

Michael Salins

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Employment

Boston University, Department of Mathematics and Statistics,
Assistant Professor, July 2017 - present

Boston University, Department of Mathematics and Statistics,
Instructor and Postdoctoral Faculty Fellow, July 2015 – June 2017

Education

University of Maryland, College Park, Maryland
Doctor of Philosophy in Mathematics, April 2015

University of Maryland, College Park, Maryland
Master of Arts in Mathematics, December 2012

University of Maryland, College Park, Maryland
Bachelor of Science in Mathematics, *magna cum laude*, May 2010

Research Interests

Asymptotic properties of stochastic partial differential equations and stochastic ordinary differential equations including finite time explosion, large deviations, exit problems, metastability, accelerated Monte Carlo simulation, and averaging.

Publications

1. M. Salins, S. Tindel, *Regularity of the law of solutions to the stochastic heat equation with non-Lipschitz reaction term*, (2023), 34 pgs. **arXiv:2302.10678**.
2. I. Gasteratos, M. Salins, and K. Spiliopoulos, *Importance sampling for stochastic reaction-diffusion equations in the moderate deviation regime*, to appear in *Stochastic and Partial Differential Equations: Analysis and Computations* (2023), 45 pgs. **arXiv:2206.00646**.
3. I. Gasteratos, M. Salins, and K. Spiliopoulos, *Moderate deviations for systems of slow-fast stochastic reaction-diffusion equations*, *Stochastics and Partial Differential Equations: Analysis and Computations* 11(2) (2023), pp.503-598. **arXiv:2101.00085**.
4. M. Salins and L. Setayeshgar, *Uniform large deviations for a class of Burgers-type stochastic partial differential equations in any spatial dimension*, *Potential Analysis* 58(1) (2023). pp. 181-201.
5. M. Salins, *Global solutions to the stochastic heat equation with superlinear accretive reaction term and superlinear multiplicative noise term on a bounded spatial domain*, *Transactions of the American Mathematical Society* 375(11) (2022), pp. 8083-8099 **arXiv: 2110.10130**
6. M. Salins, *Global solutions for the stochastic reaction-diffusion equation with super-linear multiplicative noise and strong dissipativity*, *Electronic Journal of Probability* 27 (2022), 17 pgs. **arXiv: 2107.04459**.
7. M. Salins, *Existence and uniqueness of global solutions to the stochastic heat equation with super-linear drift on an unbounded spatial domain*, *Stochastics and Dynamics* 22(5) (2022), Article Number 2250014, 30 pgs. **arXiv:2106.13221**.

8. M. Salins, *Systems of small-noise stochastic reaction-diffusion equations satisfy a large deviations principle that is uniform over all initial data*, Stochastic Processes and Their Applications 142 (2021), pp. 159-194. **arXiv: 2008.01140.**
9. M. Salins, K. Spiliopoulos, *Metastability and exit problems for systems of stochastic reaction-diffusion equations*, The Annals of Probability 49(5) (2021), pp. 2317-2370. **arXiv: 1903.06038.**
10. M. Salins, *Existence and uniqueness for the mild solution of the stochastic heat equation with non-Lipschitz drift on an unbounded spatial domain*, Stochastics and Partial Differential Equations: Analysis and Computations 9(3) (2021), pp. 714-745. **arXiv:2002.02016.**
11. C. Mueller, E. Neuman, M. Salins, and G. Truong, *An improved uniqueness result for a system of stochastic differential equations related to the stochastic wave equation*, Journal of Stochastic Analysis 1(2) (2020), pp. 1-7. **arXiv: 1909.05944**
12. W. Hu, M. Salins, and K. Spiliopoulos, *Large deviations and averaging for systems of slow-fast stochastic reaction-diffusion equations*, Stochastics and Partial Differential Equations: Analysis and Computation 7(4) (2019), pp. 808-874. **arXiv:1710.02618.**
13. M. Salins, A. Budhiraja, and P. Dupuis, *Uniform large deviation principles for Banach space valued stochastic evolution equations*, Transactions of the American Mathematical Society 372(12) (2019), pp. 8363–8421. **arXiv:1803.00648.**
14. M. Salins, *Equivalences and counterexamples between several definitions of the uniform large deviations principle*, Probability Surveys 16(1) (2019), pp. 99-142. **arXiv:1712.07231.**
15. M. Salins, *Smoluchowski-Kramers approximation for the damped stochastic wave equation with multiplicative noise in any spatial dimension*, Stochastics and Partial Differential Equations: Analysis and Computation 7(1), (2019), pp. 86-122 **arXiv:1801.10538.**
16. A. Gomez, J.J. Lee, C. Mueller, E. Neuman, and M. Salins, *On Uniqueness and blowup properties for a class of second order SDEs*, Electronic Journal of Probability 22(72) (2017), 17 pgs. **arXiv:1702.07419.**
17. M. Salins and K. Spiliopoulos, *Rare event simulation via importance sampling for linear SPDE's*, Stochastics and Partial Differential Equations: Analysis and Computation 5(4) (2017), pp. 652-690 **arXiv:1609.04365.**
18. Z. Pajor-Gyulai and M. Salins, *On dynamical systems perturbed by a null-recurrent motion: The general case*, Stochastic Processes and their Applications 127(6) (2017), pp. 1960-1997. **arXiv:1508.05346.**
19. S. Cerrai, M. Freidlin, and M. Salins, *On the Smoluchowski-Kramers approximation for SPDEs and its interplay with large deviations and long time behavior*, Discrete and Continuous Dynamical Systems 37(1) (2017), pp. 33-76. **arXiv:1602.04279.**
20. S. Cerrai and M. Salins, *On the Smoluchowski-Kramers approximation for a system with infinite degrees of freedom exposed to a magnetic field*, Stochastic Processes and their Applications 127(1) (2017), pp. 273-303. **arXiv:1409.0803.**
21. M. Salins and K. Spiliopoulos, *Markov processes with spatial delay: path space characterization, occupation time and properties*, Stochastics and Dynamics 17(06) (2016), 24 pgs. **arXiv:1601.03759.**

