

Adrien Laurent

Chargé de recherche
INRIA Rennes

IRMAR Laboratory
University of Rennes, France
✉ Adrien.Laurent@INRIA.fr
🌐 adrienlaurent.net
30 years old



Employment and education

- Since 2023 **Permanent researcher (chargé de recherche) at INRIA Rennes**
Team MINGuS: Multiscale Numerical Geometric Schemes.
- 2021 - 2023 **Postdoctoral researcher at the University of Bergen**
Project: Computational Dynamics and Stochastics on Manifolds (CODYSMA)
Supervisor: Hans Z. Munthe-Kaas.
- 2017 - 2021 **Ph.D. in Mathematics at the University of Geneva**
Title: Algebraic Tools and Multiscale Methods for the Numerical Integration of Stochastic Evolutionary Problems. Obtained with high honours.
Supervisor: Gilles Vilmart. Jury: Martin J. Gander, Tony Lelièvre, Hans Z. Munthe-Kaas.
- 2013 - 2017 **Magistère of Mathematics at the ENS Rennes**
Master in Mathematics and Master MEEF (with high honours)
Agrégation de Mathématiques (national french teaching competitive exam) (rank: 17th)
Bachelor in Mathematics and bachelor in Physics (with high honours)
Second concours de l'ENS
- 2011 - 2013 **Classes préparatoires MPSI / MP***, *Lycée Chateaubriand (Rennes)*
- 2011 **Baccalauréat Scientifique**, *Lycée Alain (Alençon)*
Mention très bien, Spécialité Mathématiques, Mention Anglais Européen

Awards and grants

- 2022 SWICCOMAS prize, awarded by the *Swiss Community for Computational Methods in Applied Sciences* for my Ph.D. thesis
- 2021 Henri Fehr prize, awarded by the journal *L'Enseignement Mathématique* for the best doctoral thesis in Mathematics of the year at the University of Geneva
- 2014 Laureate of the Lebesgue grant

Preprints and publications

- [7] A. Laurent, The Lie derivative and Noether's theorem on the aromatic bicomplex. To appear in *Journal of Computational Dynamics*, 14 pages.
- [6] A. Laurent and H. Z. Munthe-Kaas, The universal equivariance properties of exotic aromatic B-series. Submitted, 25 pages.
- [5] A. Laurent, R. McLachlan, H. Z. Munthe-Kaas, and O. Verdier, The aromatic bicomplex for the description of divergence-free aromatic forms and volume-preserving integrators. *Forum of Mathematics Sigma* 11 (2023), E69.
- [4] A. Laurent, A uniformly accurate scheme for the numerical integration of penalized Langevin dynamics. *SIAM J. Sci. Comput.* 44 (2022), no. 5, A3217-A3243.
- [3] A. Laurent and G. Vilmart, Order conditions for sampling the invariant measure of ergodic stochastic differential equations on manifolds, *Found. Comput. Math.* 22, 649–695 (2022).
- [2] A. Laurent and G. Vilmart, Multirevolution integrators for differential equations with fast stochastic oscillations, *SIAM J. Sci. Comput.* 42 (2020), no. 1, A115–A139.
- [1] A. Laurent and G. Vilmart, Exotic aromatic B-series for the study of long time integrators for a class of ergodic SDEs, *Math. Comp.* 89 (2020), 169-202.

Research stays and internships

- 06/2024 One month visit at the university of Bergen (UiB) and the university of Tromsø (UiT), invitation of Hans Munthe-Kaas.
- 04/2023 Visit at NTNU (Trondheim), invitation of Anne Kværnø.
- 03-04/2023 Visit at the University of Geneva, invitation of Gilles Vilmart.
- 01/2023 Visit at NMBU (Ås), invitation of Geir Bogfjellmo.
- 11/2021 One week stay at the University of Southern Denmark (SDU), invitation of Prof. Kristian Debrabant.
- 11/2017 One week stay at the Chinese Academy of Science (Beijing), invitation of Prof. Jialin Hong.
- 04-06/2017 Three months internship at the University of Geneva under the direction of Gilles Vilmart.
- 06-07/2015 Two months internship at the University of Geneva under the direction of Gilles Vilmart.
- 05-06/2014 Two months internship at the Jussieu campus (Paris) under the direction of Sophie Morier-Genoud on the friezes of Coxeter and Conway.
- 07/2012 Internship JANUS at the GANIL (Grand Accélérateur National d'Ions Lourds) in Caen on the two protons emission of ^{18}Ne .

