Oscar Vincent Philippe COSSERAT

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Personal homepage
arXiv page

Qualified for Maître de Conférence in sections 25 (**pure Mathematics**), 26 (**applied Mathematics**) and 60 (**Mechanics**)

POSITION

2026–2027 Post-doctoral position at ICMAT, Madrid

2023–2025 Post-doctoral position at Göttingen Mathematisches Institut

2020–2023 CNRS PhD student at La Rochelle Université

Theory and Construction of Structure Preserving Integrators in Poisson Geometry

supervised by Camille Laurent-Gengoux and Vladimir Salnikov.

EDUCATION

2019 Master MATH, Paris Sciences et Lettres (PSL)

at Paris-Dauphine, Observatoire de Paris, Sorbonne Université

Hamiltonian systems, dynamical systems, ergodic theory, stochastic calculus

Master thesis : *Existence, construction et obstruction à la globalisation des coordonnées action-angle*, directed by Jean-Pierre Marco (Analyse algébrique, Sorbonne Université)

2018 Master 1 at Humboldt-Universität, Berlin

Non-linear analysis, variational calculus, stochastic calculus, Riemann surfaces, algebraic number theory

2017 Bachelor CPES, Paris Sciences et Lettres

Initiation to research.

Bachelor thesis : *Saddle Lemma and application in quantum chemistry* directed by David Gontier (CEREMADE)

2017 Bachelor at Université Paris-Dauphine

Numerical analysis, differential calculus, functional analysis, linear algebra, Galois theory, multidimensional probability, computer science

AWARDS

- Prix Paul Germain, Congrès Français de Mécanique 2025.
- Concours Conter et Rencontrer les Sciences 2024, « Coup de cœur » Prize
- Second prize of the jury, National final 2022, "Ma Thèse en 180 Secondes"

FUNDED RESEARCH PROJECTS AND PROGRAMS

- PhD mobility program at Göttingen Mathematisches Institut under the supervision of Prof. Zhu, June–August 2023.
- Grant for invitations at the Poisson 2022 Advanced School and the Poisson 2022 Conference.
- participant of PHC Procope, 2022-2023.
- participant of CNRS project Graded Geometry and Numerical Methods, 2020-2023.

PUBLICATIONS

In refereed journals

[1] O. C. "Symplectic groupoids for Poisson integrators". In: *Journal of Geometry and Physics* 186 (2023), pp. 1–19. DOI: https://doi.org/10.1016/j.geomphys.2023.104751.

[2] O. C., A. Kotov, C. Laurent-Gengoux, L. Ryvkin, and V. Salnikov. "On Dirac structures admitting a variational approach". In: *Mathematics and Mechanics of Complex Systems* 11.1 (2023), pp. 1–18. DOI: 10.2140/memocs.2023.11.1.

[3] O. C., C. Laurent-Gengoux, and V. Salnikov. "Numerical methods in Poisson geometry and their application to mechanics". In: *Mathematics and Mechanics of Solids* 29.5 (2024), pp. 904–923. DOI: 10.1177/10812865231217096.

[4] O. C. "Some stability properties of Hamiltonian Poisson integrators". In: (2025), pp. 1–21. to appear in Comptes Rendus Mécanique: arXiv:2511.14303.

[5] O. C. and L. Le Marrec. "Timoshenko beam under finite and dynamic transformations: Lagrangian coordinates and Hamiltonian structures". In: *Communications in Analysis and Mechanics* 18.1 (2026), pp. 37–69. DOI: 10.3934/cam.2026002.

[6] O. C., D. Razafindralandy, and C. Selçuk. "Vorticity-dependent and symmetry-preserving LES models". In: *European Journal of Mechanics - B/Fluids* 118 (2026). DOI: https://doi.org/10.1016/j.euromechflu.2026.204478.

[7] Adrien Busnot Laurent and Oscar Cosserat. "Butcher series for Hamiltonian Poisson integrators through symplectic groupoids". In: *Annali di Matematica Pura ed Applicata (1923 -)* (Oct. 2026). DOI: 10.1007/s10231-026-01756-3. URL: https://link.springer.com/article/10.1007/s10231-026-01756-3.

