

Antoine GLORIA

French citizen
Born May 14th, 1979

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Professional experience

2017–	Professeur, Laboratoire Jacques-Louis Lions, UPMC (on leave from ULB)
2014–2019	Principal investigator of the ERC Starting Grant QUANTHOM.
2012–2017	Head of the joint team SIMPAF (till 2014) then MEPHYSTO (ULB, Inria, Université Lille 1).
2012–2017	Professeur, ULB.
2008–2012	Researcher at Inria Lille - Nord Europe. Member of the Paul Painlevé mathematics department, Université Lille 1. French civil engineer on leave.
2007–2008	Post-doctoral fellow at the Hausdorff Center for Mathematics, Bonn.
2003–2004	Internship, scientific computing department, Hutchinson, France.

Education

2012	Habilitation thesis, Université Lille 1.
2004–2007	PhD thesis, Ecole Nationale des Ponts et Chaussées and Université Paris Est.
2004	Master in mathematics, Université Pierre et Marie Curie.
2004	Diploma of the Ecole Nationale des Ponts et Chaussées, France.
2002	Diploma of the Ecole Polytechnique, France.

Awards

2015	Prix Agathon de Potter, Académie royale de Belgique
2013	ERC Starting grant

Long-term visits

2015	Institut des Hautes Études Scientifiques, Bures-Sur-Yvette (2 months, guest of the Schlumberger chair).
2014	Mittag Leffler Institute, Stockholm (1 month). Courant Institute of Mathematical Sciences, NYU (1 month).
2013	Stanford University (3 months).
2006	Ennio De Giorgi Center, Pise (1 month).
2006	Università di Roma Tor Vergata (3 months).
2005	Institute for Pure and Applied Mathematics, UCLA (3 months).

Publications and preprints

- (48) (with M. Duerinckx and F. Otto) Robustness of the pathwise structure of fluctuations in stochastic homogenization, working paper (29 pages).
- (47) (with M. Duerinckx and C. Shirley) Approximate Floquet-Bloch theory for linear waves in disordered media, working paper (130 pages).
- (46) (with M. Cicalese and M. Ruf) From statistical polymer physics to nonlinear elasticity, working paper (50 pages).
- (45) (with M. Ruf) Loss of strong ellipticity through homogenization in 2D linear elasticity: A phase diagram, *Arch. Ration. Mech. Anal.*, in press.
- (44) (with A. Benoit) Long-time homogenization and asymptotic ballistic transport of classical waves, *Annales Scientifiques de l'ÉNS*, in press.
- (43) (with G. A. Francfort) Isotropy prohibits the loss of strong ellipticity through homogenization in linear elasticity, *C. R. Acad. Sci. Paris, Ser. I*, 354 (2016), pp 1139-1144.
- (42) (with F. Otto) The corrector in stochastic homogenization: optimal rates, stochastic integrability, and fluctuations, preprint.
- (41) (with M. Duerinckx and F. Otto) The structure of fluctuations in stochastic homogenization, preprint.
- (40) (with S. Neukamm and F. Otto) Quantitative stochastic homogenization for correlated fields, preprint.
- (39) (with S. Neukamm and F. Otto) A regularity theory for random elliptic operators, preprint.
- (38) (with M. Duerinckx) Weighted second-order Poincaré inequality: Application to RSA models, preprint.
- (37) (with M. Duerinckx) Weighted functional inequalities: Constructive approach, preprint.
- (36) (with M. Duerinckx) Weighted functional inequalities: Concentration properties, preprint.
- (35) (with S. Armstrong and T. Kuusi) Bounded correctors in almost periodic homogenization, *Arch. Ration. Mech. Anal.*, 222 (2016), no. 1, 393–426.
- (34) (with M. Duerinckx) Stochastic homogenization of unbounded nonconvex integral functionals with convex growth, *Arch. Ration. Mech. Anal.*, 221 (2016), no. 3, 1511–1584.
- (33) (with M. Duerinckx) Analyticity of homogenized coefficients under Bernoulli perturbations and the Clausius-Mossotti formulas, *Arch. Ration. Mech. Anal.*, 220 (2016), no. 1, 297–361.
- (32) (with J. Nolen) A quantitative central limit theorem for the effective conductance on the discrete torus, *Comm. Pure Appl. Math.*, 69 (2016), no. 12, 2304–2348.
- (31) (with D. Marahrens) Annealed estimates on the Green function and uncertainty quantification, *Ann. Inst. H. Poincaré Anal. Non Linéaire*, 33 (2016), no. 5, 1153–1197.
- (30) (with F. Otto) Quantitative results on the corrector equation in stochastic homogenization, *Journ. Eur. Math. Soc (JEMS)*, 19 (2017), no. 11, pp 3489–3548.
- (29) (with M. de Buhan, P. Le Tallec and M. Vidrascu) Reconstruction of a constitutive law for rubber from in silico experiments, *International Journal of Solids and Structures*, 2015.