22. S. Cerrai and M. Salins, *On the Smoluchowski-Kramers approximation and large deviations for infinite-dimensional nongradient systems with applications to the exit problem*, the Annals of Probability 44(4) (2016), pp. 2591-2642. **arXiv:1403.5745**.
23. Z. Pajor-Gyulai and M. Salins, *On dynamical systems with perturbation driven by a null-recurrent fast motion: The continuous coefficient case*, Journal of Theoretical Probability 29(3) (2016), pp. 1083-1099. **arXiv:1410.4625**.
24. S. Cerrai and M. Salins, *Smoluchowski-Kramers approximation and large deviations for infinite dimensional gradient systems*, Asymptotic Analysis 88(4) (2014), pp. 201-215. **arXiv:1403.5743**.

Submitted Articles

25. L. Chen, M. Foondun, J. Huang, M. Salins, *Global solution for superlinear stochastic heat equation on R^d under Osgood-type conditions*, (2023), 22 pgs. **arXiv: 2310.02153**.
26. M. Salins, *Solutions to the stochastic heat equation with polynomially growing multiplicative noise do not explode in the critical regime*, (2023), 21 pgs. **arXiv:2309.04330**.

Grants and Awards

- Simon's Foundation Collaboration Support for Mathematicians – *Stochastic partial differential equations with superlinear forcing* – September 1, 2022 – August 31, 2027. Gift number: 962543.
- IOP Publishing Outstanding Reviewer for the Nonlinearity, 2017
- James C. Alexander Prize for Graduate Research, Spring 2015.
- Ann G. Wylie Dissertation Fellowship, Fall 2014.
- University of Maryland Mathematics Department Summer Fellowship, Summer 2012.
- Strauss Undergraduate Teaching Assistantship, Fall 2009-Spring 2010.
- Banneker-Key Scholarship, Fall 2006-Spring 2010.

Professional Organizations

- American Mathematical Society – member.

Teaching and Grading

Boston University, 2015-present

Instructor: Advanced Calculus, Basic Statistics and Probability, Calculus I, Calculus II, Differential Equations, Introduction to Stochastic Processes, Mathematics of Financial Derivatives, Multivariate Calculus, Probability, Graduate Probability I, Graduate Probability II.

Course developer and Instructor: Special Topics in Probability: Stochastic Partial Differential equations, Special Topics in Probability: Large Deviations

University of Maryland, 2009-2015

Instructor: Calculus III, Precalculus.

Teaching Assistant: Precalculus, Calculus I, Calculus II, Calculus III, Linear Algebra.

Grader: Applied Stochastic Processes, Advanced Calculus I, Complex Analysis I, Real Analysis II, Applied Probability and Statistics I.

