

Nicolas Chopin

Professor of Statistics

ENSAE
3, Avenue Pierre Larousse
92245 Malakoff FRANCE
☎ +33 1 41 17 65 22
✉ nicolas.chopin@ensae.fr
🌐 sites.google.com/site/nicolaschopinstatistician/



Education

- 2010 **Habilitation à Diriger des recherches**, *Université Paris Dauphine*.
(*French habilitation to supervise Ph.D. students, Viva 1st Dec. 2010*)
- 1999–2003 **Ph.D. thesis in Statistics**, *Université Paris VI*, supervisor: Pr C.P. Robert.
Sequential Monte Carlo methods and their applications to Bayesian inference.
- 1997–1999 **Msc. in Economics and Statistics**, *ENSAE*.
- 1994–1997 **Msc. in Engineering**, *Ecole Polytechnique*.

Experience

- Sept. 2006–
to date **Professor of Statistics**, *ENSAE*, Malakoff, FRANCE.
- 2003–2006 **Lecturer in Statistics**, *Bristol University*, UK.
- 2002–2003 **Statistical methodologist**, *UMS-INSEE*, Paris, FRANCE.
- 1999–2002 **Junior Lecturer in Statistics**, *ENSAE*, Malakoff, France.

Research Interests

- Monte Carlo methods in Statistics, with emphasis on Sequential Monte Carlo (particle filtering): theory (convergence properties, etc), methodology, and applications (e.g. seismology, Economics, Finance, etc.). Interests in Monte Carlo also include Importance sampling, Markov chain Monte Carlo (MCMC), the Cross-Entropy method (CE), etc.
- Bayesian (parametric and nonparametric) Statistics, Bayesian computation (variational approaches), Bayesian machine learning, Bayesian Econometrics (Stochastic volatility, discrete choice models, Markov switching models).

Awards, distinctions and grants

- 2002 Leonard J. Savage Award for an outstanding doctoral dissertation in Bayesian econometrics and statistics ('Theory and Methods' section), International Society for Bayesian Analysis.
- EPSRC first grant EP/C015886/1, Oct 2005 - Oct 2008, £74.000 ; 'Novel Applications of Sequential Monte Carlo'. (Grant awarded on a competitive basis.)
- CREST coordinator of 'SP Bayes' (Statistique Bayésienne semi-paramétrique) ANR Project led by J. Rousseau (2008-10)
- ANR grant B3DCMB, 2017-2021, 145 KE; (Big Bang à partir de Big Data (du fond diffus cosmologique))

Teaching

- **ENSAE**: “Statistique 1” (2nd year, 20 hrs), “Monte Carlo and simulation” (2nd year, 16 hrs), “State-space models and sequential Monte Carlo (3rd year, 18 hrs)
- **Université Paris Dauphine**: “Hidden-Markov models and Particle methods” (M2, 18 hours, 2007 to 2015); “Time Series” (M1, 20 hours, 2008-09)
- **HEC Paris**: “Statistique” (L3, 50 hrs, 2011-2017)
- **HEC Lausanne**: “Introduction to Time series” (Msc, 28 hours, 2009-2014)
- **Bristol University**: Bayesian Analysis (18 hours, lvl 3, 2003-06), Introduction to Statistics (18 hours, lvl 2, 2003-06)
- **Ecole Polytechnique**: “chargé de cours incomplet” (60 hours, 2007-08)
- **Università dell’Insubria**: Bayesian Analysis (18 hours, 2005)