Contributed talks

Conferences, workshops

- 07/2024 SciCADE (International Conference on Scientific Computation and Differential Equations), invitation to the mini-symposium "Stochastic numerics with application to sampling", Singapore.
- 06/2023 Foundations of Computational Mathematics conference, invitation to the workshop "Stochastic Computation", Paris
- 02/2023 MaGIC 2023 (Manifolds and Geometric Integration Colloquia), Lillehammer.
- 12/2022 H&B60, Trysil.
- 10/2022 First CODYSMA workshop, Trondheim.
- 07/2022 SciCADE (International Conference on Scientific Computation and Differential Equations), invitation to the mini-symposium "Geometric and algebraic perspectives in numerical integration", Reykjavik.
- 06/2022 CANUM, invitation to the mini-symposium "Intégrateurs numériques pour des dynamiques multi-échelles et en temps long", Evian-les-bains.
- 02/2022 MaGIC 2022 (Manifolds and Geometric Integration Colloquia), Lillehammer.
- 11/2021 Higher Structures Emerging from Renormalisation, Erwin Schrödinger Institute (Vienna).
- 07/2019 SciCADE (International Conference on Scientific Computation and Differential Equations), invitation to the mini-symposium "Numerical methods for stochastic (partial) differential equations", University of Innsbruck.
- 09/2018 NUMDIFF-15 (Numerical Solution of Differential and Differential-Algebraic Equations), invitation to the mini-symposium "Numerical methods for stochastic (partial) differential equations", Martin Luther University (Halle-Wittenberg).
- 04/2018 Swiss Numerics Day, ETH Zurich.
- 11/2017 Forum on Numerical Analysis for SDEs and SPDEs, Chinese Academy of Sciences (Beijing).
- 09/2017 SciCADE (International Conference on Scientific Computation and Differential Equations), University of Bath.

Research seminars

- 01/2024 Research seminar, Potsdam
- 01/2024 Groupe de travail de l'ENS, Rennes
- 11/2023 Workshop "Problèmes numériques pour les Equations aux Dérivées Partielles Stochastiques", Rennes
- 09/2023 Algebra and Analysis & PDE seminar, University of Bergen.
- 04/2023 DNA seminar, Trondheim.
- 04/2023 CODYSMA seminar, Bergen.
- 03/2023 Séminaire d'analyse numérique, University of Geneva.
- 01/2023 CODYSMA seminar, Bergen.
- 11/2022 Algebra and Analysis & PDE seminar, University of Bergen.
- 08/2022 CODYSMA seminar, Bergen.
- 11/2021 Séminaire d'analyse numérique, University of Geneva.
- 11/2021 Mathematics colloquia, SDU (Odense).
- 09/2021 DNA seminar, Trondheim.
- 09/2021 Algebra and Analysis & PDE seminar, University of Bergen.
- 09/2020 One World Virtual Seminar Series - Stochastic Numerics and Inverse Problems.
- 07/2020 CODYSMA (Computational Dynamics and Stochastics on Manifolds) virtual colloquium.
- 05/2019 Séminaire EDP, Modélisation et Calcul Scientifique, ENS Lyon.
- 05/2019 Séminaire d'analyse numérique, University of Geneva.

Graduate seminars and meetings

- 06/2021 Séminaire des doctorants, University of Geneva.
- 12/2020 Séminaire des jeunes chercheurs, Université Paris Dauphine.
- 12/2020 Groupe de Travail des Thésard.e.s du Laboratoire Jacques-Louis Lions.
- 03/2019 Séminaire Landau et Gaussbusters des doctorants d'analyse et probabilités, Université de Rennes 1.
- 03/2019 Séminaire des doctorants, Université de Dijon.
- 10/2018 Rencontres doctorales Lebesgue 2018, Pôle numérique de Brest.
- 06/2018 Séminaire des doctorants, Université de Bordeaux.
- 06/2018 Leysin Ph.D. meeting, Leysin.
- 03/2018 Séminaire des doctorants, University of Geneva.
- 01/2018 Séminaire Landau et Gaussbusters des doctorants d'analyse et probabilités, Université de Rennes 1.
- 11/2017 Graduate Colloquium (CUSO), University of Geneva.

