



Pierre Del Moral

Date of birth: January 7th, 1965 (Nationality: French).

Married with two children: Timothy (1989), and Tiffany (1993).

Languages (fluent): French, English, Spanish.

& INRIA Senior Research Scientist/Research Director

The National Inst. for Research in Computer Sc & Bordeaux Maths Inst.

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• **Education :**

- Higher Degree of Research, (H.D.R.) in Math., U.P.S. Toulouse III (2002).
- Ph. D. Signal processing LAAS-CNRS & P. Sabatier Univ., Toulouse (1994).
- Master of Science, theory track, P. Sabatier Univ., Toulouse (1989).
Pure Mathematics (Cohomology, Hyperbolic Geometry & Algebraic Geometry).
(Grade: 1st class Honors).

• **Positions & Education :**

- *Research Director/Senior Research Scientist : (DR1 since 2011).*
- *Collaborateur Scientifique, CMAP École Polytechnique Palaiseau since 2018*
- *Simons CRM Professor, Montréal University, Canada (2017)*
- *Professor in Mathematics and Statistics UNSW, Sydney (2014–2016)*
- *Research Director/Senior Research Scientist : (since 2011, detachment from 2014-2016). INRIA Bordeaux - Sud Ouest Center, DR since 2007. Head of INRIA Research Team ALEA (2009-2014)*
- *Professor at the École Polytechnique, Palaiseau, CMAP (2011-2014).*
- *Professor in Mathematics. Nice Sophia-Antipolis Univ. (2004–2007).*
- *C.N.R.S Research Fellow, Section Physics et Math. (1995–2004).*
- *Invited Professor, Purdue University, West Lafayette, USA (2003).*

– Invited Professor, Princeton University New-Jersey USA (2001).

• **Other professional experience :**

– *Head of the Probab. and Stat. team* of the Bordeaux Maths Inst. (2009-2010)

– Research engineer at DIGILOG-STERIA (1991-1992) & (1993-1995).
Research on Radar, Sonar, Gps signal processing and optimal control.

– *Lecturer in Mathematics.* Ecole Nationale Supérieure de l’Aéronautique et de l’Espace, Toulouse (1994-1995).

• **Research subjects :**

– Applied probability, stochastic algorithms and particle methods.

– Simulation & Monte Carlo methods in physics and engineering sciences.

– Branching and interacting particle systems, genealogical tree based models.

– Reinforced processes and self interacting Markov chain models.

– Fluctuation analysis, large deviations and convergence of empirical processes.

– Feynman-Kac-Schrödinger semigroups and their application areas : nonlinear filtering, Bayesian inference, stochastic optimisation, rare event analysis, molecular chemistry, computational biology, financial mathematics.

• **Scientific publications:**

Google scholar classic paper in Probability and Statistics (ten most-cited articles published ten years earlier):

Del Moral, P., Doucet A., Jasra A.. Sequential Monte Carlo Samplers Journal of the Royal Statistical Society, Series B, vol. 68, no. 3, pp. 411-436 (2006).

– 14 books : 5 Research books, 5 Proceedings book & 4 Pedagogical books.

– 17 Chapters and contributions to books.

– 105 articles in Applied Mathematical journals:

* 77 Articles in Pure and Applied Probability journals.

Annals of Applied Probability (10), Bernoulli (5), Stochastic Processes and their Applications (7), Probability Theory and Related Fields (2), Annales de l’Institut Henri Poincaré (3), SIAM Journals (10), Electronic Journal of Probability (4), Journal of Theoretical Probability (2), Journal of the Franklin Institute (1), Stochastic Analysis and Applications (12), Proc. Royal Soc. London Ser. A Math. Phys. (1), Bulletin AMS (1), Mat. Zametki Russian Acad. Science (1), Journal of Applied Probability (1), Advances in Applied Probability (2), Applied Math. and Optimization (1), Journal of Mathematical Analysis and Applications (1), Séminaire de Proba - Lect. Notes in Maths (2), Revista de Matematica (1), Statistica Sinica (1), ESAIM Proba & Stats (3), Annales Fac. Sc. de Toulouse (1), Markov Processes and Related Fields (2), ALEA (1), M2AN (2).

* 6 C. R. Academy of Sciences, Probability and Statistic, Paris.

- * 7 Articles in Mathematics and Statistical journals.
Annals of Statistics (1), SIAM/ASA (1), Journal of Computational and Graphical Statistics (1), Journal Royal Soc. Ser. B Stat. Methodol. (1), Stats and Computing (3).
- * 4 Articles in Physics and Mathematical journals.
Comm. in Math. Phys. (1), Russian Math. Physics (1), Journal of Physics (1), Optics Communications (1).
- * 10 Articles in Signal Processing, Control and Optimization journals.
- * 1 Articles in a Science and Medical Research journal.
- 21 Conference proceedings, and 3 Press articles.
- 6 submitted research reports, and 14 Industrial contract reports.
- 3 pedagogical lecture notes, & 21 unpublished reports.

