Curriculum Vitae
NATHAN SILVANO

PERSONAL INFORMATION

NAME: Nathan de Oliveira Silvano
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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.

Some of my research interests are:

Nonlinear Dynamics, Complex Systems, Statistical Physics, Condensed Matter, Active Matter, Pattern Formation, Biological Modelling, Quantum Field Theory.

PROFESSIONAL ACTIVITY

Jan/2025 -	Postdoctoral Researcher at Institute for Cross-Disciplinary Physics and Complex Systems, CSIC-UIB (Palma de Mallorca, Spain).

ACADEMIC DEGREES

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
2020	**Master's degree in Physics**, UERJ. Thesis : *Black Holes in Horndesky Theory.* Advisor: Dr. Rodrigo Maier.
2018	**Bachelor's degree in Physics**, UERJ. Thesis : *Accelerated Expansion in Gauss-Bonnet Theory.* Advisor: Dr. Rodrigo Maier.

LIST OF PUBLICATIONS

IN PREPARATION	*Stochastic Thermodynamics of Pattern-Forming Brownian Systems.* N.O. Silvano, P.V. Paraguassú, C. López, E. Hernandez-García.
PRE-PRINT	*The impact of fluctuations on particles systems described by Dean-Kawasaki-type equations.* N.O. Silvano, C. López, E. Hernandez-García. DOI:10.48550/arXiv.2510.25454
PUBLISHED 1	*Flow spatial structure determines pattern instabilities in nonlocal models of population dynamics* N.O. Silvano, *et.al.* **Commun Phys** 8, 326 (2025)
2	*Dynamical phase transitions in two-dimensional Brownian Matter* N.O. Silvano, D.G. Barci. **Physica A** 666, 130482 (2025)
3	*Laser induced $\mathcal{PT}$-symmetry breaking in the fluctuations of electronic fluids.* R. Aquino, N.O. Silvano, D.G. Barci. **PRB** 110, 085147 (2024).

4 *Emergent Gauge Symmetry in Active Brownian Matter* N.O. Silvano, D.G. Barci. **PRE** 109, 044605 (2024).

5 *The role of multiplicative noise in critical dynamics* N.O. Silvano, D.G. Barci. **Physica A** 630, 129246 (2023).

6 *Theoretical investigation on the magnetocaloric effect in amorphous Eu80Au20 system.* S.S. Costa and O.A.V. Roriz and N.O. Silvano and P.J. von Ranke and E.P. Nóbrega. **JMMM** 414, 78-81 (2016).

Further education

2025 Advanced Lecture Course on Computational Systems Biology (Centre Paul-Langevin, Aussois, France).

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

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.* Autunm 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

2025 *Flow spatial structure determines pattern instabilities in nonlocal models of population dynamics.* CompSysBio 2025 Centre Paul Langevin (Aussois, France).

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.* 26ª 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.

2021 III Jornada do PPGF-UERJ .

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

- Programming Languages : Python, Mathematica.

Languages

English — Advanced;

Portuguese — Native;

Spanish — Advanced;

German — Basic A1.