Contributed posters

- 01/2020 Order conditions for sampling the invariant measure of ergodic SDEs in \mathbb{R}^d or on manifolds, presented at the Workshop on Multiscale Methods for Deterministic and Stochastic Dynamics (University of Geneva).
- 09/2017 Exotic aromatic B-series for the study of long time integrators for a class of ergodic SDEs, presented at SciCADE (University of Bath).

Participation to conferences, schools and workshops

- 06/2024 Nordfjordeid Summer School on "Combinatorial Hopf algebras and modern Lie theory with applications"
- 06/2022 Second Norwegian meeting on PDEs, Bergen.
- 06/2022 Math meets industry, Trondheim.
- 05/2022 Lie-Størmer Colloquium, Rosendal.

- 2020 - 2021 One World Virtual Seminar Series - Stochastic Numerics and Inverse Problems.
- 07/2021 Applications of Rough Paths: Computational Signatures and Data Science.
- 05/2021 SIAM Conference on Mathematical Aspects of Materials Science (MS21).
- 02/2021 Cumulants in Stochastic Analysis.
- 11/2020 Colloque Wright, University of Geneva.
- 10/2020 Numerics of PDEs unplugged 2020, Karlsruhe Institute of Technology.
- 09/2020 School on “MCMC: Recent developments and new connections”, University of Bonn.
- 06/2020 FoCM Workshop - Geometric Integration and Computational Mechanics.
- 01/2020 Workshop on Multiscale Methods for Deterministic and Stochastic Dynamics, University of Geneva.
- 05/2019 Computational mathematics for model reduction and predictive modelling in molecular and complex systems, EPFL (Lausanne).
- 08/2017 Stepping Stone Symposium on Theoretical and Numerical Analysis of PDEs, University of Geneva.
- 04/2017 Spring School on Stochastic Dynamics out of Equilibrium, CIRM (Marseilles).
- 11/2016 Quinzièmes Journées Louis-Antoine on Control Theory, University of Rennes 1.
- 08/2015 Summer School on Multiscale Numerical Methods, University of Rennes 1.
- 10/2014 Fall School on Groups and Lie Algebras Representation Theory, University of Reims.
- 07/2014 Summer School on Biology for Mathematicians, CIRM (Marseilles).

Organisation of conferences

- 09/2024 Organiser of the MINGuS day (with G. Beck and N. Crouseilles).
- 05/2024 Organiser of the workshop of the MINGuS team (with G. Beck and N. Crouseilles).
- 12/2022 Member of the local organisation team for the conference B&H60, Trysil.
- 10/2022 Organiser of the workshop CODYSMA-1 (with K. Ebrahimi-Fard and H. Munthe-Kaas).
- 09/2022 Organiser of the workshop in Geometry and Geometric integration Geo2Int (with E. Grong and G. Vega-Molino), University of Bergen.
- 05/2022 Member of the local organization team for the Lie—Størmer colloquium: Between Theoretical and Computational Mathematics, Rosendal.
- 2017 - 2021 Organiser of the Graduate Seminar of the University of Geneva - creation of the official website and acquisition of a dedicated fund.
- 01/2020 Member of the local organization team and webmaster of the website for the Workshop on Multiscale Methods for Deterministic and Stochastic Dynamics, University of Geneva.

Responsibilities, memberships

- Today Member of the SMAI and the Norsk Matematisk Forening.
- 2024 - Today Organiser of the research seminar in applied mathematics at ENS Rennes.
- 2019 - Today Anonymous refereeing for international journals including BIT, Journal of Computational Dynamics, Applied Numerical Mathematics, Journal of Computational and Applied Mathematics, Journal of Computational Physics: X, Journal of Computational Mathematics, Applied Mathematics and Computation.
- 2019 - 2021 Examination board for the maturité (Swiss highschool final exam).

Teaching

- 2024 TPs of advanced analysis and TPs of numerical stochastic calculus, Univ Rennes.
- 2023 Assistant for a new team-based learning implementation for the course “Elementary Calculus I”, University of Bergen.