- (28) When are increment-stationary random point sets stationary?, *Electron. Commun. Probab.*, 19 (2014), no. 30, 14 pp.
- (27) (with Z. Habibi) Reduction in the resonance error in numerical homogenization II: correctors and extrapolation, *Found. Comput. Math.*, 16 (2016), no. 1, 217–296.
- (26) (with A.-C. Egloffé, J.-C. Mourrat, and T. N. Nguyen) Random walk in random environment, corrector equation, and homogenized coefficients: from theory to numerics, back and forth, *IMA J. Numer. Anal.*, 35 (2015), no. 2, 499–545.
- (25) (with F. Otto) Quantitative estimates on the periodic approximation of the corrector in stochastic homogenization, *CEMRACS 2013 — modelling and simulation of complex systems: stochastic and deterministic approaches*, 80–97, *ESAIM Proc. Surveys*, 48, EDP Sci., Les Ulis, 2015.
- (24) (with S. Neukamm and F. Otto) A quantitative two-scale expansion in stochastic homogenization of discrete linear elliptic equations, *M2AN Modél. Math. Anal. Numér*, special issue 2014: Multiscale problems and techniques.
- (23) (with S. Neukamm and F. Otto) Quantification of ergodicity in stochastic homogenization: optimal bounds via spectral gap on Glauber dynamics, *Inventiones Mathematicæ*, 199 (2015), No. 2, pp 455-515.
- (22) Fluctuation of solutions to linear elliptic equations with noisy diffusion coefficients, *Comm. Partial Differential Equations*, 38 (2013), No 2, pp 304-338.
- (21) Numerical homogenization: survey, new results, and perspectives, *ESAIM: Proc. Volume 37*, September 2012, *Mathematical and numerical approaches for multiscale problem*.
- (20) (with T. Goudon and S. Krell) Numerical homogenization of a nonlinearly coupled elliptic-parabolic system, reduced basis method, and application to nuclear waste storage, *Math. Models Methods Appl. Sci. (M3AS)*, 23 (2013), No. 13, pp 2523-2560.
- (19) (with P. Le Tallec, and M. Vidrascu) Foundation, analysis, and numerical investigation of a variational network-based model for rubber, *Cont. Mech. Thermodynamics*, 26 (2014), No 1, pp 1-31.
- (18) (with M. D. Penrose) Random parking, Euclidean functionals, and rubber elasticity, *Commun. Math. Phys.*, 321 (2013), No. 1, pp 1-31
- (17) (with J.-C. Mourrat) Quantitative version of the Kipnis-Varadhan theorem and Monte-Carlo approximation of homogenized coefficients, *Ann. Appl. Probab.*, 23 (2013), No. 4, pp 1544-1583.
- (16) (with S. Neukamm) Commutability of homogenization and linearization at identity in finite elasticity and applications, *Ann. Inst. H. Poincaré Anal. Non Linéaire*, 28 (2011), No 6, pp 941-964.
- (15) (with J.-C. Mourrat) Spectral measure and approximation of homogenized coefficients, *Probab. Theory Related Fields*, 154 (2012), No. 1, pp 287-326.
- (14) Numerical approximation of effective coefficients in stochastic homogenization of discrete elliptic equations, *M2AN Modél. Math. Anal. Numér*, 46 (2012), No. 1, pp 1-38.
- (13) Reduction of the resonance error. Part 1: Approximation of homogenized coefficients, *Math. Models Methods Appl. Sci. (M3AS)*, 21 (2011), No. 3, pp 1601-1630.
- (12) (with F. Otto) An optimal error estimate in stochastic homogenization of discrete elliptic equations, *Ann. Appl. Probab.*, 22 (2012), No 1, pp 1-28.
- (11) (with R. Alicandro and M. Cicalese) Integral representation results for energies defined on stochastic lattices and application to nonlinear elasticity, *Arch. Ration. Mech. Anal.*, 200 (2011), No 3, pp 881-943.
- (10) (with F. Otto) An optimal variance estimate in stochastic homogenization of discrete elliptic equations, *Ann. of Probab.*, 39 (2011), No 3, pp 779-856.