Academic Responsibilities

- **Associate Editor**: Biometrika (2018 to date); J. Roy. Stat. Soc. B (2012 to date); Stats & Comp. (2013 to date); Stat. Methods and Appl. (2012-2015); member (2013-14) and secretary (2015-16) of the research section of the RSS.
- **Paper and book Refereeing**: More than 100 referee reports for Editors such as Springer and journals such as Annals of Stat, Bernoulli, J. Royal Stat. Soc. B, Biometrika, etc.
- **Membership**: American Statistical Association (ASA), Inst. of Mathematical Statistics (IMS), Royal Statistical Society (RSS), International Society for Bayesian Analysis (ISBA).
- **Ph.D. supervision**: Lionel Riou-Durand (CREST, 2016-19), Alexander Buchholz (CREST, 2015-18), Charles Findling (ENS, 2015-18, co-supervision), Vincent Cottet (CREST, 2014-17), Mathieu Gerber (Lausanne, 2012-15, co-supervision), James Ridgway (CREST, 2012-15), Pierre Jacob (CREST, 2009-12, co-supervision), Christian Schäfer (CREST, 2009-2012), Giusi Moffa (Bristol, 2005-06), Elisa Varini (Bristol, 2004-05, co-supervision)
- **Ph.D. examiner**: Jeremy Heng (Oxford, 2016), Van Bui (Nice, 2016), Yohan Petetin (Télécom Sud-Paris, 2014), Paul Bui Quang (Rennes, 2013), Sinan Yildirim (Cambridge, 2012), Salima El Kolei (Nice, 2012), Mohamed Sedki (Montpellier, 2012), Anthony Lee (Oxford, 2011), Meili Baragatti (Marseille, 2011), Hugo Hammer (Trondheim, 2008), Zhen Liu (Lancaster, 2008), Adam Johansen (Cambridge, 2006), David Hastie (Bristol, 2004).
- **Talks**: More than 30 invited talks given in seminars and conferences.
- **Conference organisation**: Master class in Bayesian Statistics (CIRM, Oct 2018), SMC 2015 (Paris, 26-28 Aug), NeuroStats 2014 (Warwick, 3-5 Sept)
- **Visits**: Oxford (Apr 2017), Pompeu Fabra, Barcelone (Mai 2013), INRIA Bordeaux (Jul. 2011), Cambridge (Oct. 2010, Jan. 2008, Apr. 2007), Lisboa (Nov. 2010), Insubria (Nov. 2005), Trondheim (Mars 2013, Sept. 2005), Bank of Canada (Sept. 2004).
- **Admin**: Organiser of the Statistics seminar at Bristol University (2003-06), of the BiP reading group (ENSAE, 2008 to date), co-organiser of the Paris seminar on Monte Carlo methods (BigMC, 2008-2014).

Publications

- [1] A. Buchholz and N. Chopin. Improving approximate Bayesian computation via quasi Monte Carlo. **ArXiv preprint 1710.01057** (Oct. 2017).
- [2] M. Gerber, N. Chopin, and N. Whiteley. Negative association, ordering and convergence of resampling methods. **ArXiv preprint 1707.01845** (July 2017).
- [3] N. Chopin and M. Gerber. Sequential quasi-Monte Carlo: Introduction for Non-Experts, Dimension Reduction, Application to Partly Observed Diffusion Processes. **ArXiv preprint 1706.05305** (June 2017). To be published in the proceedings of MCQMC 2016.