Submitted preprints

[1] O. C., Damiano Rigo, and Vladimir Salnikov. "Extending geometric integrators to control systems - an example study". Oct. 2026. URL: https://hal.science/hal-05740249.

Refereed proceedings

[1] O. C., Kotov A., C. Laurent-Gengoux, L. Ryvkin, and V. Salnikov. "Dynamique de Dirac pour les problèmes mécaniques". In: *25ème Congrès Français de Mécanique*. Nantes, France, Aug. 2022, pp. 1–4. URL: https://hal.science/hal-03782507v1.

[2] O. C., C. Laurent-Gengoux, and V. Salnikov. "Intégrateurs Géométriques en Géométrie de Poisson". In: *25ème Congrès Français de Mécanique*. Nantes, France, Aug. 2022, pp. 1–10. URL: https://hal.science/hal-03782503v1.

[3] O. C. "Une théorie géométrique des intégrateurs de Poisson pour la mécanique hamiltonienne". In: *26ème Congrès Français de Mécanique*. Metz, France, Aug. 2025, pp. 1–20. URL: https://hal.science/hal-05273652.

Work in progress

- O. C., J.-P. Marco, *Nearly optimal uniform lower bounds of the splitting in analytic near-integrable Hamiltonian systems*, in final preparation.
- V. Carlier, O. C., L. Le Marrec, A. Patel, *Energetic exchanges between vibration modes along bifurcations in the Timoshenko model*, in preparation.
- D. Calaque, O. C., *A semi-classical formality theorem*, in preparation.

SCIENTIFIC EVENTS ORGANISATION

July 2026 Organizer of the RTG Summer School "Higher Categories for the Working Mathematician", Göttingen.

June 2024 Co-organizer of the Working seminar on singular foliations

May 2023 Co-organizer of the La Rochelle Poisson Conference 2023

STUDENTS SUPERVISION

Master thesis

2025–2026 Simon Klanke (Msc. Göttingen), Dirac Structures and variational principles

Bachelor thesis

2026–2027 Antonio Moroño Moreno (Bsc. Universidad Autónoma de Madrid), Symplectic integrators: an introduction to Hamiltonian mechanics (ongoing thesis)

2025–2026 Fatih Sayin (Bsc. Göttingen), Lie-Poisson and Euler-Poincaré reductions

Research internships

2026 Juan de Frutos Jiménez (Bsc. Universidad de Valladolid), Symplectic integrators: an introduction to Hamiltonian mechanics

TEACHING ACTIVITIES

2025 Göttingen Universität, leader of a student Seminar

Symplectic geometry

2024-2025 Göttingen Universität, Teaching Assistant for Mathematics Bachelor

Differential calculus I and II

2024 Göttingen Universität, Teaching Assistant for Mathematics Bachelor

Complex analysis

2023 Göttingen Universität, Lecturer for Mathematics Bachelor

Group theory

2023 Göttingen Universität, 1^{st} year of Physics Bachelor

Mathematics for physics

2023 La Rochelle Université, Teaching assistant in 1^{st} year of Civil Engineering Bachelor

Integral calculus and differential equations

2022 La Rochelle Université, Teaching assistant in 1^{st} year of Mathematics Bachelor

2021 La Rochelle Université, Teaching assistant, 3^{rd} year of Civil Engineering Bachelor

Tensor analysis, Fourier series and Laplace transform

2021 Exercise session of Quiberon CNRS Summer school

Differential geometry in mechanics: curvature of surfaces

2018 Oral sessions of mathematics in "Classes préparatoires" Lavoisier, Paris

COLLECTIVE RESPONSABILITIES

2026 Peer-reviewer of Journal of Mathematical Biology and Comptes Rendus Mécanique

2025 Peer-reviewer of Foundations of Computational Mathematics

2025 Equal opportunity commissioner for the Göttingen Mathematics Intitute

2024 Peer-reviewer of IMA Journal of Numerical Analysis

2022 Elected PhD students representative at the Research Committee of La Rochelle Université

SCIENCE OUTREACH

May 2023 Member of AKMA3 oceanographic expedition

"Tourbillons" is a book I wrote (to be published) aiming at relating the scientific mission and explaining fluid dynamics with poetry. The text won the 2024 "Coup de cœur" prize of AUF.