- (9) (with M.-A. Fernandez, J.-F. Gerbeau, and M. Vidrascu) A partitioned Newton method for the interaction of a fluid and a 3D shell structure, *Eur. J. Comp. Mech.*, 19 (2010), 5-7, pp.479-512.
- (8) (with J.-F. Coulombel) Semigroup stability of finite difference schemes for multidimensional hyperbolic initial boundary value problems, *Math. Comp.*, 80 (2011), pp 165-203.
- (7) (with M. Barchiesi) New counterexamples to the cell formula in nonconvex homogenization, *Arch. Ration. Mech. Anal.*, 195 (2010), No 3, pp 991-1024.
- (6) Stochastic diffeomorphisms and homogenization of multiple integrals, *AMRX*, Vol. 2008, Article ID abn001.
- (5) (with R. Alicandro and M. Cicalese) Variational description of bulk energies for bounded and unbounded spin systems, *Nonlinearity*, 21 (2008), pp 1881-1910
- (4) (with A. Braides) Exact Bounds on the Effective Behavior of a Conducting Discrete Polycrystal, *SIAM MMS*, 6 (2008), No. 4, pp 1198-1216.
- (3) Analytical framework for numerical homogenization. Part 2: Windowing and oversampling, *SIAM MMS*, 7 (2008), No. 1, pp 274-293.
- (2) Analytical framework for the numerical homogenization of elliptic monotone operators and quasiconvex energies, *SIAM MMS*, 5 (2006), No. 3, pp 996-1043.
- (1) A direct approach to numerical homogenization in nonlinear elasticity, *NHM*, 1 (2006), No.1, pp 109-141.
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PhD students and post-doctoral fellows

2018-2021	N. Clozeau and J. Pertinand
2017-2018	L. Giovangigli, post-doctoral fellow (ERC)
2016-2019	M. Ruf, post-doctoral fellow (ERC)
2015-2019	C. Shirley, post-doctoral fellow (ERC)
2015-2017	A. Benoit, post-doctoral fellow (ERC), now assistant professor in Université du Littoral (Calais).
2014-2017	M. Duerinckx, PhD student (FNRS), now post-doctoral fellow at ENS Lyon.
2013-2015	T. Gallouët (with C. Chainais-Hillairet), post-doctoral fellow, Inria and ULB, now junior scientist at Inria Paris.
2011-2012	Z. Habibi, post-doctoral fellow, Inria, now engineer at AGC European R&D Centre, Belgium.
2010-2011	S. Krell, post-doctoral fellow, Inria, now assistant professor in Nice.
2010-2011	M. de Buhan, post-doctoral fellow, Inria, now CNRS researcher.