- [4] S. Vasishth, N. Chopin, R. Ryder, and B. Nicenboim. Modelling dependency completion in sentence comprehension as a Bayesian hierarchical mixture process: A case study involving Chinese relative clauses. **ArXiv preprint 1702.00564** (Feb. 2017). accepted in CogSci 2017.
- [5] S. Vasishth, B. Nicenboim, N. Chopin, and R. Ryder. Bayesian Hierarchical Finite Mixture Models of Reading Times: A Case Study. **PsyArXiv** (July 2017).
- [6] D. Alvares, C. Armero, A. Forte, and N. Chopin. Sequential Monte Carlo Methods in Random Intercept Models for Longitudinal Data. **Bayesian Statistics in Action: BAYSM 2016, Florence, Italy, June 19-21**. Ed. by R. Argiento, E. Lanzarone, I. Antoniano Villalobos, and A. Mattei. Cham: Springer International Publishing, 2017, 3–9.
- [7] M. Gerber and N. Chopin. Convergence of sequential quasi-Monte Carlo smoothing algorithms. **Bernoulli** 23.4B (2017), 2951–2987.
- [8] C. J. Oates, M. Girolami, and N. Chopin. Control functionals for Monte Carlo integration. **J. R. Stat. Soc. Ser. B. Stat. Methodol.** 79.3 (2017), 695–718.
- [9] C. Schretter, Z. He, M. Gerber, N. Chopin, and H. Niederreiter. Van der Corput and golden ratio sequences along the Hilbert space-filling curve. **Monte Carlo and quasi-Monte Carlo methods**. Vol. 163. Springer Proc. Math. Stat. Springer, [Cham], 2016, 531–544.
- [10] P. Alquier, J. Ridgway, and N. Chopin. On the properties of variational approximations of Gibbs posteriors. **J. Mach. Learn. Res.** 17 (2016), Paper No. 239, 41.
- [11] S. Barthelmé, N. Chopin, and V. Cottet. Divide and conquer in ABC: Expectation-Propagation algorithms for likelihood-free inference. **ArXiv preprint 1512.00205** (Dec. 2015). To appear in Handbook of Approximate Bayesian Computation in May 2018.
- [12] N. Chopin and M. Gerber. Application of sequential Quasi-Monte Carlo to autonomous positioning. **Signal Processing Conference (EUSIPCO), 2015 23rd European**. Aug. 2015, 489–493.
- [13] N. Chopin, J. Ridgway, M. Gerber, and O. Papaspiliopoulos. Towards automatic calibration of the number of state particles within the SMC² algorithm. **ArXiv preprint 1506.00570** (June 2015).
- [14] N. Chopin and J. Ridgway. Leave Pima Indians alone: binary regression as a benchmark for Bayesian computation. **Statist. Sci.** 32.1 (2017), 64–87.
- [15] M. Gerber and N. Chopin. Sequential quasi Monte Carlo. **J. R. Stat. Soc. Ser. B. Stat. Methodol.** 77.3 (2015), 509–579.
- [16] S. Barthelmé and N. Chopin. The Poisson transform for unnormalised statistical models. **Stat. Comput.** 25.4 (2015), 767–780.
- [17] N. Chopin and S. S. Singh. On particle Gibbs sampling. **Bernoulli** 21.3 (2015), 1855–1883.
- [18] N. Kantas, A. Doucet, S. S. Singh, J. Maciejowski, and N. Chopin. On particle methods for parameter estimation in state-space models. **Statist. Sci.** 30.3 (2015), 328–351.
- [19] A. Gelman et al. Expectation propagation as a way of life. **ArXiv e-prints** (Dec. 2014).
- [20] J. Ridgway, P. Alquier, N. Chopin, and F. Liang. PAC-Bayesian AUC classification and scoring. **Advances in Neural Information Processing Systems 27**. Ed. by Z. Ghahramani, M. Welling, C. Cortes, N. Lawrence, and K. Weinberger. Curran Associates, Inc., 2014, 658–666.
- [21] P. Alquier, V. Cottet, N. Chopin, and J. Rousseau. Bayesian matrix completion: prior specification and consistency. **ArXiv preprint 1406.1440** (2014).
- [22] S. Barthelmé and N. Chopin. Expectation propagation for likelihood-free inference. **J. Amer. Statist. Assoc.** 109.505 (2014), 315–333.
- [23] C. Andrieu, N. Chopin, A. Doucet, and S. Rubenthaler. Perfect simulation for the Feynman-Kac law on the path space. **ArXiv preprint 1210.0376** (Mar. 2013).
- [24] N. Chopin, P. E. Jacob, and O. Papaspiliopoulos. SMC²: an efficient algorithm for sequential analysis of state space models. **J. R. Stat. Soc. Ser. B. Stat. Methodol.** 75.3 (2013), 397–426.

