

Adrien Busnot Laurent

Chargé de recherche
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Employment and education

- Since 2023 **Associate Professor (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

Awards

- 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

Grants

- 2026-2029 **PI of ANR JCJC - MaStoC** (Manifolds and Stochastic Computations) - 225000€
- 2025-2027 **PI of AIS Bretagne** (local scientific starting research grant) - 10000€
- 2025 PI of BOUM SMAI (with Léopold Trémant and Pierre Catoire) - 700€
- 2025 PI of PEPS JCJC - 2500€
- 2015 - 2017 Full scholarship (fonctionnaire normalien) at ENS Rennes
- 2014 Laureate of the Lebesgue grant

Publications

Academic articles

- [14] E. Bronasco, A. Busnot Laurent, and B. Huguet, High order integration of stochastic dynamics on Riemannian manifolds with frozen flow methods. Submitted.
[arXiv:2503.21855](https://arxiv.org/abs/2503.21855).
- [13] A. Busnot Laurent and O. Cosserrat, Butcher series for Hamiltonian Poisson integrators through symplectic groupoids. Submitted.
[arXiv:2503.05000](https://arxiv.org/abs/2503.05000).

- [12] E. Bronasco and A. Laurent, Hopf algebra structures for the backward error analysis of ergodic stochastic differential equations. Submitted.
arXiv:2407.07451.
- [11] K. Beauchard, A. Laurent, and F. Marbach, Control theory and splitting methods. Preprint.
arXiv:2407.02127.
- [10] A. Laurent, The Lie derivative and Noether's theorem on the aromatic bicomplex for the study of volume-preserving numerical integrators. *Journal of Computational Dynamics* (2024), 11(1): 10-22.
arXiv:2307.07984. doi:10.3934/jcd.2023011.
- [9] A. Laurent and H. Z. Munthe-Kaas, The universal equivariance properties of exotic aromatic B-series. *Found. Comput. Math.* (2024).
arXiv:2305.10993. doi:10.1007/s10208-024-09668-5.
- [8] 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.
arXiv:2301.10998. doi:10.1017/fms.2023.63.
- [7] A. Laurent, A uniformly accurate scheme for the numerical integration of penalized Langevin dynamics. *SIAM J. Sci. Comput.* 44 (2022), no. 5, A3217-A3243.
arXiv:2110.03222. doi:10.1137/21M1455188.
- [6] 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).
arXiv:2006.09743. doi:10.1007/s10208-021-09495-y.
- [5] A. Laurent and G. Vilmart, Multirevolution integrators for differential equations with fast stochastic oscillations, *SIAM J. Sci. Comput.* 42 (2020), no. 1, A115–A139.
arXiv:1902.01716. doi:10.1137/19M1243075.
- [4] 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.
arXiv:1707.02877. doi:10.1090/mcom/3455.

Conference reports and proceedings

- [3] C.-E. Brehier, A. Busnot Laurent, L. Goudenege, P. Maurer, and U. Vaes, Recent contributions to stochastic numerics, In revision for ESAIM proceedings and surveys.
- [2] A. Laurent, High order integration of stochastic dynamics in $\mathbb{R}^d$, on manifolds, and in the neighbourhood of manifolds, Oberwolfach Report No. 26/2024.
doi:10.14760/OWR-2024-26.

Thesis

- [1] A. Laurent, Algebraic Tools and Multiscale Methods for the Numerical Integration of Stochastic Evolutionary Problems, PhD thesis, University of Geneva, 2021.
doi:10.13097/archive-ouverte/unige:153796.

Research stays

- 2025 University of Geneva (invitation of Gilles Vilmart, 1 week), University of Lens (invitation of Léopold Trémant, 1 week), University of Strasbourg (invitation of Vladimir Dotsenko, 1 week), University of Göttingen (invitation of Oscar Cosserat, 1 week), University of Geneva (invitation of Gilles Vilmart, 2 weeks), University of Bergen (invitation of Hans Munthe-Kaas, 1 week).
- 2024 University of Geneva (invitation of Gilles Vilmart, 2 weeks), University of Bergen (invitation of Hans Munthe-Kaas, 2 weeks), National Center for Theoretical Sciences (NCTS) in Taipei (invitation of Marco Sutti, 2 weeks), University of Oxford (invitation of Georg Maierhofer, 1 week), University of Bergen (invitation of Hans Munthe-Kaas, 2 weeks).

