

Nikolas TAPIA

Curriculum Vitae

* 18.07.1988

✉ tapia@wias-berlin.de

🌐 <https://wias-berlin.de/people/tapia>

🆔 0000-0003-0018-2492

👤 [ntapiam](#)

Research Positions



Postdoc, WIAS & HU Berlin, Germany

Postdoc position at WIAS (50%) and HU Berlin (50%), as part of the CRC/SFB/TRR 388 “Rough Analysis, Stochastic Dynamics and Related Fields” project B01 “Statistical learning from path observations”.



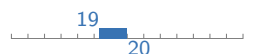
Postdoc, WIAS, Germany

Postdoc position at WIAS, as part of the BMS MATH⁺ AA4-2 project “Optimal Control in Energy Markets Using Rough Analysis and Deep Networks”.



Postdoc, WIAS & TU Berlin, Germany

Joint postdoc position at WIAS (50%) and TU Berlin (50%), as part of the BMS MATH⁺ EF1-13 project “Stochastic and Rough Aspects in Deep Neural Networks”.



Postdoc, WIAS & TU Berlin, Germany

Joint postdoc position at WIAS (50%) and TU Berlin (50%), as part of the BMS MATH⁺ EF1-5 project “On robustness of deep neural networks”.



Postdoc, NTNU Trondheim, Norway, (6 months)

ERCIM postdoc position at the Norwegian University of Science and Technology, hosted by K. Ebrahimi-Fard.

Academic Formation



PhD in Mathematics, U. de Chile and Sorbonne Université, Chile and France

Joint diploma under the direction of D. Remenik (UCh) and L. Zambotti (SU).

Thesis: *Directed Polymers and Rough Paths*.



MSc. Mathematical Engineering, U. de Chile, Chile

Thesis: *Exponential ergodicity for AIMD Markov processes*

Teaching Experience



Lecturer, Technische Universität Berlin, Germany, taught in German
Versicherungsmathematik.



Lecturer, Technische Universität Berlin, Germany, taught in German
Stochastik für Informatik(er).



Lecturer, Universidad de Chile, Chile

Multivariate Calculus.



Lecturer, Universidad de Los Andes, Chile

Advanced calculus.

Languages

Spanish Native

English Advanced

French B2+

German B1+

Computer skills

Python, Lean Advanced

Julia, Rust Intermediate

L^AT_EX Advanced

Research keywords

Residual Neural Networks, Rough Paths, Signatures, Numerical Analysis, Hopf algebras.

Scholarships and Grants

October 2018–April 2019, European Research Consortium for Informatics and Mathematics (ERCIM)

Alain Bensoussan postdoctoral fellowship

March 2014–September 2018, Chilean National Council for Research and Development
Doctoral scholarship

Students

Dunjian Li **May–October 2025**, MSc in Mathematics at HU Berlin
Differential Equations on Manifolds with Rough Paths Techniques
Cotutored with Markus Reiß