Radios

June 2022 La Méthode Scientifique, France Culture

May 2022 L'invité de France Bleu La Rochelle, France Bleu La Rochelle

Newspapers

June 2022 Ma thèse en 180 secondes : le doctorant rochelais finit 2e de la finale nationale, Sud-Ouest

May 2022 Charente-Maritime : c'est le grand jour pour le Rochelais Oscar Cosserat, en finale du concours Ma thèse en 180 secondes, Sud-Ouest

March 2022 Talence : le Rochelais Oscar Cosserat premier prix de la finale régionale de « Ma thèse en 180 secondes », Sud-Ouest

Internet

May 2026 Interview about the Paul Germain prize, ICMAT YouTube Channel

April 2025 Interview about my PhD, Réseau National des Écoles Doctorales Sciences pour l'Ingénéieur

May 2023 Discovering of the mud volcano Borealis in the Barents Sea by AKMA3 expedition, NTB Kommunikasjon (norwegian press release of the discovery)

May 2022 Rencontre avec Oscar Cosserat, deuxième prix du jury de MT180, Institut des Sciences et de l'Ingéniérie des Systèmes, CNRS

Meeting

2022 "Cordées de la réussite", meeting with high-school students promoting research and PhD

TALKS

Conferences

- Deformation of Lagrangian submanifolds and numerical analysis, XXXIV International Fall Workshop on Geometry and Physics, Tarragona, Spain, September 2026.
- Hamiltonian Poisson integrators, FoCM 2026, Vienna, Austria, July 2026.
- Timoshenko beam under finite and dynamic transformations: Lagrangian coordinates and Hamiltonian structures, ICoNSoM2026, Alghero, Italy, June 2026.
- Generating functions for variational integrators, Mini-symposium: Geometric integration techniques for the numerical integration of evolutionary problems, CANUM2026, Britany, France, June 2026.
- Hamiltonian dynamics on Poisson manifolds and symplectic groupoids, Infinite-dimensional Geometry: Theory and Applications (Thematic Programme), Erwin Schrödinger International Institute for Mathematics and Physics (ESI), Vienna, Austria, January 2025.
- Structure-preserving integration in Poisson geometry, and a bit of Hamiltonian PDEs, NumKin 2024, Max Planck Institut für Plasmaphysik, Munich, Germany, November 2024.
- Tracking Liouville tori on a symplectic foliation, Developments in Modern Mathematics: the 2nd WiMGo conference, Göttingen, Germany, September 2024.
- Hamilton-Jacobi equation for Poisson Hamiltonian dynamics and tree-like algebraic structures, Decorated Tree-like structures for singular dynamics, Nancy, France, May 2024.

- Vertex Dynamics : from the planar case to the third dimension, Margaux PhD Days, Poitiers, May 2023.
- Intégrateurs géométriques en géométrie de Poisson, CFM, Nantes, August 2022.
- Symplectic groupoids for Poisson integrators, Higher Structures and Field Theory, ESI, Vienna, Austria, August 2022.
- Geometric Integrators in Poisson geometry, Margaux PhD Days, Bordeaux, May 2022.

Lectures

- Invariant theory of Hamiltonian mechanics and related numerical analysis, RTG Lecture, Mathematisches Institut, Göttingen, December 2025.
- Invariant theory of Hamiltonian mechanics and related numerical analysis, Topology and Geometry Seminar (online), IIIT Delhi, India, September 2025.
- Invariant theory of Hamiltonian mechanics and related numerical analysis, Sino-Russian Mathematics Center-JLU Colloquium (2025-030) (online), Jilin University, China, August 2025.

