Curriculum Vitae

Christian Bayer

Personal Information

- Date of birth: November 23, 1979

- Place of birth: Linz, Austria

- Private address: Glasower Straße 41, 12051 Berlin, Germany

- Institutional address: Weierstrass Institute, Mohrenstr. 39, 10117 Berlin, Germany

- Nationality: Austria

- Marital status: married

- Telephone number (office): +49 30 20372 579

- Telephone number (private): +49 176 9831 8557

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Research Interests

- Numerical methods for stochastic differential equations: cubature approach of T. Lyons and N. Victoir, adaptive Euler-Maruyama schemes for reflected diffusions, multi-level Monte Carlo.

- Rough paths and rough partial differential equations.

- Numerics for partiald differential equations with random coefficients.

- Mathematical finance, in particular interest rate theory and computational finance, asymptotics of option prices and greeks, heat kernel expansions, consistent modeling of prices and volatilities.

- Symplectic methods in molecular dynamics.

- EM algorithm in statistics.

Publications and Preprints

Stochastic Numerics:

- Christian Bayer, Josef Teichmann: *The proof of Tchakaloff's Theorem*, Proceedings of the American Mathematical Society 134(10): 3035–3040, 2006.

- Christian Bayer, Josef Teichmann: *Cubature on Wiener space in infinite dimension*, Proceedings of the Royal Society London, Ser. A, 464(2097):2493–2516, 2008.

- Christian Bayer, Josef Teichmann, Richard Warnung: *An implementation of hypo-elliptic simulated annealing*, working paper.

- Christian Bayer, Anders Szepessy, Raul Tempone: *Adaptive weak approximation of reflected diffusions*, Monte Carlo Methods and Applications 16:1–67, 2010.

- Christian Bayer, Peter K. Friz: *Cubature on Wiener space: Pathwise convergence*, Applied Mathematics and Optimization 67(2):261–278, 2013.

- Christian Bayer, John Schoenmakers: *Simulation of conditional diffusions via forward-reverse stochastic representations*, Annals of Applied Probability 24(5), 1994–2032, 2014.

- Christian Bayer, Peter Friz, Sebastian Riedel, John Schoenmakers: *From rough-path estimates to multi-level Monte Carlo*, preprint.

- Christian Bayer, Håkon Hoel, Erik von Schwerin, Raul Tempone: *On non-asymptotic optimal stopping criteria for Monte Carlo simulation*, SISC, 36(2), A869–A885, 2014.

- Christian Bayer, Alvaro Moraes, Raul Tempone, Pedro Vilanova: *An Efficient Forward-Reverse Expectation-Maximization Algorithm for Statistical Inference in Stochastic Reaction Networks*, to appear in Stochastic Analysis and Applications, 2015.

- Christian Bayer, Hilmar Mai, John Schoenmakers: *Forward-reverse EM algorithm for Markov chains*, preprint, 2013.

Finance:

- Christian Bayer, Peter K. Friz, Ronnie Loeffen: *Semi-closed form cubature and application to financial diffusion models*, Quantitative Finance 13(5), 769–782, 2013.

- Christian Bayer, Bezirgen Veliyev: *Utility Maximization in a Binomial Model with Transaction Costs: A Duality Approach Based on the shadow price process*, IJTAF 17(4), 1450022, 2014.

- Christian Bayer, Peter Laurence: *Asymptotics beats Monte Carlo: The case of correlated CEV baskets*, Communications on Pure and Applied Mathematics, 67(10):1618–1657, 2014.

- Christian Bayer, Jim Gatheral, Morten Karlsmark: *Fast Ninomiya-Victoir calibration of the Double-Mean-Reverting model*, Quantitative Finance, 13(11):1813–1829, 2013.

- Christian Bayer, Peter Laurence: *Asymptotics for at the money local vol basket options*, appeared in: Large Deviations and Asymptotic Methods in Finance, Springer, 2015.