- 2023 NMBU in Ås (invitation of Geir Bogfjellmo, 1 week), University of Geneva (invitation of Gilles Vilmart, 1 week), NTNU in Trondheim (invitation of Anne Kværnø, 1 week).
- 2021 University of Southern Denmark (SDU) (invitation of Kristian Debrabant, 1 week).
- 2017 Chinese Academy of Science in Beijing (invitation of Jialin Hong, 1 week).
- 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 .

Conferences

Invited talks in conferences, workshops

- 07/2026 Foundations of Computational Mathematics conference, invitation to the workshop "Geometric Integration and Computational Mechanics", Vienna
- 03/2026 GeoStoch 2026, Eindhoven
- 12/2025 Workshop "Numerical solutions to (S)PDEs with complex geometries", Thessaloniki, Greece.
- 12/2025 Workshop "Operads, Symmetries for Quantum Field Theory and Singular SPDEs", Nancy.
- 06/2025 Groupe de travail Statistiques et Géodésiques, Piriac-sur-mer.
- 05/2025 G-StAI, Lesbos.
- 12/2024 Lie-Størmer colloquium, Tromsø.
- 10/2024 Rencontres de Besse, Besse-et-Saint-Anastaise.
- 10/2024 Plenary speaker (mini-course) at Journée d'analyse Rennes-Nantes.
- 09/2024 NUMDIFF-17 (Numerical Solution of Differential and Differential-Algebraic Equations), invitation to the mini-symposium "Advances in the Numerical Approximation of S(P)DEs", Martin Luther University (Halle-Wittenberg).
- 08/2024 Journées MAS, invitation to the session "Méthodes numériques", Poitiers.
- 07/2024 SciCADE (International Conference on Scientific Computation and Differential Equations), invitation to the mini-symposium "Stochastic numerics with application to sampling", Singapore.
- 05/2024 Workshop "Constrained Dynamics, Stochastic Numerical Methods and the Modeling of Complex Systems", Oberwolfach.
- 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", Reykjavík.
- 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.

Talks in research seminars

- 10/2025 Séminaire d'analyse numérique, University of Geneva.
- 05/2025 Séminaire d'analyse numérique, Université d'Artois.
- 02/2025 Séminaire ART, Université de Strasbourg.
- 02/2025 Séminaire d'analyse numérique, University of Geneva.
- 01/2025 Algebra and geometry seminar, Göttingen.
- 07/2024 Numerical analysis seminar, Oxford.
- 07/2024 NCTS Seminar on Scientific Computing, Taipei.
- 05/2024 Séminaire d'analyse numérique, Université de Rennes.
- 05/2024 ACPMS online seminar.
- 04/2024 Séminaire d'analyse numérique, University of Geneva.
- 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.

Talks in 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 without talks

- 10/2025 Research meets Outreach, Les Diablerets.
- 06/2025 Workshop Ken, Rennes.
- 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).

Responsibilities, memberships

- 2025 - Today Member of the scientific committee of GdR Calcul.
- 2024 - Today Organiser of the research seminar in applied mathematics at ENS Rennes.
- 2024 - Today Member of the gender-parity/diversity commission of the mathematics laboratory IRMAR.
- Today Member of the SMAI and the Norsk Matematisk Forening.

- 2019 - Today Anonymous refereeing for international journals including FoCM, BIT Numer. Math., Journal of Computational Dynamics, Applied Numerical Mathematics, Journal of Computational and Applied Mathematics, JCP, JCP: X, Journal of Computational Mathematics, Applied Mathematics and Computation, ESAIM, Annales Henry Poincaré, Studies in Applied Mathematics, ...
- 2019 - 2021 Examination board for the maturité (Swiss highschool final exam).
- 2017 - 2021 Organiser of the Graduate Seminar of the University of Geneva - creation of the official website and acquisition of a dedicated fund.