Seminars

- Deformation theory and numerical analysis in Poisson geometry, ALPE seminar, Barcelona, November 2026.
- Hamiltonian dynamics for vibration problems, MIMESIS seminar, LaMCoS, INSA Lyon, September 2026.
- Analytical mechanics, invariants and numerical analysis, COMMET seminar, LMPS, Saclay, June 2026.
- Symplectic groupoids and combinatorics, An afternoon of mathematical physics, IRMA, Strasbourg, May 2026.
- A geometric approach to the splitting of invariant manifolds, Geometry seminar of ICMAT, Spain, March 2025.
- Hamiltonian dynamics and combinatorics for a Hamilton-Jacobi equation, Geometry, mechanics and control theory seminar of ICMAT, Madrid, Spain, November 2025.
- Symplectic groupoids, Hamilton-Jacobi equation and deformation theory, Geometry seminar, Università degli Studi di Salerno, Italy, November 2025.
- An introduction to Hamiltonian mechanics and its adapted numerical methods, DIPMAT, Università degli Studi di Salerno, Italy, November 2025.
- Symplectic foliations and combinatorics for a Hamilton-Jacobi equation, Séminaire de Géométrie Analytique, IRMAR, Rennes, November 2025.
- Hamiltonian mechanics of the Timoshenko model on the moving frame, Numerical Methods for Plasma Physik Seminar, Garching, Germany, June 2025.

- Hamiltonian dynamics and symplectic groupoids, AGATA Seminar, Montpellier, March 2025.
- Hamiltonian mechanics, Comfluans working group, Montpellier, March 2025.
- A few analytical aspects concerning geometric integration, LaSIE Seminar, La Rochelle, October 2024.
- A few analytical aspects concerning geometric integration, Research Seminar in applied mathematics, ENS Ker Lann, Rennes, October 2024.
- Symplectic foliations: Hamiltonian dynamics and resonances, GAGALie Seminar, Poitiers, September 2024.
- Structure-preserving integrators in Poisson geometry, Seminar, Centre for Mathematics, University of Coimbra, Portugal, January 2024.
- Poisson geometry and applications in numerical analysis, Analysis Seminar of Institut de Recherche Mathématique de Rennes, March 2023.
- Poisson geometry and applications in numerical analysis, PhD Seminar of Institut Élie Cartan de Lorraine, Metz, March 2023.
- Groupoids endowed with a multiplicative structure for numerical analysis in theoretical mechanics, Geometry, Mechanics and Control Seminar (online), Instituto de Ciencias Matemáticas, Madrid, Spain, March 2023.
- Poisson geometry : theory, examples and applications in numerical analysis, LaSIE seminary, La Rochelle, March 2023.

Seminars in Göttingen

- Operadic deformation of the cotangent groupoid, Higher Strucures Seminar, Göttingen, Germany, April 2025.
- Angles in symplectic geometry and related topics, Obersmeinar Topology/Geometry, Göttingen, Germany, January 2025.
- It is interesting to be slightly perturbed, PhD Seminar, Göttingen, Germany, June 2024.
- Hopf algebras and dynamical systems II, Higher structures seminar, Göttingen, Germany, June 2024.
- Hopf algebras and dynamical systems I, Oberseminar Topology/Geometry, Göttingen, Germany, June 2024.
- Symplectic groupoids for Poisson integrators, RTG Colloquium, Mathematisches Institut, Georg-August-Universität Göttingen, Germany, November 2023.
- Groupoids endowed with a multiplicative structure and perturbation theory in Poisson geometry, Higher Structures Seminar, Mathematisches Institut, Georg-August-Universität Göttingen, Germany, June 2023.
- On the geometry of isotropic bisections of a presymplectic groupoid, Göttingen Universität, Germany, October 2022.

CNRS Research Regroupement "Differential Geometry and Mechanics"

- Multisymplectic variational integrators for field theories, Paris, November 2026.
- Generating functions for variational integrators in infinite dimension, INSA Lyon, June 2026.
- Towards geometric integrators for the Timoshenko model, Université de La Rochelle, June 2025.
- Hamiltonian formulation of the Timoshenko model, Université de La Rochelle, June 2024.
- Hamiltonian approach for the construction of long-time stable integrators in bi-dimensional incompressible fluids on the sphere, IRCAM, Paris, Mai 2024.
- A space geometric discretisation of 2-dimensional incompressible fluid through Poisson brackets, La Rochelle Université, June 2023.
- Perturbative Dynamics and Backward Analysis, ENS Paris-Saclay, November 2022.
- Geometric Integrators in Poisson geometry, Bordeaux, June 2022.
- Discretization of Poisson Structures, La Rochelle, June 2021.