- Christian Bayer, Peter Friz, Peter Laurence: *On the probability density function of baskets*, appeared in: Large Deviations and Asymptotic Methods in Finance, Springer, 2015.

- Christian Bayer, Ulrich Horst, Jinniao Qiu: *A functional limit theorem for limit order books*, preprint, 2014.

- Christian Bayer, Peter Friz, Jim Gatheral: *Pricing under rough volatility*, Quantitative Finance, appeared online, 2015.

- Christian Bayer, John Schoenmakers: *Option pricing in affine generalized Merton models*, preprint, 2015.

Applications in Physics and Economics:

- Christian Bayer, Klaus Wälde: *Optimal saving in frictional labour markets*, preprint.

- Christian Bayer, Klaus Wälde: *The Dynamics of Distributions in Continuous-Time Stochastic Models*, preprint.

- Christian Bayer, Håkon Hoel, Ashraful Kadir, Petr Plechac, Mattias Sandberg, Anders Szepessy: *Computational error estimates for Born-Oppenheimer molecular dynamics with nearly crossing potential surfaces*, Appl. Math. Res. Express, 2015.

Academic career

- Since April 2012, Research Scientist at the Weierstrass Institute of Applied Analysis and Stochastics, Berlin, Germany.

- April 2015 – September 2015, Visiting Professor at Humboldt-Universität zu Berlin. (At leave from Weierstrass Institute)

- August 2010 – February 2012, Assistant Professor at the Institute of Mathematics of the University of Vienna, Austria.

- October 2009 – August 2010, Post-Doc at the Institute of Mathematics of the TU Berlin, Germany.

- October 2008 – September 2009, Post-Doc at the Institute of Mathematics, Royal Institute of Technology, Stockholm, Sweden.

- May 2008 – September 2008, Post-Doc at the Institute of Applied Mathematics, University of Bonn, Germany.

Teaching

- Summer term 2015, lecturer "Stochastik I", HU Berlin.

- Summer term 2015, organizer of a student seminar for teaching students at HU Berlin.

- Summer term 2013 and 2014, lecturer "Computational Finance" (together with Antonis Papapantoleon), TU Berlin.

- Winter term 2011, lecturer "Finanzmathematik II", University of Vienna.

- Summer term 2011, lecturer "Höhere Wahrscheinlichkeitstheorie", University of Vienna.

- Winter term 2010, assistent for the "Einführung in lineare Algebra und Geometrie" and "Finanzmathematik: Diskrete Zeit", University of Vienna.

- Summer term 2010, lecturer "Computational Finance", TU Berlin.

- Summer term 2010, assistant for the lecture course "Finanzmathematik II", TU Berlin.

- Winter term 2009, assistant for the lecture course "Finanzmathematik I", TU Berlin.

- Summer term 2008, assistant for the lecture course "Algorithmische Mathematik II", University of Bonn.

- Summer term 2007, lecturer of the course "Einführung in Finanz- und Versicherungsmathematik", Vienna University of Technology.

- July 2006, short course on "Brownian motion and Ito calculus" at the WK summercamp in Weissensee, Austria.

- Summer 2002, co-author of official lecture notes for the lecture course "Versicherungsmathematik I".

Education

- March 2004 – April 2008 University of Technology, Vienna.

  - PhD under supervision of Dr. Josef Teichmann in stochastic analysis with focus on numerical methods completed "sub auspiciis praesidentis" (with highest distinction) on March 4, 2009.

  - Member of the graduate school "Differential Equation Models in Science and Engineering" supported by the Austrian Science Foundation (FWF) from July 1, 2004, until June 30, 2007.

- October 1999 – January 2004 University of Technology, Vienna.

  - Studies of "Technical Mathematics", with specialization in actuarial and financial mathematics.

  - Graduated with distinction on January 22, 2004.

- September 1990 - June 1998 Gymnasium BG/BRG Khevenhüllerstraße 1, Linz.
  - Matura (i. e. graduation) with distinction.

Military service

- October 1998 June 1999 in Amstetten and St. Pölten.