Organization of conferences and workshops

May 2017	Workshop “nonlinear elasticity”, University of Dresden (with S. Neukamm).
July 2015	Mini-symposium “stochastic homogenization”, Equadiff 2015, Lyon (with S. Armstrong).
March 2014	Workshop “relaxation, homogenization and dimensional reduction in hyperelasticity”, Université Paris Nord (with G. Francfort and M. Kruzik).
June 2013	Mini-symposium “stochastic homogenization and applications to materials science”, SIAM conference on Mathematical Aspects of Materials Science, Philadelphia (with J. Nolen).

December 2010 Workshop “from polymer physics to nonlinear elasticity”, Institut Henri Poincaré, Paris (with F. Lequeux, P. Le Tallec and M. Vidrascu).

Invited courses

May 2018 Stanford University, distinguished lectures (3h): “Stochastic homogenization: large-scale regularity, quantitative estimates, and fluctuations”.

February 2018 Journées Louis Antoine (4h30)

March 2016 Fluctuations in stochastic homogenization (4h30), workshop “Large Deviations for Interacting Particle Systems and Partial Differential Equations” (Young European Probabilists), Eindhoven.

February 2016 Fluctuations in stochastic homogenization (1h30), winter school, Augsburg.

December 2015 Quantitative stochastic homogenization (1h30), séminaire EDP/Proba, IHP.

November 2014 Stochastic homogenization (2h), MoMaS colloquium, CIRM, Marseille.

September 2014 Stochastic homogenization and Markov processes (3h, with J.-C. Mourrat), Mittag-Leffler Institute, Stockholm.

January 2014 Hypatie seminar in probability (4h, with F. Otto), Lyon.

Fall 2013 Quantitative stochastic homogenization (24h), Stanford University.

December 2010 Introduction to numerical homogenization (4h), CEA-EDF-Inria winter school.

November 2010 Introduction to stochastic homogenization (4h), Max Planck Institute for Mathematics in the Sciences, Leipzig.

Talks at conferences

July 2019 Workshop “Computational Multiscale Methods”, Oberwolfach.

July 2019 Workshop “Paths between Probability, PDEs, and Physics”, Imperial College, London.

February 2018 Workshop “Interplay of Analysis and Probability in Applied Mathematics”, Oberwolfach.

August 2017 Workshop “Large scale properties of partial differential equations with random coefficients”, Kyoto.

June 2017 Conference “Journées EDP”, Roscoff.

February 2017 Workshop “Stochastic aspects of numerical homogenization”, Hausdorff Trimester Program on Multiscale Problems.

January 2017 Workshop “Multiscale methods for stochastic dynamics”, Genève.

December 2016 Workshop “functional inequalities”, Oberwolfach.

May 2016 Nonlinear Analysis day, Louvain-la-neuve.

March 2016 British Mathematical Colloquium, Probability section, Bristol.

January 2016 GAMM Conference, Paris.

October 2015 One-day conference on Calculus of Variations, Lille.

July 2015 Workshop “Developments in the theory of homogenization”, Banff international research station.

June 2015 Special session “Homogenization and its Contemporary Stochastic Aspects” at the AMS-EMS-SPM International Meeting, Porto.

January 2015 BLPro workshop on probability, Université de Liège.

September 2014 Workshop on stochastic homogenization, Mittag-Leffler Institute, Stockholm.

March 2014	GSSI Starting Workshop on Mechanics and Simulations: From microscopic to continuum models in Materials Science, L'Aquila.
March 2014	Workshop "Relaxation, homogenization and dimensional reduction in hyperelasticity", Paris.
September 2013	International conference on applied mathematics, Heraklion, plenary speaker.
June 2013	SIAM Conference on mathematics and materials, Philadelphia.
March 2013	workshop "Stochastic homogenization", Oberwolfach.
September 2012	Symposium workshop "At the Frontier of Analysis and Probability", university of Warwick
June 2012	Spring school on nonlinear PDEs, ULB.
November 2011	SIAM conference in PDEs, San Diego.
June 2011	ACMAC workshop on stochastic PDEs, Creta.
January 2011	Institut Henri Poincaré, workshop "From polymer physics to rubber elasticity".
December 2009	Workshop "Numerical analysis of multiscale computations", Banff international research station.
May 2009	SMAI congress, Nice.
September 2008	Workshop of the European network MULTIMAT, Bonn
August 2007	Symposium international "Continuum models and discrete systems CMDS 11", Paris.
July 2007	ICIAM congress, Zurich.
November 2006	MULTIMAT workshop, Antwerp.
June 2006	SIMAI congress, Sicily.