Publications and preprints

- [1] C. Bayer, P. K. Friz, and N. Tapia, *Stability of deep neural networks via discrete rough paths*, *SIAM J. Math. Data Sci.* **5** (2023), no. 1, 50–76.
- [2] J. Beda, G. dos Reis, and N. Tapia, *An introduction to tensors for path signatures*, *Signature Methods in Finance* (C. Bayer, G. dos Reis, B. Horvath, and H. Oberhauser, eds.), Springer Finance, Springer, Cham, 2026, pp. 65–83.
- [3] C. Bellingeri, A. Djurdjevac, P. K. Friz, and N. Tapia, *Transport and continuity equations with (very) rough noise*, *Partial Differ. Equ. Appl.* **2** (2021), no. 4, Paper No. 49, 26.
- [4] C. Bellingeri, E. Ferrucci, and N. Tapia, *Branched Itô formula and natural Itô-Stratonovich isomorphism*, *Adv. Math.* **484** (2026), 110687.
- [5] N. Berglund, T. Klose, and N. Tapia, *Perturbative renormalisation of the $\phi_{4-\varepsilon}^4$ model via generalized wick maps*, 2025, [arXiv:2507.03820](https://arxiv.org/abs/2507.03820) [math.PR].
- [6] E. Celledoni, P. I. E. Lystad, and N. Tapia, *Signatures in shape analysis: an efficient approach to motion identification*, *Geometric science of information, Lecture Notes in Comput. Sci.*, vol. 11712, Springer, Cham, 2019, pp. 21–30.
- [7] I. Chevyrev, J. Diehl, K. Ebrahimi-Fard, and N. Tapia, *A multiplicative surface signature through its magnus expansion*, 2024, [arXiv:2406.16856](https://arxiv.org/abs/2406.16856) [math.RA].
- [8] I. Chevyrev, E. Ferrucci, D. Lee, T. Lyons, H. Oberhauser, and N. Tapia, *Orthogonal polynomials on path-space*, 2026, [arXiv:2602.18808](https://arxiv.org/abs/2602.18808) [math.PR].
- [9] J. Diehl, K. Ebrahimi-Fard, and N. Tapia, *Iterated-sums signature, quasisymmetric functions and time series analysis*, *Sém. Lothar. Combin.* **84B** (2020), Art. 86, 12.
- [10] ———, *Time-warping invariants of multidimensional time series*, *Acta Appl. Math.* **170** (2020), 265–290.
- [11] ———, *Tropical time series, iterated-sums signatures, and quasisymmetric functions*, *SIAM J. Appl. Algebra Geom.* **6** (2022), no. 4, 563–599.
- [12] ———, *Generalized iterated-sums signatures*, *J. Algebra* **632** (2023), 801–824.
- [13] J. Diehl, R. L. D. Preiß, M. Ruddy, and N. Tapia, *The moving-frame method for the iterated-integrals signature: Orthogonal invariants*, *Found. Comput. Math.* **23** (2023), no. 4, 1273–1333.
- [14] K. Ebrahimi-Fard, F. Patras, N. Tapia, and L. Zambotti, *Hopf-algebraic deformations of products and Wick polynomials*, *Int. Math. Res. Not. IMRN* (2020), no. 24, 10064–10099.
- [15] ———, *Wick polynomials in noncommutative probability: a group-theoretical approach*, *Canad. J. Math.* **74** (2022), no. 6, 1673–1699.
- [16] ———, *Shifted substitution in non-commutative multivariate power series with a view toward free probability*, *SIGMA Symmetry Integrability Geom. Methods Appl.* **19** (2023), Paper No. 038, 17.
- [17] P. K. Friz, P. P. Hager, and N. Tapia, *Unified signature cumulants and generalized Magnus expansions*, *Forum Math. Sigma* **10** (2022), Paper No. e42, 60.
- [18] ———, *On expected signatures and signature cumulants in semimartingale models*, *Signature Methods in Finance* (C. Bayer, G. dos Reis, B. Horvath, and H. Oberhauser, eds.), Springer Finance, Springer, Cham, 2026, pp. 381–424.
- [19] L. Schmitz and N. Tapia, *Free generators and hoffman's isomorphism for the two-parameter shuffle algebra*, *Commun. Algebra* (2025).

- [20] D. Shmelev, K. Ebrahimi-Fard, N. Tapia, and C. Salvi, *Explicit and Effectively Symmetric Runge-Kutta Methods*, 2025, [arXiv:2507.21006](#) [math.NA].
- [21] N. Tapia and L. Zambotti, *The geometry of the space of branched rough paths*, *Proc. Lond. Math. Soc.* (3) **121** (2020), no. 2, 220–251.
- [22] M. G. Varzaneh, S. Riedel, A. Schmeding, and N. Tapia, *The geometry of controlled rough paths*, *Stochastic Process. Appl.* **184** (2025), Paper No. 104594, 27.