- **5 Most significant published articles and books in the last five years:**

- Mean field simulation for Monte Carlo integration (626p.) Chapman & Hall. CRC Press, Monographs on Statistics & Applied Probability (June 2013).
- P. Del Moral R. Kohn, F. Patras. On particle Gibbs Markov chain Monte Carlo models. *Annales de l'Institut Henri Poincaré, Probab. & Statist.*, Vol. 52, No. 4, 1687–1733. (2016).
- A.N. Bishop, P. Del Moral. K. Kamatani, and B. Rémillard. On one-dimensional Riccati diffusions. *Annals of Applied Probability*, to appear (2019).
- P. Del Moral, A. Kurtzmann, J. Tugaut. On the stability and the uniform propagation of chaos of a Class of Extended Ensemble Kalman-Bucy filters. *SIAM Journal Control & Optimization*, vol. 55, no. 1, pp. 119–155 (2017).
- P. Del Moral, A. Jasra. A Note on random walks with absorbing barriers and sequential Monte Carlo methods. *Stochastic Analysis and Applications*, vol. 36, no. 3, pp. 413–442 (2018).

- **Editorial Boards**

- Associate editor : *Stochastic Analysis and Applications* since 2001.
- Associate editor : *Applied Mathematics and Optimization* since 2009.
- Associate editor *Revista de Matemàtica: Teoria y Aplicaciones*, 2009-2018.
- Chief editor : *ESAIM: Proceedings* (2006-2012).
- Chief editor with P. Gareths *American J. of Algo. and Computing* in 2012.
- Associate editor : *Stoch. Proc. and their Applications* (2006-2009).
- Guest editor of *M2AN* with Nicolas Hadjiconstantinou (MIT University) for a 2010 special Volume on Probabilistic Methods.

- **Selection Committees and Research Management**

- Member of the Research Evaluation Committee: Mathematics, Information and Computing Sciences. Australian Government, Australian Research Council. Excellence in Research for Australia (2015).
- Scientific expert for the European Commission. Evaluator for the Directorate General Communications Networks, Content and Technology (2013-2014).
- Scientific expert for the PES research grant selection committee of the French Ministry of Research 2010-2014 section CNU 25 and 26 (Pure and Applied Mathematics).
- Scientific expert for the AERES Committee of the Laboratoire de Mathématiques de l'Université de Clermont Ferrand in 2003-2004.
- Member of the working group *Information, communication, matériaux-nanotechnologies*, China. of the National Strategy of Research and Innovation of the French Ministry of Research 2010-2014.
- Member of Recruitment and Selection Committees: Montpellier (2013); Luxembourg University (2013), Toulouse Univ and INSA (2000-2004; 2011-2012), Nice and Sophia Antipolis Univ. (2004-2007), Bordeaux 1 and 2 Univ. (2009-2010; 2011-2012), Lille Univ. (2010), Rennes Univ. (2010).
- Member of the Selection Committee of INRIA junior research fellows in Bordeaux in 2010, and in 2011.

• **Member of the ANR (French Research Agency) projects :**

- *Pistage Radar et Optronique Passif*. [ANR Propagation], 2.300 KE (2009-2012).
- *Epidemic propagations analysis*. [ANR SYSCOMM Viroscopy] (2008-2012).
- *Forecasting and Data assimilation*. [ANR PREVASSEMBLE] (2008-2012).
- *Virtual prairie*. [ANR SYSCOMM MODECOL] (2009-2011).
- *Watermarking of digital contents*. [ANR SETIN Nebbiano] (2007-2010).
- *Probabilités & Interaction*. 416KE (2006-2009)
[ANR Chaire d'Excellence Prof. Persi Diaconis]

• **International institutes and scientific societies**

- Member of the Statistical Society of Australia Inc.
- Elected member of the International Stat. Institute (ISI) since 2006.
- Member of the MAS thematic group of the SMAI (industrial and applied mathematical society) (2005-2008).
- Member of the SMAI 2005-2014.
- Member of the SFdS and the SMF 2009-2014.
- Member of European Geosciences Union 2011-2012.

• **National and international research programs**

- Since 2018, principal investigator of the Australian ARC/Linkage Project 17 : Remote sensing to improve structural efficiency of high-speed catamarans.

- (2011-2014) Leader with Bernard Cazelles (ENS Paris) of the *”Projet exploratoire pluri-disciplinaire inter-instituts”* : Modélisation stochastique et Inférence Bayésienne pour l’Epidémiologie des Maladies transmissibles multi-souches. Institut de Mathématiques de Bordeaux CNRS and the Ecologie & Evolution, CNRS-UMPC-ENS.
- Leader of the ARC EPS, Eco-Microbiology projet with the INRA (2009-2011).
- French Coordinator of the China Associate INRIA team 2009 : 2AS (Wuhan Univ. with Prof. Wu Li Ming)
- Member of the ARC RARE. INRIA cooperative research action on rare event simulation (2005-2007).
- Member of the international cooperation between the ARMOR and ASPI INRIA team projects and the GERAD of Montréal University and HEC Montréal School (2005-2007).
- Scientific leader in Nice-Sophia Antipolis University of a methodological research project of the MIA INRA Dpt. : *”Approche Statistique de la Dynamique des Systèmes Microbiologiques, et Applications à la Maîtrise des Risques Alimentaires”* (2006).
- CNRS-Research Program on Particle Methods and Hidden Markov chains. Research Projet Math-STIC CNRS (2002-2003).
- MITACS Network on Prediction in Interacting Systems (1999-2005) .
- Project leader of the CNRS-Research Program on Particle Methods for Non Linear Filtering (1998-2001).
- TMR Network on Stochastic Analysis and Applications (1996– 2001).
- Principal investigator of the INTAS-RFBR, European Program on Idempotent Analysis (1996–1999).