Presentations

- *Global solutions to the stochastic reaction-diffusion equation with superlinear forcing and superlinear multiplicative noise*, BU-Keio-Tsinghua Workshop, Boston, MA, June 27, 2023.
- *Stochastic partial differential equations with superlinear forcing*, New Trends in Stochastic Analysis, Casa Matematica Oaxaca, Oaxaca, Mexico, May 23, 2023.
- *Stochastic heat equation with superlinear forcing defined on an unbounded spatial domain*, AMS Spring Sectional Meeting, Georgia Institute of Technology, Atlanta, GA, March 18, 2023.
- *Stochastic heat equation with superlinear forcing*, Auburn University Probability Seminar, Auburn, AL, March 15, 2023.
- *Global existence of mild solutions to SPDEs with superlinear forcing*, Joint Mathematics Meeting, Special Session on Stochastic Analysis, Boston, MA, January 4, 2023.
- *Global solutions to the stochastic reaction-diffusion equation with superlinear forcing and superlinear multiplicative noise*, Workshop on Modern Topics in Probability, Brin Mathematics Research Center, University of Maryland, College Park, MD, October 17, 2022.
- *Systems of stochastic reaction-diffusion equations satisfy a large deviations principle that is uniform over all initial data*, Conference on Stochastic Processes and their Applications, online on Zoom (originally scheduled for Wuhan, China), June 27, 2022.
- *Systems of stochastic reaction-diffusion equations satisfy a large deviations principle that is uniform over all initial data*, AMS Spring Sectional Meeting, online on Zoom (originally scheduled for West Lafayette, IN), March 26, 2021.
- *Systems of stochastic reaction-diffusion equations satisfy a large deviations principle that is uniform over all initial data*, Beijing International Center for Mathematical Research Stochastic Analysis Seminar (online on Zoom), December 7, 2021.
- *Systems of stochastic reaction-diffusion equations satisfy a large deviations principle that is uniform over all initial data*, Ohio State Probability and Stochastic Analysis Seminar (online on Zoom), November 4, 2021.
- *Global solutions for the stochastic reaction-diffusion equation with polynomially dissipative forcing*, Canadian Mathematical Society Summer Meeting, online on Zoom (Ottawa, Canada), June 7, 2021.
- *Existence and uniqueness for the mild solution of the stochastic heat equation with non-Lipschitz drift on an unbounded spatial domain*, Stochastic Analysis Under COVID, online on Zoom, March 23, 2021.
- *Existence and uniqueness for the mild solution of the stochastic heat equation with non-Lipschitz drift on an unbounded spatial domain*, AMS Spring Sectional Meeting, online on Zoom (formerly scheduled for Providence, RI), March 20, 2021.
- *Existence and uniqueness for the mild solution of the stochastic heat equation with non-Lipschitz drift on an unbounded spatial domain*, Drexel University Probability Seminar, Philadelphia, PA, March 12, 2020.
- *Existence and uniqueness for the mild solution of the stochastic heat equation with non-Lipschitz drift on an unbounded spatial domain*, University of Maryland Probability Seminar, College Park, MD, March 11, 2020.