Talks in schools, workshops and meetings

- Symplectic groupoids: An unexpected Hopf algebra, BCGW-U Meeting, Würzburg, December 2025.
- Connes-Kreimer Characters and Lie-Butcher series for Hamiltonian Poisson integrators, Rencontres de l'ANR Combinatoire Algébrique, Résurgence, Probabilités Libres et Opérades (CARPLO), Besse, October 2024.
- Hamiltonian dynamics and groupoids endowed with a multiplicative structure, 2023 Winter School in Mathematical Physics, Les Diablerets, Switzerland, January 2023.
- Hamiltonian systems and groupoids endowed with a multiplicative structure, Atelier on Higher Structures in Differential Geometry, Lyon, December 2022.

Working group at LaSIE, La Rochelle Université

- Poisson integrators, February 2022.
- "Lie groupoids and algebroids applied to the study of uniformity and homogeneity of material bodies", January 2021.
- Integrable Hamiltonian systems, October 2020.

CONFERENCES, WORKSHOPS, SCHOOLS AND MEETINGS

- CNRS Summer school Fondements théoriques de la plasticité, Quiberon, September 2026.
- Poisson school and conference 2026, Belgium, August 2026.

- Structures Hamiltoniennes en mécanique des milieux à plusieurs échelles, Vèbre, France, April 2026.
- VIII Iberoamerican Meeting on Geometry, Dynamics, and Field Theory, Tenerife, Spain, January 2026.
- CNRS Summer school Méthodes Variationnelles en Mécanique, Quiberon, September 2025.
- Bonn – Cologne – Würzburg – Göttingen Higher Structures Meeting, Burbach, Germany, March 2025.
- CNRS Summer school Problèmes Inverses en Mécanique, Quiberon, September 2024.
- Poisson 2024, Accademia Pontaniana, Napoli, July 2024.
- Bonn – Würzburg – Göttingen Higher Structures Meeting, Kloster Höchst, Germany, October 2023.
- CNRS Summer school Approches théoriques pour les métamatériaux, Quiberon, September 2023.
- The many interactions of symplectic and Poisson geometry (in honour of Alan Weinstein's 80th birthday), IHP, Paris, June 2023.
- Thematic trimester at IHP Higher Structures in Geometry and Mathematical Physics, IHP, Paris, Spring 2023.
- CIRM-IHP Program Research School Higher Structures in Geometry and Mathematical Physics, CIRM, Marseille, April 2023.
- Göttingen Mathematisches Institut, Göttingen, October 2022.
- Poisson 2022 Conference, ICMAT Madrid, July 2022.
- Summer school Advanced Poisson School, CRM, Barcelona, July 2022.
- CNRS Summer school Champs de Phases en Mécanique, Quiberon, September 2022.
- Winter school "Foliations, pseudodifferential operators and groupoids", University of Göttingen, March 2022.
- Winter school "Lie Theory and Poisson Geometry", CIRM, January 2022.
- Poisson meeting 2020, La Rochelle, October 2021.
- CNRS Summer school Differential geometry in mechanics, Quiberon, September 2021.
- Summer school "Geometry for Higher Spin Gravity: Conformal Structures, PDEs, and Q-manifolds", Erwin Schrödinger Institute for Mathematics and Physics (ESI), Vienna, August 2021.
- Graded geometry and numerical methods 2.0, IHP, Paris, October 2021.
- CNRS Summer school "Méthodes Probabilistes et Stochastiques en Mécanique", Quiberon, Septembre 2020.
- GraNum meeting, La Rochelle, August 2020.

LANGUAGES

- French: native
- English: Spoken : advanced – Written : advanced
- German: Spoken : advanced – Written : advanced
- Spanish: Spoken : advanced – Written : advanced

PROGRAMMING LANGUAGES

- Good level: Python
- Good level: Latex