- **Teaching**

- **2016-2018**: Introduction to stochastic processes (Math and post-doctoral lectures) in the School of Maths and Stats UNSW, Sydney.
- **2014-2016**: Introduction to stochastic processes (36h) and advanced Monte Carlo methods (36h) in the School of Maths and Stats UNSW, Sydney. Tutorial on Statistics (12h) and on Stochastic Processes (12h).
- **Sept. 2011-Sep. 2013** : Professeur chargé de cours Polytechnique, CMAP (58h).
- **Academic year 2007/2011** : **Simulation and Stochastic Algorithms** (Master I & II Math), Bordeaux University (66h).
- **Academic year 2005/2006**:
Integration, probability and statistics (Master I Math), Financial mathematics (L3 Mass, and Ecole Polytechnique Universitaire Nice-Sophia Antipolis), Stochastic engineering (Master 2 MASS). Université de Nice, Sophia-Antipolis.
- **Academic year 2004/2005**:
Integration, probabilities and statistic (Master I Math), Financial Mathematics (L3 Mass), Dynamical Systems (L3 Mass), Statistics (Master Mass II). Sophia-Antipolis and Nice University.

- **Academic year 2003/2004:**
Formules de Feynman-Kac et systèmes de particules en interaction,
Second year graduate course in Applied Mathematics, Paul Sabatier University, Toulouse III.
- **Academic year 2002/2003:**
Introduction to Probability, Under graduate course, Dept. of Statistics, Purdue University, West Lafayette, Indiana-USA.
- **Academic year 2000/2001:**
Interacting particle approximations of non linear filtering problems
Post Graduate course, ORFE department, Princeton, New Jersey-USA.
- **Academic years 1996/1997 to 2001/2002:**
Simulation and Stochastic Algorithms [Statistics & Applied Probability]
-DESS Modèles Mathématiques et Méthodes Informatiques, Université Paul Sabatier, Toulouse III.
-Institut National des Sciences Appliquées, Toulouse III, France.
- **Academic year 1994/1995:**
[Harmonic Analysis, Statistics, Probability and Markov Processes]
Ecole Nationale Supérieure de l’Aéronautique et de l’Espace, Toulouse, France.

• **13 Ph. D. tutoring & supervision**

- Since September 2018, Camille Palmier (ONERA-Palaiseau), co-supervised with D. Laneuville NAVAL-GROUP.
- September 2012-2015, Antoine Campi, co-supervised with Ch. Baehr Météo France, Toulouse.
- September 2012-2014, Paula Craciun (co-supervised with J. Zerubia, AYIN INRIA team project), and ASTRIUM Toulouse.
- Septembre 2011-2015, Nicolas Antunes, Ph. D. in the INRIA Center of Bordeaux-Sud Ouest and the team Préhistoire, Paléoenvironnement, Patrimoine CNRS UMR 5199 PACEA, Bordeaux, (co-tutoring Francesco d’Errico), Bourse inter-ED.
- September 2012 - July 2015. Christelle Vergé, Ph. D. in ONERA Palaiseau and École Polytechnique Palaiseau.
- November 2010 - December 2013, Frédéric Proïa, Ph. D. in the INRIA Center of Bordeaux-Sud Ouest on statistical methods for electricity consumption prediction (co-tutoring with B. Bercu).
- September 2010 - November 2013, Paul Lemaître, Ph D. in the INRIA Center of Bordeaux-Sud Ouest and EDF Chatou, on industrial risk analysis (co-tutoring with B. Iooss EDF Chatou).
- September 2009 - June 2012, Peng Hu a Ph. D. thesis in the INRIA Center of Bordeaux-Sud Ouest on Monte Carlo approximations of Snell envelopes and optimal stopping time problems (co-tutoring with N. Oudjane EDF Clamart).
- September 2009 - May 2013, François Giraud a Ph. D. thesis in the CEA CESTA on SAR-ISAR Radar Imaging (co-tutoring with P. Minvielle).

- September 2008 - February 2012, Aurélie Le Cain, Ph. D. in the CEA CESTA on the statistical modeling of electromagnetic fields (co-tutoring with B. Bercu and A. Bourgeade).
- Michele Pace (Post-doc Univ. Bruxelles), from sept 2008 to July 2011, on computer implementations of a new generation of interacting stochastic search algorithms for multiple targets tracking.
- Mathias Rousset (CR INRIA Lille), from 2004 to 2007, on continuous time particle interpretations of Feynman-Kac-Schroedinger models.
- Christophe Baehr (Météo France Engineer), from 2004 to 2008, on filtering atmospheric turbulent fluids.
- Ph.D. examination jury member : Christophe Avenel (INRIA Rennes), Olivier Bardou (INRIA de Sophia Antipolis), Agnès Lagnoux Renaudie (Univ. Paul Sabatier, Toulouse), Florent Malrieu (IRMAR, Univ. Rennes), Nadia Oudjane (Département OSIRIS, EDF), Anastasia Papavasiliou (Princeton Univ.), Vivien Rossi (IRISA de Rennes), Sylvain Rubenthaler (Université de Nice-Sophia Antipolis), Florian Simonatos (INRIA Rocquencourt), Ghislain Verdier (INRA, Montpellier), Denis Villemonais (Polytechnique Paris, CMAP).
- HDR examination jury member : Christian Musso (ONERA), Rama Cont (Polytechnique Paris, CMAP, CNRS), Fabien Campillo (IRISA de Rennes and INRIA Sophia Antipolis), Djalil Chafai (ENVT & LSP Toulouse), Manuel Davy (LAGIS-CNRS, Villeneuve d'Ascq), Madalina Deaconu (INRIA Nancy), Florent Malrieu (IRMAR, Univ. Rennes), Sylvain Rubenthaler (Lab. J.A. Dieudonné, Nice Sophia Antipolis Univ.).