- 2022 - 2023 Guest lecturer in the course “Finance theory”, University of Bergen.
- 2022 - 2023 Lecturer for “Real analysis”, Bachelor, University of Bergen.
- 2021 - 2022 Lecturer for “Stochastic differential equations”, Master, University of Bergen.
- 2017 - 2021 Assistant for “analyse numérique”, Bachelor 2nd year, University of Geneva.
- 2019 - 2020 Assistant for “intégration numérique géométrique”, Master course, University of Geneva.
- 2018 - 2020 Assistant for “algèbre 1”, Bachelor 1st year, University of Geneva.
- 2017 - 2018 Assistant for “analyse réelle”, Bachelor 2nd year, University of Geneva.
- 2017 - 2018 Assistant for “mathématiques pour informaticiens”, Bachelor 1st year, University of Geneva.
- 2016 - 2017 Assistant for “intégration et analyse complexe”, Bachelor 3rd year, INSA Rennes.
- 2016 - 2017 Khôlleur at the lycée Chateaubriand in MP*.
- 2014 - 2015 Khôlleur at the lycée Chateaubriand in MPSI.

Supervision of students

- Master Marie De Penguern (with N. Crouseilles, 2024)
- Mahmoud Naesan Menla Ali (with G. Bogfjellmo, 2023)
- Marco Cacace (with H. Z. Munthe-Kaas, 2023)
- Eugen Bronasco (with G. Vilmart, 2021)
- Bachelor Amar Ahmane (2024)
- Tristan Roy (2024)
- Nora Bemanian (with F. Valet, 2023)
- Xalbador Otxandorena Ieregi (with H. Z. Munthe-Kaas, 2022)

Popularization of science

- 04/2024 Invited animator at the workshop ”Les Marmottes - Filles et Maths” (Switzerland)
- 03/2024 Animator for the club Rennes et maths
- 12/2023 Festival Rennes en Sciences
- 05/2023 Pub lecture on geometric numerical integration (Bergen)
- 04/2023 Invited animator at the workshop ”Les Marmottes - Filles et Maths” (Switzerland)
- 03/2023 Organiser and animator at the open days of the university of Bergen
- 11/2022 Coordinator at the competition Baltic Way for high-school students (Tromsø)
- 08/2022 Organiser and animator at kunnskapsfest i botanisk hage
- 04/2022 Organiser and animator at Oppløp på Marineholmen (festival for the 75th anniversary of the UiB)
- 2021 Head and creator of the escape game of Mathematics project, in collaboration with the Mathscope, Christine Plaza and Léo Nicollier, and with the support of the Swiss mathematical Society and the Swiss academy of sciences
- 2020 - 2021 Animator for the Mathscope of the University of Geneva - organisation of activities for familiarizing the public with the research in Mathematics
- 2018 - 2021 Supervising researcher of the MATH.en.JEANS association with the Institut Florimont (Geneva) and the Lycée de la Versoie (Thonon-les-Bains)
- 01/2020 Writer of a play on numerical analysis for the Science Me show, originally scheduled in July 2020.
- 07/2018 Organiser at the “Nuit de la science” (Geneva) - performer of a play on knot theory for the Science Me show

Computer skills

Languages Python, OCaml
Scientific Julia, Matlab, Scilab, Mathematica, Maple
Others Parallel computing, HTML, \LaTeX

Languages

French Native
English Fluent
Norwegian Intermediate (\sim B1)
German Intermediate

References

Research

Hans Z. Munthe-Kaas
Department of Mathematics
University of Bergen
Postbox 7803
N-5020 Bergen, Norway
✉ Hans.Munthe-Kaas@uib.no
☎ +47 55 58 41 79

Nicolas Crouseilles
IRMAR Laboratory
University of Rennes
Campus Beaulieu
35700 Rennes, France
✉ Nicolas.Crouseilles@INRIA.fr
☎ + 33 22 323 53 08

Gilles Vilmart
Section of Mathematics
University of Geneva
24, rue du Général Dufour
Geneva, Switzerland
✉ Gilles.Vilmart@unige.ch
☎ +41 22 379 11 61

Charles-Édouard Bréhier
Laboratoire de Mathématiques
Université de Pau
Avenue de l'Université - BP 1155
64013 Pau CEDEX, France
✉ Charles-Edouard.Brehier@univ-pau.fr

Teaching and science outreach

Antonella Z. Munthe-Kaas
Department of Mathematics
University of Bergen
Postbox 7803
N-5020 Bergen, Norway
✉ Antonella.Zanna@uib.no
☎ +47 55 58 48 57

Martin J. Gander
Section of Mathematics
University of Geneva
24, rue du Général Dufour
Geneva, Switzerland
✉ Martin.Gander@unige.ch
☎ +41 22 379 11 76