- *Existence and uniqueness for the mild solution of the stochastic heat equation with non-Lipschitz drift on an unbounded spatial domain*, Purdue University Probability Seminar, West Lafayette, IN, February 19, 2020.
- *Uniform large deviations principles*, SIAM Minisymposium on Deterministic and Probabilistic Approaches for Nonlinear PDEs, Joint Mathematics Meetings, Denver, CO, January 18, 2020.
- *Uniform large deviations principles*, University of Pittsburgh Analysis and PDE Seminar, Pittsburgh, PA, November 4, 2019.
- *Uniform large deviations principles*, Workshop on the Theory and Applications of Stochastic Partial Differential Equations, Fields Institute, Toronto, ON, June 10, 2019.
- *Uniform large deviations principles and applications to the exit problem for SPDEs*, University of Maryland Probability Seminar, College Park, MD, May 23, 2019.
- *Uniform large deviations principles and applications to the exit problem for SPDEs*, Tufts University Probability Seminar, Medford, MA, March 29, 2019.
- *Uniform large deviations principles and applications to the exit problem for SPDEs*, University of Connecticut Discrete Mathematics and Statistical Mechanics Seminar, Feb 13, 2019.
- *The Smoluchowski-Kramers approximation in finite and infinite dimensions*, Boston University Dynamics Seminar, Boston, MA, Oct. 30, 2017.
- *Uniform large deviations for a general class of stochastic partial differential equations*, Brown University Probability Seminar, Providence, RI, May 9, 2017.
- *Rare event simulation via importance sampling for linear SPDEs*, University of Maryland Probability Seminar, College Park, MD, March 29, 2017.
- *Uniform large deviations for a general class of stochastic partial differential equations*, Courant Institute Probability Seminar, New York, NY, Feb. 10, 2017.
- *Uniform large deviations for a general class of stochastic partial differential equations*, Boston University Probability Seminar, Boston, MA, Jan. 23, 2017
- *Rare event simulation via importance sampling for linear SPDEs*, Northeast Probability Seminar, New York, NY, Nov. 18, 2016.
- *Rare event simulation via importance sampling for linear SPDEs*, AMS Sectional Meeting, Raleigh, NC, Nov. 13, 2016.
- *Random perturbations of dynamical systems*, Pre-colloquium talk, Boston University, Sept. 2016.
- *Local time and null-recurrent averaging*, BU/Keio Workshop, Aug. 2016.
- *Null-recurrent averaging*, Analysis and Probability Seminar, University of Connecticut, Feb. 2016.
- *The Smoluchowski-Kramers approximation and large deviations for the stochastic wave equation*, Brown/BU Dynamics and PDE Seminar, Apr. 25, 2016.
- *Null-recurrent averaging*, Seminar on Stochastic Processes, University of Maryland, Mar. 17, 2016.
- *The Smoluchowski-Kramers approximation and large deviations for the stochastic wave equation*, Workshop on Stochastic PDEs, University of Pittsburgh, Dec. 5, 2015.
- *The Smoluchowski-Kramers approximation and large deviations for the stochastic wave equation*, Northeast Probability Seminar, Courant Institute, Nov. 29, 2015.
- *Freidlin-Wentzell exit problems for stochastic equations in Banach spaces*, AMS Spring Eastern Sectional Meeting, Georgetown University, Mar. 7, 2015.

- *Smoluchowski-Kramers approximation and the exit problem for infinite dimensional systems*, Statistics and Probability Seminar, Boston University, Feb. 2015.
- *Smoluchowski-Kramers approximation and the exit problem for stochastic partial differential equations*, PDE Research Interaction Team, Nov. 2014.
- *A dynamical system driven by fast Brownian motion*, Probability Seminar, University of Maryland, Sept. 2014.
- *Smoluchowski-Kramers approximation and the exit problem for infinite dimensional systems*, École d'été de Probabilités de Saint Flour, France, Jul. 18, 2014.
- *Using random functions to model deterministic phenomena*, one of four winning talks at the Monroe-Martin Talks, University of Maryland, May 2014.
- *Exit place and exit time problems for infinite dimensional stochastic equations with second-order time derivatives*, Seminar on Stochastic Processes, University of California, San Diego, Mar. 27, 2014.
- *Introduction to the large deviations principle, why and how to study rare events*, Monroe-Martin Talks, University of Maryland, May 2013.
- *Stochastic partial differential equations and control theory*, Student Probability Seminar, several talks, Summer 2012-Spring 2013.
- *Quasipotentials of the damped semilinear wave equation and stochastic heat equation*, Seminar on Stochastic Processes, Duke University, Mar. 15, 2013.
- *Semigroups of linear operators*, Monroe-Martin Talks, University of Maryland, May 2012.
- *The axiom of choice and predicting the future*, Monroe-Martin Talks, University of Maryland, May 2011.

Conference Organizing

- BU-Keio-Tsinghua Workshop 2023 – Co-PI Siu-Cheong Lau – Boston University, Boston, MA, June 26-30, 2023.
- Joint Mathematics Meeting – Special Session on Stochastic Analysis and Applications – co-organized with Parisa Fatheddin – Boston, MA, January 4-5, 2023.
- Union College Mathematics Conference – Stochastic Analysis and Applications Session – Co-organized with Phaniel Mariano, Schenectady, NY, June 3-5, 2022.
- SIAM Northern States Sectional Meeting - SIAM Minisymposium on Recent Trends in SPDEs – Co-organized with Hakima Bessaih, Laramie, WY, September 29, 2019.