• Visiting positions

- *May/June + Nov. 2017 & 2018* (2 × 3 months) : **UTS & UNSW, Sydney** (Prof. A.N. Bishop & S. Penev).
- *Aug.-Sept. 2018* (2 weeks) : **NUS, Singapore** (Prof. A. Jasra).
- *Feb. 2018* (1 month) : **FGV, Rio de Janeiro** (Prof. R. Targino).
- *Sept. 2017* (1 month - Simons CRM Professor) : **CRM, Montréal** (Prof. B. Rémillard).
- *Oct.-Nov. 2016* (1 month) : **Imperial College, London** (Prof. R. Cont & D. Crisan).
- *Feb/March 2016* (2 weeks) : **Oxford Univ, England** (Prof. A. Doucet).
- *Oct. 2013* (2 weeks) : **CSIRO, Perth** and (**Curtin Univ**).
(Dr L. Murray, and Prof. B. N. Vo)
- *August 2013* (1 month) : **CSIRO, Sydney** (Prof. P. Shevchenko).
- *May 2013* (2 weeks) : **Univ. of Medellín, Colombia** (Prof. F. Caro).
- *Winter 2012* (2 weeks) : **Univ. of New South Wales, Sydney** (Prof. G. Peters).
- *Summer 2011* (three weeks) : **China Academy of Sciences** (Prof. L. Wu).
- *Spring 2011* (one week) : **Cinvestav, Mexico** (Prof. O. Schutze).
- *Winter 2011* (two weeks) : **Luxembourg University** (Prof. P. Bouvry).

- *Spring 2010* (one week) : **Oxford University, England** (Prof. T. Lyons).
- *Winter 2009* (one week) : **Imperial College, London** (Prof. D. Crisan).
- *Autumn 2009* (two weeks) : **La Havana University**, Cuba.
- *Autumn 2009* (one week) : **Erlangen University** (Prof A. Greven).
- *Winter 2009* (two weeks) : **Tokyo University, Japan** (Prof. A. Doucet).
- *Winter 2008* (one week) : **Oxford University, England** (Prof. P. Tarrès).
- *Spring 2008* (two weeks) : **Wuhan University, China** (Prof. Wu Liming).
- *Summer 2008* (one week) : **SAMSI program, North Carolina University.** (Prof. A. Doucet).
- *Spring 2003* (six months): Department of Statistics, **Purdue University.** (Prof. F. Viens).
- *Summer 2002* (one month): Department of Electrical Engineering, **Melbourne University,** Australia (Professor Arnaud Doucet).
- *Spring 2002* (one week): Department of Mathematics, **Rolf Nevanlinna Institute** The 24th Finnish summer school in probability theory, Helsinki University, Finland (Professor D. Gasbara).
- *Autumn 2001* (two months): Department Operation Research and Financial Engineering, **Princeton University,** NJ. (Professor René Carmona).
- *Spring 1999* (one week): Department of Mathematical Sciences, **University of Alberta,** Edmonton (Professor M. Kouritzin).
- *Fall 1998* (one week) Laboratoire de Probabilités, **Université Paris 6,** Pierre et Marie Curie, Paris (Professor J. Jacod).
- *Winter 1997* (two weeks): Department of Mathematics, **Imperial College of Science,** Technology and Medicine, London (Professor T. J. Lyons).
- *Winter 1995* (one month): Institute for Problems in Mechanics, **Russian Academy of Sciences,** Moscow (Academician V. P. Maslov).

• **Workshop/Conference Organizations**

- Workshops on *particle methods in filtering and computer sciences*: Interactions industry and university. The intent of these workshops is to bring together the applied probability and the engineering community to present current results in the field and to strengthen the potential for communication and collaboration between researchers.
 - * Bordeaux, November 2011.
 - * Bordeaux, March, 2010.
 - * Paris, Centre Emile Borel, Institut Henri Poincaré, June 2001 (co-organized with R. Carmona and J. Jacod).
 - * Cambridge, Math. Depart., December 1999 (co-organized with D. Crisan and A. Doucet).
 - * Rennes, CNRS/IRISA, June 1998 (co-organized with F. LeGland).
 - * Toulouse, LSP/CNRS December and April 1997.

– National workshops

- * Sequential Monte Carlo methods and Efficient simulation in Finance. Polytechnique School, Paris, France, October 10th-12th, 2012.
- * Workshop on Stochastic Algorithms Analysis, Bordeaux, France, June 16-18 2009.
- * Workshop on multi-targets tracking, Bordeaux, France, May 14-15 2009.
- * Journées de Probabilités et Statistique de Bordeaux, with the CEA CESTA in october 2008.
- * Conference MAS Lille 2006, Session : "Méthodes particulières en physique et en ingénierie stochastique".

– International workshops

- * Workshop on Polymers models and related topics, Nice, Feb 2007.
- * International Workshop on Rare Event Simulation (co-organized with G. Rubino, B. Tuffin), Nice April 2007.
- * Satellite conference of the VI World Congress Bernoulli Society for Mathematical Statistics and Probability, Barcelone, July 2004.

– Co-organization of summer school and conferences :

- * Conference : EVOLVE 2013. Leiden, July (2013).
- * EVOLVE 2012, Mexico, July/August (2012).
- * Machine Learning Summer School (2011). Co-organization of the summer-school in Bordeaux.
- * Journees MAS et Journée en l'honneur de Jacques Neveu, August-Sept. 2010. Co-organization of the Conference in Bordeaux.

