, 1999
- “UAB-GIT International Conference on Differential Equations and Mathematical Physics”, Birmingham, Alabama, March 15–22, 1999

- “GT-UAB International Conference on Differential Equations and Mathematical Physics”, Atlanta, March 23–29, 1997
- IMA Workshop, “Mechanical Response of Materials from Angstroms to Meters”, Minneapolis, Sept. 9–15, 1995
- “UAB-GT International Conference on Differential Equations and Mathematical Physics”, Birmingham, Alabama, March 13–17, 1994
- AMS Special Session on “Mathematics of Many-Body Quantum Theory”, Lexington, Kentucky, March 18–19, 1994

Workshops and seminars.

- Séminaire “tournant” de Physique Mathématique, Institut Henri Poincaré, March 17, 2008
- Séminaire de Physique Mathématique, Université des Sciences et Techniques de Lille, February 12, 2008
- Séminaire “entre-nous”, Université Paris-Dauphine, January 22, 2008 • Séminaire Analyse Numérique et EDP, Université de Paris Sud, March 23, 2006
- Séminaire de Mathématiques Appliquées, Collège de France, January 20, 2006
- Universidad Miguel Hernandez, Elche, Spain, June 5, 2005
- Centro de Modelamiento Matemático, Universidad de Chile, Santiago de Chile, April 19, 2004
- Universidad de Buenos Aires, April 7, 2004
- Technisches Universität, Mainz, May 6, 2003
- Czech Technical University, Prague, April 22, 2003
- Kick-Off meeting Munich, December 6-8, 2002
- Universidad de Buenos Aires, August 22, 2002
- Groupe de travail Calcul des variations, Université Paris-Dauphine, Jan. 2002 and March 2001
- Journée d’Analyse Non Linéaire, Université Libre de Bruxelles / Université Catholique de Louvain, March 30, 2001
- Séminaire “Analyse-Equations aux Dérivées Partielles”, CEREMATH, Université Toulouse 1 (Feb. 2001)
- Workshop on “Coulomb interactions, kinetic equations and asymptotic analysis”, CIRM, Luminy, Feb. 21–25, 2000
- Workshop on “Large Coulomb Systems”, Oberwolfach, Aug. 1–7, 1999

- Journée d'Analyse non Linéaire, Université Libre de Bruxelles/ Université Catholique de Louvain, March 21, 1998
- Journée "Equations aux Dérivées Partielles et environnement", Université Paul Sabatier, Toulouse, Nov. 21, 1997
- Journée Chimie Quantique, INRIA, Rocquencourt, Nov 6, 1997
- Groupe de Travail de Physique-Mathématique, Université de Paris-Sud, May 14, 1996
- ENS Cachan, CMLA-URA 1611, June 1994
- Journée d'Analyse non Linéaire, Université Libre de Bruxelles et Université Catholique de Louvain, March 1994
- Université de Tours, May 1993
- Institut Fourier, Grenoble, May 1992
- CEREMADE, Université Paris-Dauphine, Dec. 1991

Other research activities

Visiting researcher

- Pontifica Universidad Catolica de Chile, Santiago de Chile, ECOS research project No. C02E09, July 12–26, 2007.
- Universidad Miguel Hernandez de Elche, Spain, July 2005 (1 week) invited by Jose Maria Amigo
- Universidad de Granada, Spain, July 2005 (2 weeks)
- P. Universidad Católica de Chile, Santiago de Chile, April 2004 (2 weeks)
- University of Buenos Aires, August 22-24, 2003 and April 6-10, 2004
- University of Mainz, May 5-9 2003
- Université Libre de Bruxelles, 1993 (one year)
- University of Houston, August 1990 (one month)

Attended workshops and congresses :

- Oberwolfach Workshop *Mathematical and Numerical Aspects of Quantum Chemistry Problems*, Oct. 22–28, 2006
- Oberwolfach Workshop *Analysis and Quantum Theory*, Oberwolfach, Sept. 18–24, 2005
- *2nd Network meeting* of the European network IHP "Analysis and Quantum", Vienna, Dec. 6–7, 2003
- XIVth International Congress in Mathematical Physics ICMP 2003, Lisboa, July 28–Aug. 2, 2003

- “Stability matters”, Symposium in Mathematical Physics mathématique in the honor of E.H. Lieb for his 70th birthday, Vienna, july 28–aug. 2, 2002

Summer schools

- *Modèles quantiques relativistes*, Piriac-sur-Mer (Loire Atlantique), August 27–31, 2001
- One-week school *Selected issues in the mechanics of crystalline solids*, Padova, Italy, October 2–6, 2000

Ph.D. Students

- Since sept. 2004, co-advisor with C. Bardos (Paris) and N. Mauser (Vienna) of the Ph. D. thesis of **Saber Trabelsi** on “*The time dependent multi-configuration Hartree-Fock equations*”
- Co-advisor with Claude le Bris at Ecole Nationale des Ponts et Chaussées of the Ph. D. thesis of **Yousra GatiI** “*Modélisation mathématique et simulation numérique de fluides non newtoniens*” [Mathematical modelling and numerical simulation of non-newtonian fluids] defended in july 2004

Implication in programs of international collaboration:

- ECOS-CONYCIIT Project (french-chilian cooperation) No. C02E09 “*Oprateurs maximaux, équations d’ordre 4 et drive-diffusion*”. Scientifics in charge: Jean Dolbeault/Patricio Felmer (2006–2008).
- Spanish research project GV05/064 *Non-newtonian fluids and free boundary problems* with the University Miguel Hernandez of Elche. Scientific in charge: José Maria Amigo (2005–2006).
- European IHP network *Analysis and Quantum*. Scientific in charge: Heinz Siedentop (2002–2005).
- European IHP network (*HYperbolic and Kinetic Equations : Asymptotics, Numerics, Analysis*). Scientific in charge: Norbert Mauser (2002–2005).
- ECOS-CONYCIIT Project (french-chilian cooperation) no. C02E06 *Equations aux dérivées partielles de la physique mathématique*. Scientifics in charge: Eric Séré/Rafael Benguria (2003–2005).

Scientific Societies

- Member of the french mathematical society for applied mathematics SMAI (Société de Mathématiques Appliquées et Industrielles)
- Member of the French Mathematical Society
- Member of the International Association of Mathematical Physics

Refereeing for the following journals

M³As, EJDE, Lett. Math. Phys, CPDE, SIAM J. Math. Anal, Nonlinearity

Teaching experience

At the University of Paris-Dauphine:

- First year calculus on optimization techniques for functions with two variables and applications in economics, for students in economical sciences (since 2003)
- DEA EDPA - Equations aux Dérivées Partielles et Applications: “Mathematical and numerical analysis of Quantum Chemistry models” (since 2003)

At the universities of Monastir and Tunis, Tunisia : Lectures on “Mathematical analysis of some non-compact variational models from Quantum Chemistry” (every year, since 2004)

Language skills

French (mother tongue), English and Spanish (fluent).