Travel Support Awards

- Seminar on Stochastic Processes, University of Virginia, March 2017.
- Northeast Probability Seminar, Baruch College, CUNY, November 2016.
- Seminar on Stochastic Processes, University of Maryland, March 2016.
- Northeast Probability Seminar, New York, November 2015.
- École d'été de Probabilités de Saint-Flour, France, July 2014.
- Seminar on Stochastic Processes, University of California, San Diego, March 2014.
- Seminar on Stochastic Processes, Duke University, March 2013.
- Topics in Probability, Chennai Mathematical Institute, Chennai, India, December 2012.

Academic Service

- Referee for: Acta Applicandae Mathematicae, Annals of Applied Probability, Annales de l'Institut Henri Poincaré (B), Applied Mathematics and Optimization, Applied Probability Journals, Asymptotic Analysis, Communications in Mathematical Physics, Communications on Pure and Applied Analysis, Discrete and Continuous Dynamical Systems, Electronic Communications in Probability, Electronic Journal of Probability, ESAIM: Probability and Statistics, Journal of Computational and Applied Mathematics, Journal of Differential Equations, Journal of Evolution Equations, Journal of Mathematical Analysis and Applications, Journal of Nonlinear Science, Journal of Statistical Physics, Journal of Theoretical Probability, Management Science, Markov Processes and Related Fields, Memoirs of the AMS, Nonlinearity, Partial Differential Equations in Applied Mathematics, Partial Differential Equations and Applications, SIAM Journal on Applied Dynamical Systems, SIAM Journal on Mathematical Analysis, Stochastics: An International Journal of Probability and Stochastic Processes, Stochastics and Dynamics, Stochastic Analysis and Applications, Stochastic Processes and their Applications, Transactions of the AMS, Zeitschrift für angewandte Mathematik und Physik,

Doctoral Student Mentorship

- Ioannis Gasteratos (co-advisor Konstantinos Spiliopoulos) – Phd 2022 – Ioannis is now a postdoctoral research associate at Imperial College in London. Ioannis works on moderate deviations principles for coupled fast-slow stochastic partial differential equations.
- John Ivanhoe – current student – John investigates the roles of superlinear forcing terms in stochastic partial differential equations.

Undergraduate Student Mentorship

- Boston University
 - Advised Tianyi Chen on a project about stochastic differential equations and options pricing, Fall 2021
 - Advised Amarri Harrison on a project about Brownian motion and stochastic differential equations, Summer 2021 – Fall 2021
 - Advised Jiawei Wu on a project about stochastic differential equations and options pricing, Summer-Fall 2021
 - Advised Shai Almagor on a project about stochastic population modelling, Spring 2018.
- Directed Reading Program, University of Maryland
 - Pairs undergraduate students with graduate student mentors for semester-long independent study projects.
 - Committee member, Fall 2014
 - Mentor for undergraduate research projects in:
 - *Brownian Motion*, Spring 2015
 - *Lines of Best Fit*, Fall 2013.
 - *First-order Logic and Model Theory*, Spring 2013.
 - *Laplace's Method and Stirling's Formula*, Fall 2012.

- *Paradoxes in Voting Theory*, Fall 2011.

Interdisciplinary Research Programs

- Focused Research Program on Simulation Modelling in Population Health – Rafik B. Hariri Center for Computational Science and Engineering – September 2021-June 2022

Departmental Involvement

- Director of Graduate Admissions – Statistics, Department of Mathematics and Statistics, Boston University, September 2022 – present.
- Undergraduate student advising Spring 2020 – present.
- PhD dissertation committees, Boston University
 - Zachary Bezemek 2023
 - Max Heldman 2023
 - Ioannis Gasteratos 2022
 - Thanh Dang 2022
 - Jingwei Ma 2021
 - Jia Yang 2020
 - Eric Cooper 2019
 - Matthew Morse 2019
- Hiring committee member, Boston University, Probability and Statistics Postdoc search 2022
- Co-organizer, Probability and Statistics Seminar, Boston University, Jan 2019-December 2021
- Hiring committee member, Boston University, Probability and Statistics Postdoc search 2019
- Graduate Committee Member, Boston University, 2017-present – reviews graduate student applications for the statistics programs and for the mathematics program.
- Department Holiday Party Committee, University of Maryland, Fall 2013-Fall 2014.
- Daily Student Tea Time Coordinator, University of Maryland, Fall 2012-Fall 2013.

Language Skills: English (native speaker), French (proficient), Turkish (beginner).