• Invited conferences

– (2018)

- * The Mathematics of Data Science . Rio de Janeiro, FGV Workshop Brasil (2018).
- * Advanced Monte Carlo methods . Summer course, FGV - School of Applied Maths, Rio de Janeiro June-March (2018).
- * Seminar IMPA . Rio de Janeiro, Feb 22th (2018).
- * XIV EBEB - Brazilian Meeting on Bayesian Statistics - Rio de Janeiro. Rio de Janeiro, March(2018).
- * Course Stochastic processes. UNSW, Sydney Australia, April-June (2018).
- * Seminar ENS Lyon. Lyon, ENS April 5th (2018).
- * IMS - Bayesian Computation for High-Dimensional Statistical Models Singapore, August-september (2018).
- * Special session MCQMC. Rennes, MCQMC Conf, July (2018).

– (2017)

- * Sixth Wellington Workshop in Probability and Mathematical Statistics. Victoria University of Wellington, New Zealand dec 4-6th (2017).

- * UNSW-Macquarie Univ. Workshop. Risk modeling, optimization and inference. UNSW Sydney, Australia, Dec 7 and 8 (2017).
 - * Seminar Centre Recherche en Mathématique. Montréal, Canada Oct. 19th (2017).
 - * Seminar HEC . Montreal, Canada Oct. 20th (2017).
 - * Seminar McGill University, Séminaire informel de théorie des systèmes (ISS) . Montréal, Canada Oct. 18th (2017).
 - * Seminar Sherbrooke University. Sherbrooke, Canada Sept 27 (2017).
 - * Sequential Monte Carlo workshop. Uppsala, Sweden, Aug 30- Sept 1 (2017).
 - * Interactions EDP/probabilités : équations cinétiques, temps long et propagation du chaos (slides) CIRM 18-22 april 2017
 - * Lectures Stochastic Processes and their Applications UNSW, Sydney, Australia April-May (2017).
 - * UNSW & Sydney Univ. SDG meeting: Friday June 2 (2017).
 - * Seminar, Data 61, CISRO, Sydney June 2017.
- **(2016)**
- * IMS World Congress Probability & Statistics, Toronto 2016 (Medallion lecture).
 - * CFM-Imperial Distinguished Lectures Imperial College London, October-November (2016).
 - * Uncertainty propagation, Particle methods and Stochastic algorithms for Big Data October 2015 - June 2016 | Paris (8h lectures).
 - * IRMAR Seminar IRMAR Rennes May (2016).
- **(2015)**
- * Maxwell Colloquium. University of Edinburgh, Scotland, February (2015).
 - * Mini-course on particle methods, University of Edinburgh, Scotland, February (2015)
 - * First UNSW Workshop on data sciences. University of New South Wales, Australia, March (2015).
 - * IASC-ARS 2015 Singapore (advisor board), National University Singapore, december 17-19 (2015).
 - * Vth Conference on Statistical Science, National University Singapore, April 8th (2015).
 - * Evolve 2015, Iasi, Romania, 18-24th June 8th (2015).
- **(2014)**
- * Risk: modeling, optimization, inference. UNSW - CSIRO Workshop UNSW, Sydney, december (2014).
 - * French-Vietnam, Summer School, Saigon Vietnam 12-22nd July (2014)
 - * STM and CSM 2014, Institute of Statistical Mathematics, Tokyo, Japan July 28th (2014).
 - * ABC in Sydney, Workshop July 3-4 (2014).
 - * BIG DATA, Workshop UNSW, july 1st (2014).

* IMS ASC Conference (Bayesian Statistics Session), July 7-10 (2014).

– (2013)

* SSAI AGR Seminar Series, UNSW, Sydney, 23rd August (2013).

* Australian National Univ., Maths Sciences Inst., Canberra 13rd August (2013)

* CSIRO Seminars, 5th & 14th August Sydney and Canberra (2013).

* 9th IMACS Seminar on Monte Carlo, Annecy-Le Vieux, July (2013).

* BIGMC Seminar, Paris May (2013).

* Ecological Modeling for Ecosystems Sustainability in the Context of Global Changes. The 19th biennial ISEM Conference. Meteo France, Toulouse, October (2013).

* Risques et modélisation Séminaire thématiques Laboratoire interdisciplinaire des énergies de demain, January 22th (2013).

* Genetic models and quasi-stationarity CNRS-CIRM Luminy, March 5-8 (2013).

* V Congreso internacional de formación y modelación en ciencias básicas Medellín, Colombia May (2013).

* Academy of Mathematics and Systems Science, Summer School Probability Beijing, China July (2013).

* ICCAIS 2013 Nah Trang, Vietnam, November (2013).

– (2012)

* ICREM Workshop : Monte Carlo Methods in the Physical and Biological Sciences. Brown University (Oct 29 - Nov 2, 2012).

* Conference on Data Assimilation Oxford University 24th-28th September (2012).

* Journée scientifique événements rares. ONERA Palaiseau, Nov 15th (2012).

* Lectures (10h), CNRS-INLN Sophia-Antipolis, December 10-14, 2012

* Particle methods in statistical inference and uncertainty propagations. CEA-CESTA Seminar November 13rd (2012).

* Ecole d'été ENS Lyon. Événements rares pour les systèmes dynamiques complexes, avec applications en physique, chimie, biophysique et turbulence. Centre Blaise Pascal ENS Lyon (11-15th June 2012).

* Particle methods in multiple object non linear filtering. Toulouse Mathematical Institute. Seminar November 21st (2012).