- [25] N. Chopin, J. Rousseau, and B. Liseo. Computational aspects of Bayesian spectral density estimation. **J. Comput. Graph. Statist.** 22.3 (2013), 533–557.
- [26] S. S. Singh, N. Chopin, and N. Whiteley. Bayesian learning of noisy Markov decision processes. **ACM Trans. Model. Comput. Simul.** 23.1 (2013), Art. 4, 25.
- [27] C. Schäfer and N. Chopin. Sequential Monte Carlo on large binary sampling spaces. **Stat. Comput.** 23.2 (2013), 163–184.
- [28] N. Chopin, A. Gelman, K. L. Mengersen, and C. P. Robert. In praise of the referee. **ArXiv preprint 1205.4304** (May 2012).
- [29] C. Andrieu et al. Some discussions of D. Fearnhead and D. Prangle's Read Paper "Constructing summary statistics for approximate Bayesian computation: semi-automatic approximate Bayesian computation". **ArXiv preprint 1201.1314** (Jan. 2012).
- [30] N. Chopin and C. Robert. Discussion of "Catching up faster by switching sooner: a predictive approach to adaptive estimation with an application to the AIC–BIC dilemma" by Erven, Tim van and Grünwald, Peter and de Rooij, Steven. **Journal of the Royal Statistical Society (series B)** 74.3 (2012), 361–417.
- [31] J. Rousseau, N. Chopin, and B. Liseo. Bayesian nonparametric estimation of the spectral density of a long or intermediate memory Gaussian process. **Ann. Statist.** 40.2 (2012), 964–995.
- [32] N. Chopin, T. Lelièvre, and G. Stoltz. Free energy methods for Bayesian inference: efficient exploration of univariate Gaussian mixture posteriors. **Stat. Comput.** 22.4 (22 2012), 897–916.
- [33] S. Barthelmé et al. Discussions on "Riemann manifold Langevin and Hamiltonian Monte Carlo methods" by M. Girolami and B. Caldherhead. **Journal of the Royal Statistical Society (series B)** 73.2 (2011), 123–214.
- [34] N. Chopin and C. Robert. Comments on "Using TPA for Bayesian inference" by Huber, M. and Schott, S. **Bayesian Statistics 9**. Ed. by J. M. Bernardo et al. Oxford University Press, 2011, 257–282.
- [35] N. Chopin and O. Papaspiliopoulos. Comments on "Bayesian variable selection for random intercept modeling of Gaussian and non-Gaussian Data" by Frühwirth-Schnatter, S. and Wagner, H. **Bayesian Statistics 9**. Ed. by J. M. Bernardo et al. Oxford University Press, 2011, 165–200.
- [36] N. Chopin. Fast simulation of truncated Gaussian distributions. **Stat. Comput.** 21.2 (2011), 275–288.
- [37] N. Chopin, P. Del Moral, and S. Rubenthaler. Stability of Feynman-Kac formulae with path-dependent potentials. **Stochastic Process. Appl.** 121.1 (2011), 38–60.
- [38] N. Chopin et al. On Particle Learning; comments on "Particle learning for sequential Bayesian computation" by Lopes, Carvalho, Johannes, and Polson. **Bayesian Statistics 9**. Ed. by J. M. Bernardo et al. Oxford University Press, 2011, 317–360.
- [39] N. Chopin and P. Jacob. Free energy sequential Monte Carlo, application to mixture modelling. **Bayesian statistics 9**. Ed. by J. M. Bernardo et al. With discussions by Peter J. Green and Benjamin M. Taylor. Oxford Univ. Press, Oxford, 2011, 91–118.
- [40] S. Barthelmé and N. Chopin. ABC-EP: Expectation Propagation for likelihood-free Bayesian computation. **Proceedings of the 28th International Conference on Machine Learning (ICML-11)**. Ed. by L. Getoor and T. Scheffer. ICML '11. Bellevue, Washington, USA: ACM, June 2011, 289–296.
- [41] C. P. Robert, N. Chopin, and J. Rousseau. Rejoinder: Harold Jeffreys's Theory of Probability Revisited. **ArXiv preprint 0909.1008** (Jan. 2010).
- [42] N. Chopin and C. P. Robert. Properties of nested sampling. **Biometrika** 97.3 (2010), 741–755.
- [43] P. Jacob, N. Chopin, C. P. Robert, and H. Rue. Comments on "Particle Markov chain Monte Carlo" by C. Andrieu, A. Doucet, and R. Hollenstein. **ArXiv preprint 0911.0985** (Nov. 2009).
- [44] H. Rue, S. Martino, and N. Chopin. Approximate Bayesian inference for latent Gaussian models by using integrated nested Laplace approximations. **J. R. Stat. Soc. Ser. B Stat. Methodol.** 71.2 (2009), 319–392.

