In total, I have published 28 peer-reviewed papers and 8 preprints, 20 of them as first or co-first author and 4 as last or co-last author, including 4 in *Physical Review Letters*, 1 in *Physical Review X*, 2 in *PNAS*, 1 in *Science Advances* and 1 in *Nature Ecology & Evolution*.

Highlighted publications

Balancing information and dissipation with partially observed fluctuating signals — Phys. Rev. Lett.
G. Nicoletti, I. Di Terlizzi, D. M. Busiello — *137, 127101 (2026)*
Featured on the cover of Physical Review Letters, Editors' Suggestion, and Viewpoint in APS *Physics*
I conceived the idea together with my co-authors, developed the research, performed the analytical calculations and numerical simulations

Decoding behavior with minimal and interpretable agent models — PLOS Comp. Bio.
G. Nicoletti, A. Celani — *22 (8), e1014585 (2026)*
I conceived the project and developed the algorithm for inferring memory states from behavior. I implemented the method, tested it on simulated trajectories, and used it on experimental data.

Information propagation in multilayer systems with higher-order interactions across timescales — Phys. Rev. X
G. Nicoletti, D. M. Busiello — *14 (2) 021007 (2024)*
Jointly with D. M. Busiello, I conceived the project, developed the theoretical framework, and performed the analytical calculations and numerical simulations

Other publications

Dispersal diversity buffers species vulnerability to local extinction — Nature Eco. Evo.
D. Bernardi, **G. Nicoletti**, P. Padmanabha, S. Suweis, S. Azaele, S. A. Levin, A. Rinaldo, A. Maritan — *10, 2060–2073 (2026)*

Higher-order assembly and emergent persistence in biology — Curr. Opin. Sys. Bio.
B. Vidiella, **G. Nicoletti**, R. Fernández, A. Spiridonov, A. Sanchez, S. T. Hussain, S. Valverde — *100608 (2026)*

Habitat heterogeneity and dispersal network structure as drivers of metacommunity dynamics — J. Stat. Mech.
D. Bernardi*, A. Doimo*, **G. Nicoletti***, P. Padmanabha*, A. Rinaldo, S. Suweis, S. Azaele, A. Maritan (* equal contribution) — *084003 (2026)*

Generalized scaling of blue metabolism in river basins — Water Res. Research
G. Nicoletti, E. Bertuzzo, P. Padmanabha, F. Bassani, S. Bonetti, A. Maritan, A. Rinaldo — *62, e2025WR041131 (2026)*

Unveiling gene perturbation effects through gene regulatory networks inference from single-cell transcriptomic data — PLOS Comp. Bio.
C. Corridori, M. Romeike, **G. Nicoletti**, C. Buecker, S. Suweis, S. Azaele, G. Martello — *22 (4), e1014067 (2026)*

Information-directed sampling for bandits: a primer — J. Stat. Mech.
A. Hirling, **G. Nicoletti**, A. Celani — *4, 043402 (2026)*

Stochastic processes with multiple temporal scales: timescale separation and information — J. Stat. Mech.
G. Nicoletti, D. M. Busiello — *12, 124004 (2025)*

Fast nonlinear integration drives accurate encoding of input information in large multiscale systems — Comm. Physics
G. Nicoletti, D. M. Busiello — *8, 437 (2025)*

Optimal information gain at the onset of habituation to repeated stimuli — eLife
G. Nicoletti, M. Bruzzone, S. Suweis, M. Dal Maschio, D. M. Busiello — *13:RP99767 (2025)*

Finite size scaling of survival statistics in metapopulation models — Phys. Rev. E
A. Doimo, **G. Nicoletti**, D. Bernardi, P. Padmanabha — *111 (6), 064415 (2025)*

Excitation-inhibition balance controls information encoding in neural populations — Phys. Rev. Lett.
G. Barzon, D. M. Busiello, **G. Nicoletti** — *134 (6), 068403 (2025)*

Information interference driven by environmental activity — Phys. Rev. Research
G. Nicoletti, D. M. Busiello — *6 (4), 043275 (2024)*

Landscape and environmental heterogeneity support coexistence in competitive metacommunities — PNAS
P. Padmanabha*, **G. Nicoletti***, D. Bernardi*, S. Suweis, S. Azaele, A. Rinaldo, A. Maritan (*equal contribution) — *121 (44), e2410932121 (2024)*