* Seminar LPMA, Pierre et Marie Curie and Denis Diderot Universities Paris (May, 6th 2012).

* 1-eres Rencontres R : Bordeaux University, June (2012).

* International Conference on Ensemble Methods in Geophysical Sciences, Météo-France, Toulouse (2012).

* MCQMC 2012, Sydney, Feb. 2012.

* 8-th World Congress in Probability and Statistics, *session : rare event simulation*. July 2012.

* Journées MAS 2012, SMAI, Clermont Ferrand (August-Sept 2012).

- * Sequential Monte Carlo methods from a methodological and theoretical perspective, Warwick from 19th-21st September, 2012.
 - * International Conference on Control, Automation and Information Sciences, ICCAIS 2012 (IEEE Conf ID No. 20340), Ho Chi Minh City, Vietnam, November 26-29, 2012.
- (2011)
- * **Colloque Horizon Mathématiques 2011**, Fondation Sciences Mathématiques de Paris, AREVA Paris, le 12-13 décembre 2011.
 - * INRIA Workshop on Statistical Learning, IHP Paris, Décembre (2011)
 - * CCE 2011. 8th International Conference on Electrical Engineering, Computing Science and Automatic Control. Merida, Mexico, Oct. 2011.
 - * Workshop on Computational Methods in Applied Sciences. Department of Statistics, Columbia University, New York, September 23-25, 2011.
 - * Workshop on Stochastic modeling and applications. (LPMA Paris and the Math Institute of the Chinese Academy of Sciences) Beijing, China, June 27-30, 2011.
 - * Sino-French Summer Institute. Beijing, China, June 13-25, 2011.
 - * European Geosciences Union General Assembly. Vienna, Austria, April 2011.
 - * Symposium of the ICIAM 2011. 7th International Congress on Industrial and Applied Mathematics. Vancouver, July 2011.
 - * Workshop Filtering, MCMC and ABC methods. Lille, France, March 2011.
 - * EVOLVE 2011. Conference on evolutionary stochastic processes, Luxembourg, May 2011.
 - * Workshop on Probability and Statistics. Mexico, CINVESTAV, Feb-March 2011.
- (2010)
- * ICM, International Congress of Mathematicians, Satellite Conference on Probability and Stochastic Processes at the Indian Statistical Institute, Bangalore, August 13-17, 2010.
 - * Workshop on SDE's for PK/PD modelling and simulation, Copenhagen University, Mai 2010.
 - * University of Cambridge, Statistics Laboratory seminar, Feb. 2010.
 - * Isaac Newton Institute for Mathematical Sciences, Workshop on filtering. June 2010
 - * Analysis and Probability in Nice, 3rd workshop, Nov. 2010.
 - * Workshop OPUS on rare events, Institut Henri Poincare, June 2010.
 - * Workshop on Evolutionary Algorithms - Challenges in Theory and Practice, Bordeaux, March, 2010.
 - * Workshop on numerical methods for computing American style options, Bordeaux, June 2010.
 - * Workshop MODECOL : modelling clonal plant growth : from ecological concepts to mathematics , Rennes June 2010.
- (2009)

- * Stochastic Analysis Seminar, Imperial College, London, dec. 2009.
- * Journée Scientifique ONERA, Analyse d'événements rares, dec. 2009.
- * Journées 2009 du GDR Statistique et Santé. Univ. Paris-Descartes October 2009.
- * Recent Advancements in the Theory and Practice of Credit Derivatives. Laboratoire J.A. Dieudonne CNRS et Université de Nice Sophia Antipolis, September 2009.
- * Seminar, Department of Mathematics, Bristol University. October 2009.
- * 7th ISAAC Congress Imperial College London, July 13-18, 2009.
- * Cinquième Rencontre de Statistiques Mathématiques Bordeaux Santander Toulouse-Valladolid, June 3-5 Le Teich, 2009.
- * Ecole Optimisation et Contrôle des Écoulements et des Transferts, Roscoff.
- * Workshop on Multi-target tracking, Bordeaux, France, May 14-15, 2009.

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- * Rencontres GdR MASCOT-NUM, CEA Cadarache (March 12-14 2008). (3h lectures, slides to download)
- * Computational Mathematics, Numerical methods in molecular simulation Bonn (April 7-11th 2008). (3h lectures, slides to download)
- * Opening workshop, Sequential Monte Carlo Methods, SAMSI, Duke Univ. (September 7-10th 2008). (2h lectures, slides to download)
- * 10th Machine Learning summer school, Ile de Ré (September 1-15th 2008). (6h lectures, slides to download)
- * Colloquium du MAP5, Université Paris Descartes, (March 28th, 2008). (slides to download)
- * Rencontres EDP/Probab à l'Institut Henri Poincaré, Paris (March 2008) (slides to download)
- * Conference on Monte Carlo methods Theory and applications. Brown University (April 25-26, 2008). (slides to download)
- * Workshop on Probability and Statistics, Wuhan University (May 30, 2008). (slides to download)
- * Workshop on Probability and Statistics, Capital Normal University, Beijing (June 2nd 2008). (slides to download)
- * Colloque : Modélisation pour les Ressources Naturelles, INRA Montpellier (June 18-20 2008). (slides to download)
- * Analysis and Probability in Nice, Nice (June 23-28 2008). (slides to download)
- * International Workshop: Credit Risk, Evry (June 25-27 2008). (slides to download)
- * SIAM Conference on Nonlinear Waves and Coherent Structures, session Mathematical modeling of optical communication systems, Università di Roma La Sapienza (July 21-24 2008).
- * Workshop on Numerics and Stochastics, Helsinki University (August 25-29 2008). (slides to download)