Seminars

July 2018	Colloquial talk, Einstein Center for Mathematics, Berlin.
July 2018	Institute for Science and Technology (IST), Austria.
June 2018	University of Chicago
May 2018	Stanford University
May 2018	UCLA
May 2018	IAS, Princeton
May 2018	École Centrale Paris
April 2018	Nice
January 2018	Séminaire Laurent Schwartz — Ecole polytechnique & IHES
October 2017	Seminar, LJLL.
September 2017	Seminar, Inria Saclay – Ecole polytechnique.
October 2016	Probability seminar, Warwick.
May 2016	Courant Institute for Mathematical Sciences, NYU.
January 2016	ENS Rennes.
July 2015	Oberseminar, MPIMS Leipzig.
March 2015	Mathematics department, Université de Nice.
May 2014	Mathematics department, Université de Marseille.
May 2014	Applied mathematics department, Columbia University.

May 2014	Courant Institute for Mathematical Sciences, NYU.
March 2014	OxPDE seminar, Oxford University.
December 2013	Applied mathematics department, Caltech.
June 2013	Mathematics department, Paris Dauphine.
May 2013	Mathematics department, Université de Lyon.
February 2013	Nonlinear analysis seminar, ENS - Paris 6.
June 2012	Mathematics department, Stanford University.
June 2012	Seminar of the laboratoire Jacques-Louis Lions, Université Pierre et Marie Curie.
May 2012	Probability seminar, University of Warwick.
January 2012	Mathematics department, ULB.
August 2011	CIRM, Marseille.
December 2010	Probability seminar, Université de Lille 1.
July 2010	Max Planck Institute for Mathematics in the Sciences, Leipzig.
May 2010	Mathematics department, Université de Nîmes
October 2009	Mathematics department, Universität Bonn.
May 2009	Nonlinear analysis seminar, ENS - Paris 6.
April 2009	Mathematics department, Ecole nationale des ponts et chaussées.
April 2008	Max Planck Institute for Mathematics in the Sciences, Leipzig.
December 2007	Mathematics department, Universität Bonn.
September 2007	Mathematics department, Université de Lille 1.
November 2006	Mathematics department, Universität Bonn.
June 2006	Mathematics department, Università di Roma Tor Vergata.
October 2005	IPAM, UCLA.
September 2005	LMS, Ecole polytechnique, Paris.
June 2005	IMA, University of Minneapolis.

Service to the community

2014–	Editor at North-Western European Journal of Mathematics. Referee for: Mathematical Modelling and Numerical Analysis, Discrete and Continuous Dynamical Systems - Series B, ESAIM Proc, Applied Mathematics and Computation, IMA Journal of Applied Mathematics, Journal of the Mechanics and Physics of Solids, Mathematical Models and Methods in Applied Sciences, Multiscale Modeling and Simulation, Networks and Heterogeneous Media, Nonlinearity, Rocky Mountain Journal of Mathematics, SIAM Scientific Computing, Stochastic Partial Differential Equations: Analysis and Computations, IMA Journal of Numerical Analysis, Numerische Mathematik, Foundations of Computational Mathematics, Manuscripta Mathematica, SIAM Journal on Mathematical Analysis, Journal de l'Ecole Polytechnique, Transactions of the American Mathematical Society, Communications in Partial Differential Equations, Communication in Mathematical Physics, Archive for Rational Mechanics and Analysis, Journal of the European Mathematical Society, Annales scientifiques de l'ENS, Communications on Pure and Applied Mathematics, Journal of the American Mathematical Society, Inventiones Mathematicæ.
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