Information propagation in Gaussian processes on multilayer networks — J. Phys. Complex.
G. Nicoletti, D. M. Busiello — *5, 045004 (2024)*

Tuning transduction from hidden observables to optimize information harvesting — Phys. Rev. Lett.
G. Nicoletti, D. M. Busiello — *133, 158401 (2024)*
Physical Review Letters Editors' Suggestion and viewpoint in the APS "Physics" magazine

Prenatal experience with language shapes the brain — Science Advances
B. Mariani, **G. Nicoletti**, G. Barzon, M. C. O. Barajas, M. Shukla, R. Guevara, S. Suweis, J. Gervain — *9 (47), eadj3524 (2023)*

Emergent encoding of dispersal network topologies in spatial metapopulation models — PNAS
G. Nicoletti*, P. Padmanabha*, S. Azaele, S. Suweis, A. Rinaldo, A. Maritan (*equal contribution) — *120 (46), e2311548120 (2023)*

The emergence of scale-free fires in Australia — iScience
G. Nicoletti, L. Saravia, F. Momo, A. Maritan, S. Suweis — *26 (3) 106181 (2023)*
Best poster award at the conference "Stochastic Models and Experiments in Ecology and Biology 2021" Venice, Italy

Mutual information in changing environments: Nonlinear interactions, out-of-equilibrium systems, and continuously varying diffusivities — Phys. Rev. E
G. Nicoletti, D. M. Busiello — *106, 014153 (2022)*

Information-driven transitions in projections of underdamped dynamics — Phys. Rev. E
G. Nicoletti, A. Maritan, D. M. Busiello — *106, 014118 (2022)*

Criticality and network structure drive emergent oscillations in a stochastic whole-brain model — J. Phys. Complex.
G. Barzon*, **G. Nicoletti***, B. Mariani, M. Formentin, S. Suweis (*equal contribution) — *3, 025010 (2022)*

Disentangling the critical signatures of neural activity — Sci. Rep.
B. Mariani, **G. Nicoletti**, M. Bisio, M. Maschietto, S. Vassanelli, S. Suweis — *12, 10770 (2022)*
Featured in the "Top 100 papers in Neuroscience" published by Scientific Reports in 2022

Mutual information disentangles interactions from changing environments — Phys. Rev. Lett.
G. Nicoletti, D. M. Busiello — *127, 228301 (2021)*
Physical Review Letters Editors' Suggestion, viewpoint in the APS "Physics" magazine and highlight in PRL's weekly tip sheet for reporters

Neuronal avalanches across the rat somatosensory barrel cortex and the effect of single whisker stimulation — Front. Syst. Neur.
15:709677 (2021)
B. Mariani, **G. Nicoletti**, M. Bisio, M. Maschietto, R. Oboe, A. Leparulo, S. Suweis, S. Vassanelli

Scaling and criticality in a phenomenological renormalization group — Phys. Rev. Research
G. Nicoletti, S. Suweis, A. Maritan — *2, 023144 (2020)*

Preprints

Resolving the backbone of multiscale interactions through mutual information rates — arXiv
A. Raiola, **G. Nicoletti***, D. M. Busiello* (* equal contribution) — *2611.12554 (2026)*

Universal thermokinetic decomposition of short-time information fluctuations — arXiv
G. Nicoletti, D. M. Busiello — *2605.29957 (2026)*

Emergence of information interference in stochastic systems with non-diagonal noise and switching environments — arXiv
2605.13556 (2026)
A. Marchetti, D. M. Busiello*, **G. Nicoletti*** (* equal contribution)

Pulse desynchronization of neural populations by targeting the centroid of the limit cycle in phase space — arXiv
2603.12878 (2026)
R. Guevara, M. Zenari, **G. Nicoletti**, E. Marini, S. Suweis, S. Azaele, M. Formentin

Plasticity-induced multistability on fast and slow timescales enables optimal information encoding and spontaneous sequence discrimination — arXiv
2509.13867 (2025)
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The somatosensory barrel cortex controls the spindle thalamocortical oscillation by frequency locking — bioRxiv
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R. Guevara, M. Tambaro, M. Maschietto, A. Leparulo, C. Checchetto, **G. Nicoletti**, B. Mariani, S. Suweis, S. Vassanelli

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A network-based method for extracting the organization of brain-wide circuits from reconstructed connectome datasets — bioRxiv
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K. K. H. Manjunatha*, M. Bruzzone*, **G. Nicoletti**, S. Suweis*, M. Dal Maschio* (* equal contribution)