- * **Stochastic Analysis Seminar**, Oxford University (December 1st, 2008). (slides to download)
 - * **Stochastic Analysis Seminar**, Warwick University (December 3rd, 2008). (slides to download)
 - * **Seminar of the Statistics Department**, Oxford University (December 4th, 2008). (slides to download)
 - * **Seminaire de Statistique et Sante Publique de l'IFR 99**, Bordeaux 2, (December 9th 2008).
 - * **Workshop AST&Risk project**, Approches Spatio Temporelles pour la modélisation du Risque, Lyon Univ., (December 11th 2008).
 - * **Seminaire UMPA**, ENS Lyon, (December 12th 2008).
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- * **Workshop on Stochastic Processes and Algorithms** (September 3-7) 2007, Hausdorff Research Institute
 - * **Congres National de Mathematiques Appliquees et Industrielles**, SMAI Congress, (June 4-8) 2007, Praz sur Arly
 - * **Bioinformatics, Genetics and Stochastic Computation: Bridging the Gap, Banff** (July 1-6) 2007
 - * **Workshop : New directions in Monte Carlo Methods**, Fleurance (June 25-29) 2007.
 - * **Polymer Models and Related Topics (February 2007)** ANR Project : Probabilites et Interactions, Chaire d'Excellence Persi Diaconis.
 - * **Rencontres Nicoise de Mecanique des Fluides**, Lab. Cassiopee, Observatoire de Nice (January 2007).
- (2006)
- * **Workshop Recent Advances in Monte-Carlo Based Inference**, Isaac Newton Institute, Cambridge, November 2006.
 - * **Journees MASS de la SMAI Lille**, September 2006. (Session "Méthodes particulières appliquées la physique et l'ingénierie").
 - * **Symposium on stochastic algorithms and Markov processes**, DMV meeting Bonn, September 2006
- (2005)
- * **Colloque à l'Assemblée generale du departement MIA (Mathematique et Informatique Appliquees)**, INRA . Agde, October 2005
 - * **Colloque Statistique des processus, Applications au traitement du signal et de l'image**. Angers, September 2005.
 - * **Journees de Statistique et applications en biologie**. Rennes, September 2005.
 - * **Journées de statistique sur les modles données manquantes**, Université Marne la Vallée, February 2005.
- (2004)

- * **Segundo Congreso Latinoamericano de Matemáticos**, Cancun, Mexique, June 2004.
- * **VI World Congress Bernoulli Society for Mathematical Statistics and Probability**, Barcelona, July 2004.
- * **XXXVI Journées de Statistiques**, Montpellier, May 2004.
- (2003)
 - * **Stochastic Analysis with Applications** Meeting of the American Mathematical Society, Bloomington, USA, April 2003
- (2002)
 - * **Journée de probabilités CRM, Université de Montréal**, Montréal, Canada, November 2002.
 - * **Stochastic Processes and their Applications**, Melbourne, Australie, July 2002 (invited plenary session).
 - * **Filtering 2002**, Jasper, Edmonton, Canada, July 2002.
- (2001)
 - * **Congreso Latino Americano de Probabilidades Clapem VIII**, La Havana, Cuba, November 2001.
 - * **International Statistical Institute**, 53^{ème} session Seoul, August 2001.
 - * **Conference on Particle systems and filtering**, (co-organised with René Carmona and Jean Jacod) Institut Henri Poincaré, Paris, June 2001.
 - * **Workshop on discrete and continuous Stochastic Evolutions** (organisé par David Elworthy and Roger Tribe), Warwick Angleterre, March 2001.
- (2000)
 - * **International Society for Bayesian Analysis, 6th World Meeting ISBA**, Hersonissos-Heraklion, Crete, June 2000.
 - * **4th International Conference on Operation Research, Optimization, Probability and Statistics**, Mathematical Economics and Algorithms, La Havana, Cuba, March 2000.
- (1999)
 - * **Workshop on Practical and Theoretical Aspects of Particle Filters.**, (co-organisée avec Dan Crisan and Arnaud Doucet) Cambridge Angleterre, December 1999.
 - * **The Second EvoNet Summer School on Theoretical Aspects of Evolutionary Computing**, Anvers, Belgique, September 1999.
 - * **Colloquium Department of Mathematical Sciences University of Alberta**, Edmonton Canada, April 1999.
 - * **Workshop on Numerical Methods and Stochastics**, Fields Institute, Toronto canada, April 1999.
 - * **Workshop on Non Linear Filtering**, Uniqueness and Approximation Techniques for Solutions of Filtering Equations. Dipartimento di ingegneria elettrica, universita' degli studi dell'aquila, L'Aquila - Italie, January 1999.

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- * **International Conference on Stochastic Analysis**, Institut Henri Poincaré, Paris June 1998.
- * **International Conference dedicated to the 90th Anniversary of L.S. Pontryagin**, Moscow Russie, September 1998.