Organisation of conferences

- 2027 Co-organiser of the first French LGBT+ mathematics conference "Queers support Mathematics".
- 06/2026 Organisation of a minisymposium at SciCADE, Edinburgh.
- 06/2026 Organisation of a minisymposium and member of the local organisation team for the CANUM conference.
- 03/2026 Co-organiser of the conference GeoStoch2026 (with S. Cox, E. Luesink, F. Redig, and F. Van Der Meulen), Eindhoven (the Netherlands).
- 05/2024 Organiser of the workshop BMS of the MINGuS team (with G. Beck and N. Crouseilles), Rennes (France).
- 12/2022 Member of the local organisation team for the conference B&H60, Trysil (Norway).
- 10/2022 Organiser of the workshop CODYSMA-1 (with K. Ebrahimi-Fard and H. Munthe-Kaas), Trondheim (Norway).
- 09/2022 Organiser of the workshop in Geometry and Geometric integration Geo2Int (with E. Grong and G. Vega-Molino), University of Bergen (Norway).
- 05/2022 Member of the local organization team for the Lie-Størmer colloquium: Between Theoretical and Computational Mathematics, Rosendal (Norway).
- 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 (Switzerland).

Teaching

- 2025-2027 Lecturer for “Foundations of deterministic and stochastic geometric numerical integration”, Master, Univ Rennes.
- 2024-2025 Lecturer for “Introduction to geometric numerical integration”, Master, Univ Rennes.
- 2023-2025 Mock oral exams for the modelisation part of the agrégation, ENS Rennes.
- 2023-2025 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.

Students supervision

PhD

2025-2028 Sébastien Macé (with N. Crouseilles)

Master

2025 Sébastien Macé (with N. Crouseilles)

2024 Dorian Coudière

2024 Marie De Penguern (with N. Crouseilles)

2023 Mahmoud Naesan Menla Ali (with G. Bogfjellmo)

2023 Marco Cacace (with H. Z. Munthe-Kaas)

2021 Eugen Bronasco (with G. Vilmart)

Bachelor

2024-2025 Yann Bellardi, Jules Guerault, Valérie Maleappa

2023-2024 Amar Ahmane, Tristan Roy

2022-2023 Nora Bemanian (with F. Valet)

2021-2022 Xalbador Otxandorena Ieregi (with H. Z. Munthe-Kaas)

Science outreach

03/2026 Co-organiser of the Math.en.JEANS congress (Rennes)

11/2025 Co-organiser and animator at Journées scientifiques (Saint-Grégoire)

10/2025 Participation to the conference "From research to outreach", Les Diablerets (Switzerland)

10/2025 Co-organiser and animator at fête de la science (Rennes)

06/2025 Speaker and local helper for the journées Parité, Rennes.

04/2025 Invited animator at the workshop "Les Marmottes - Filles et Maths" (Switzerland)

03/2025 Speaker at the MixTic seminar for computer science students (Rennes)

10/2024 Co-organiser and animator at the festival des sciences (Rennes)

09/2024 Speaker at 5 minutes Lebesgue

07/2024 Invited speaker for the "Livestorm Doctorant.e.s : la médiation scientifique, pour quoi faire ?"

06/2024 Collaboration with T. Menuet for the creation of a riddle mixing mathematics and music

05/2024 Co-organiser for the workshop Maths C pour L

05/2024 Animator for the club Rennes et maths

04/2024 Invited animator at the workshop "Les Marmottes - Filles et Maths" (Switzerland)

02/2024 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 Opplev 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 Animator at the “Nuit de la science” (Geneva) - performer of a play on knot theory for the Science Me show

Computer skills

Scientific Julia, Python, Matlab, Scilab, Mathematica, Maple
 Others Parallel computing, HTML, L^AT_EX

Languages

French Native
 English Fluent
 Norwegian Intermediate
 German Intermediate

References

Research

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Teaching and science outreach

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