- [45] C. P. Robert, N. Chopin, and J. Rousseau. Harold Jeffreys's theory of probability revisited. **Statist. Sci.** 24.2 (2009), 141–172.
- [46] N. Chopin. Jim Albert: Bayesian computation with R. **Statistics and Computing** 19 (2009), 111–112.
- [47] N. Chopin. On the equivalence between standard and sequentially ordered hidden Markov models. **Statist. Probab. Lett.** 78.14 (2008), 2171–2174.
- [48] N. Chopin and C. Robert. Comment on 'Nested Sampling' by Skilling. **Bayesian Statistics 8**. Ed. by O. U. P. Bernardo J. M. ET AL. (EDS). 2007, 491–524.
- [49] N. Chopin and C. Robert. Comment on 'Estimating the integrated likelihood via posterior simulation using the harmonic mean equality', by Raftery et al. **Bayesian Statistics 8**. Ed. by J. M. e. a. (Bernardo. Oxford University Press, 2007, 371–416.
- [50] N. Chopin and P. Fearnhead. Comment on 'Objective Bayesian analysis of multiple changepoints for linear models', by Giron et al. **Bayesian Statistics 8**. Ed. by O. U. P. Bernardo J. M. ET AL. (EDS). 2007, 227–252.
- [51] N. Chopin. Comment on 'Sequential Monte Carlo for Bayesian computation' by Del Moral et al. **Bayesian Statistics 8**. Ed. by O. U. P. Bernardo J. M. ET AL. (EDS). 2007, 115–148.
- [52] H. Rue, S. Martino, and N. Chopin. Discussion on 'Modern Statistics for Spatial Point Processes' by Mller and Waagepetersen. **Scandinavian Journal of Statistics** 34.4 (2007), 685–711.
- [53] N. Chopin. Dynamic detection of change points in long time series. **Ann. Inst. Statist. Math.** 59.2 (2007), 349–366.
- [54] N. Chopin. Inference and model choice for sequentially ordered hidden Markov models. **J. R. Stat. Soc. Ser. B Stat. Methodol.** 69.2 (2007), 269–284.
- [55] N. Chopin and E. Varini. Particle filtering for continuous-time hidden Markov models. **Conference Oxford sur les méthodes de Monte Carlo séquentielles**. Vol. 19. ESAIM Proc. EDP Sci., Les Ulis, 2007, 12–17.
- [56] N. Chopin. Discussion of 'Exact and efficient likelihood-based estimation for discretely observed diffusion processes' by Beskos et al. **Journal of the Royal Statistical Society (series B)** 68 (2006). Ed. by O. U. P. Bernardo J. M. ET AL. (EDS), 333–382.
- [57] N. Chopin. Central limit theorem for sequential Monte Carlo methods and its application to Bayesian inference. **Ann. Statist.** 32.6 (2004), 2385–2411.
- [58] N. Chopin and F. Pelgrin. Bayesian inference and state number determination for hidden Markov models: an application to the information content of the yield curve about inflation. **J. Econometrics** 123.2 (2004), 327–344.
- [59] N. Chopin. Comment on 'lid sampling with self-avoiding particle filters: the pinball sampler by Mengersen and Robert. **Bayesian Statistics 7**. Ed. by O. U. P. Bernardo J. M. ET AL. (EDS). 2003, 277–292.
- [60] N. Chopin. A sequential particle filter method for static models. **Biometrika** 89.3 (2002), 539–551.