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- * **Symposium on Stochastic Control and Nonlinear Filtering**, (organisée par B. Rozovsky), University of Southern California, Los Angeles USA, December 1997.
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Publication List

Research monographs

- [1] A.N. Bishop, P. Del Moral, A. Niclas. An introduction to Wishart matrix moments (130p.). *Foundations and Trends in Machine Learning*, vol. 11, no. 2, pp 97–218 (2018).
- [2] P. Del Moral. Mean field simulation for Monte Carlo integration (626p.) Chapman & Hall. *Monographs on Statistics & Applied Probability* (June 2013).
- [3] P. Del Moral, P. Hu, L. Wu On the concentration properties of Interacting particle processes HAL-INRIA RR-7677 (2011). *Foundations and Trends in Machine Learning*, 10.1561/9781601985132, Vol. 3, No. 3 - 4, 225-389 (2012).
- [4] P. Del Moral. Feynman-Kac formulae. Genealogical and interacting particle systems with applications. *Probability and its Applications* (New York). (573p.) Springer-Verlag, New York (2004).
- [5] P. Del Moral and L. Miclo. Branching and interacting particle systems approximations of Feynman-Kac formulae with applications to non-linear filtering. In *Séminaire de Probabilités, XXXIV*, volume 1729 of *Lecture Notes in Math.*, pages 1–145. Springer, Berlin (2000).

Pedagogical books

- [6] P. Del Moral, S. Penev. *Stochastic Processes: From Applications to Theory*. Chapman & Hall/CRC Press, (866p.) (2016).
- [7] P. Del Moral, C. Vergé. *Modèles et Méthodes Stochastiques. Une introduction avec applications*. Springer Series : Maths et Applications XXIV, SMAI, vol 75 [487p.] (2014).
- [8] P. Del Moral, B. Rémillard, and S. Rubenthaler. *Intégration, Probabilités et Processus Stochastiques*. Ellipses, Paris (2006).
- [9] N. Bartoli and P. Del Moral. *Simulation et algorithmes stochastiques : Une introduction avec applications*. Cépadués, Toulouse (2001).

Direction of work

- [10] Evolve - A Bridge between Probability, Set Oriented Numerics, and Evolutionary Computation III. Edts. O. Schuetze, C. A. Coello Coello, A. Tantar, E. Tantar, P. Bouvry, P. Del Moral, P. Legrand International Conference held at Cinvestav, Mexico, August 2012. Studies in Computational Intelligence, vol. 500 (2014).
- [11] Evolve - A Bridge between Probability, Set Oriented Numerics, and Evolutionary Computation IV. Edts. M. Emmerich, A. Deutz, O. Schuetze, T. Back, E. Tantar, A. Tantar, P. Del Moral, P. Legrand, P. Bouvry, C. A. Coello International Conference held at Leiden University, July 10-13 2013. Advances in Intelligent Systems and Computing, vol. 227 (2013).
- [12] Evolve : A bridge between Probability, Set Oriented Numerics and Evolutionary Computation I. Edts : E. Tantar, A. Tantar, P. Del Moral, C. A. Coello Coello, P. Legrand, O. Schutze, P. Bouvry. Springer Series: Studies in Computational Intelligence, Vol. 447, No. XII, 412 p. Springer (2013).
- [13] R. Carmona, P. Del Moral, P. Hu, N. Oudjane **Numerical Methods in Finance**. Springer New York, Series: Proceeding in Mathematics, Series: Springer Proceedings in Mathematics, Vol. 12, XVII, 471 p. (2012).
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- [15] J. Houssineau, P. Del Moral. Particle association measures and multiple target tracking in *Springer Briefs Spatial Temporal Modeling Series*, to appear (2016)
- [16] C. Vergé, J. Morio, P. Del Moral, J.C. Dolado Pérez. Probabilistic safety analysis of the collision between a space debris and a satellite with an island particle algorithm. Space Engineering: Modeling and Optimization with Case Studies, G. Fasano and J.D. Pinter (Eds), Springer (2016).
- [17] P. Del Moral, E. Tantar, A. Tantar. **On the foundations and the applications of evolutionary computing [90p.]** in Evolve - A bridge between Probability, Set Oriented Numerics and Evolutionary Computation I. Studies in Computational Intelligence, Vol. 447, No. XII, 412 p. Springer (2013).
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- [20] P. Del Moral, and A. Doucet Particle Methods: An introduction with applications HAL-INRIA RR-6991 [48p], July 2009. *2008 Machine Learning Summer School, Springer LNCS/LNAI Tutorial book no. 6368* (2011).
- [21] P. Del Moral, and Fr. Patras. Interacting path systems for credit portfolios risk analysis HAL-INRIA RR-7196 [9p], (Feb. 2010). To appear in : *Recent Advancements in the Theory and Practice of Credit Derivatives*. D. Brigo, T. Bielecki, F. Patras Eds. Bloomberg Press (2010).
- [22] P. Del Moral, F. Patras, and S. Rubenthaler. A mean field theory of nonlinear filtering. HAL-INRIA, Technical Report RR 6437. In D. Crisan and B. Rosovsky, editors, *Oxford Handbook of Nonlinear Filtering*, pages 1–39. Oxford University Press (2010).
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- [37] Pierre Del Moral. Nonlinear filtering: interacting particle resolution. *C. R. Acad. Sci. Paris Sér. I Math.*, 325(6):653–658 (1997).
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- [39] A.N. Bishop, P. Del Moral. K. Kamatani, and B. Rémillard. On one-dimensional Riccati diffusions. *Annals of Applied Probability*, to appear (2019).
- [40] A.N. Bishop, P. Del Moral. On the Robustness of Riccati Flows to Complete Model Misspecification. *Journal of the Franklin Institute*, to appear (2019).
- [41] A.N. Bishop, P. Del Moral, S. D. Pathiraja Perturbations and Projections of Kalman-Bucy Semigroups Motivated by Methods in Data Assimilation. *Stochastic Processes and their Application*, vol. 128, no. 9, pp. 2857–2904 (2018).

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