

Curriculum Vitae

NATHAN SILVANO

PERSONAL INFORMATION

NAME: Nathan de Oliveira Silvano
NATIONALITY: Brazilian
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I'm a theoretical physicist interested in the description of dynamical phase transitions in biological systems. I have a background in quantum field theory and its applications to condensed matter and stochastic dynamics.

EDUCATION

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|-------------|---|
| 2020 - 2024 | Ph.D. degree in Physics, UERJ, Brazil
with Sandwich period at CASUS, Germany
Thesis : Non-equilibrium dynamics: phase transitions and pattern formation.
Advisor: Dr. Daniel G. Barci .
Co-Advisor: Dr. Ricardo Martínez-García |
| 2018- 2020 | Master's degree in Physics, UERJ.
Thesis : Black Holes in Horndesky Theory.
Advisor: Dr. Rodrigo Maier. |
| 2013 - 2018 | Bachelor's degree in Physics, UERJ.
Thesis : Accelerated Expansion in Gauss-Bonnet Theory.
Advisor: Dr. Rodrigo Maier. |

LIST OF PUBLICATIONS

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| IN PREPARATION | <i>Spatial patterning makes ecological systems more resistant to environment-driven stochastic extinctions.</i> N.O. Silvano, E.H. Colombo, C. López, R. Martínez-García. |
| PRE-PRINT | <i>Shear and transport in a flow environment determine spatial patterns and population dynamics in a model of nonlocal ecological competition.</i> N.O. Silvano, J. Valeriano, E. Hernández-García, C. López, R. Martínez-García. DOI: 10.48550/arXiv.2409.04268 |
| PUBLISHED 1 | <i>Dynamical phase transitions in two-dimensional Brownian Matter</i> N.O. Silvano, D.G. Barci. Physica A 666, 130482 (2025) |
| 2 | <i>Laser induced \mathcal{PT}-symmetry breaking in the fluctuations of electronic fluids.</i> R. Aquino, N.O. Silvano, D.G. Barci. PRB 110, 085147 (2024). |
| 3 | <i>Emergent Gauge Symmetry in Active Brownian Matter</i> N.O. Silvano, D.G. Barci. PRE 109, 044605 (2024). |
| 4 | <i>The role of multiplicative noise in critical dynamics</i> N.O. Silvano, D.G. Barci. Physica A 630, 129246 (2023). |

FURTHER EDUCATION

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| 2024 | School on Active Matter (ICTP-SAIFR/IFT-UNESP, São Paulo, Brazil). |
| 2023 | XI GEFENOL Summer school on Statistical Physics of Complex Systems (UB, Barcelona, Spain). |
| 2021 | Serrapilheira/ICTP-SAIFR Training Prog. in Quantitative Biology and Ecology. (5-31 July 2021) |

2021 III Escola Jayme Tiomno de Física Teórica - Nonlinear Phenomena in Biology, 10hrs (USP, São Paulo, Brazil).

RESEARCH VISITS

APRIL 2023 - JANUARY 2024 – Center for Advanced Systems Understanding - Helmholtz Zentrum Dresden Rossendorf (CASUS-HZDR). Exchange doctoral program - advisor: Dr. Ricardo Martínez-García.

FELLOWSHIPS

2025 - on going Maria de Maetzu, .
 2023 - 2024 Sandwich Fellowship/PDSE, CAPES-PrInt.
 2020 - 2024 CAPES fellowship. Ministry of Education of Brazil.
 2018 - 2020 CAPES fellowship. Ministry of Education of Brazil.
 2015 - 2017 Scientific initiation fellowship, FAPERJ.

PRESENTATIONS

Talks

2024 *Pattern formation in non-local models of population dynamics under variable environmental conditions.* Autumn Meeting 2024 Brazilian Physics Society (Santa Catarina, Brazil).
 2023 *The role of multiplicative noise in critical dynamics.* XI GEFENOL Summer School on Statistical Physics of Complex Systems (Barcelona, Spain).
 2022 *The role of multiplicative noise in critical dynamics.* IV Jornada do PPGF-UERJ (Rio de Janeiro, Brazil).
 2021 *Corridors Between Fragmented Patches An Approach With Contact Process.* Training Program in Q-Bio & Ecology (São Paulo, Brazil).

Posters

2024 *Emergent Gauge Symmetry in Active Brownian Matter.* Autumn Meeting 2024 Brazilian Physical Society (Santa Catarina, Brazil).
 2023 *Spatial patterning makes ecological systems more resistant to environment-driven stochastic extinctions.* Big data analytical methods for complex systems (Wroclaw, Poland).
 2022 *Critical Dynamics of Multiplicative Systems.* Autumn Meeting 2022 Brazilian Physical Society (São Paulo, Brazil).
 2021 *Critical Dynamics of Multiplicative Systems.* Brazilian Meeting on Statistical Physics (Brazil).
 2021 *Critical Dynamics of Multiplicative Systems.* VII National Workshop of Quantum Field Theory (Rio de Janeiro, Brazil).
 2017 *Study of Refrigerant capacity of Amorphous Ribbons.* 26^a Scientific Initiation Week of UERJ (Rio de Janeiro, Brazil).

EVENT ORGANIZATION

2022 IV Jornada do PPGF-UERJ.
 "Jornada do PPGF-UERJ" or "UERJ's Graduate Program Journey" consist in a week where the graduate students present their works to the physics institute and regional scientific community.

SKILLS

- Analytic methods for stochastic process;
 - Mathematical modeling of Biological Interactions;
 - Numerical integration of differential equations;
 - QFT Renormalization Group;
 - Differential Geometry;
 - Mean field theory techniques
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- Programming Languages : Python, Mathematica.

LANGUAGES

English — Understands, speaks, writes and reads well;

Portuguese — Native;

Spanish — Understands and reads well, basic speaking and writing;

German — Basic A1.