MATTEO SAPONATI

Research Scientist

Advancing Neuromorphic Computing and Machine Learning for next generation AI

✉ matteosaponati@gmail.com
🌐 matteosaponati.github.io
📱 +41 782047966
🏠 Zürich, Switzerland
⌂ 🐦 in 🐘 @matteosaponati

About me

I am a Research Scientist with extensive experience in developing neuro-inspired computing algorithms and Machine Learning architectures for Computational Neuroscience and Neuromorphic Computing. I am passionate about understanding the principles of learning in brains and machines, designing novel intelligent devices, and contributing to the evolution of Artificial Intelligence. I conduct my research using analytical and numerical tools with inspiration from Neuroscience and Machine Learning.

Experience

Postdoctoral Researcher
Sep 2023 - ongoing

📍 Institute of Neuroinformatics, ETH/UZH, Zurich (CH)

● Design and test novel learning algorithms for Spiking Neural Networks (SNNs) for Neuromorphic hardware and edge computing.
● Lead research on modern Machine Learning architectures such as Deep Neural Networks (DNNs), Transformer models, and Recurrent Neural Networks (RNNs).
● Supervise students (B.Sc., M.Sc., and Ph.D.) from ETH Zürich, University of Zürich, and ZHAW Center for Artificial Intelligence.
● Present research at international conferences.

Research Associate (Ph.D.)
Sep 2019 - Sep 2023

📍 Max-Planck Institute for Brain Research and Ernst Strüngmann Institute, Frankfurt Am Main (DE)

● Design neuro-inspired algorithms for SNNs, with applications in Machine Learning and Computational Neuroscience, employing state-of-the-art ML frameworks (PyTorch, Tensorflow).

● Publish scientific articles and present research at international conferences (3 scientific articles, 6 presentations).

● Lead data analysis projects in Systems Neuroscience.

● Coordinate a series of scientific talks, inviting external speakers, and teaching classes at the Theoretical Neuroscience course from Radboud University.

Assistant Research Scientist
2019

📍 Institute des Neurosciences des Systemes Aix-Marseille University, Marseille (FR)

Education

2020 - 2023	**Ph.D. in Neuroinformatics**
	Highest Honors (top 5%) - Donders Centre for Neuroscience, Radboud University (NL)
2016 - 2018	**M.Sc. in Physics**
	110/110 - Department of Physics, University of Pisa (IT)
2011 - 2016	**B.Sc. in Physics**
	94/110 - Department of Physics, University of Pisa (IT)

Skills

Coding Skills	Python, PyTorch, LaTex, Matlab, C++, Adobe Illustrator, Music production DAWs
Research Skills	Neuro-inspired computing algorithms, Machine Learning architectures (Transformers, RNNs, state-space models), Mathematical Modelling, Critical Thinking, Public Speaking, Problem Solving, Teamwork, Data Analysis
Language Skills	Italian (Mother tongue), English (Fluent), Portuguese (Intermediate)

Research

Saponati, **M.**, & Vinck, M. (2023a, August 27). *Inhibitory feedback enables predictive learning of multiple sequences in neural networks*. https://doi.org/10.1101/2023.08.26.554928

Saponati, **M.**, & Vinck, M. (2023b). Sequence anticipation and spike-timing-dependent plasticity emerge from a predictive learning rule. *Nature Communications*, *14*(1), 4985. https://doi.org/10.1038/s41467-023-40651-w

Saponati, **M.**, Garcia-Ojalvo, J., Cataldo, E., & Mazzoni, A. (2022). Thalamocortical Spectral Transmission Relies on Balanced Input Strengths. *Brain Topography*, *35*(1), 4–18. https://doi.org/10.1007/s10548-021-00851-3

Spyropoulos, G., **Saponati**, **M.**, Dowdall, J. R., Schölvinck, M. L., Bosman, C. A., Lima, B., Peter, A., Onorato, I., Klon-Lipok, J., Roese, R., Neuenschwander, S., Fries, P., & Vinck, M. (2022). Spontaneous variability in gamma dynamics described by a damped harmonic oscillator driven by noise. *Nature Communications*, *13*(1), 2019. https://doi.org/10.1038/s41467-022-29674-x

Saponati, **M.**, Garcia-Ojalvo, J., Cataldo, E., & Mazzoni, A. (2019). Integrate-and-fire network model of activity propagation from thalamus to cortex. *Biosystems*, *183*, 103978. https://doi.org/10.1016/j.biosystems.2019.103978

Grants and Awards

Jan 2024 - Jan 2026	**ETH Postdoctoral Fellowship**
	ETH Zurich Postdoctoral Fellowship programme (Zürich, CH)
Mar 2023	**Cosyne Presenters Travel Grant**
	Cosyne Conference 2023 (Montreal, CA)
Sep 2019 - Sep 2023	**IMPRS Research Fellowship**
	International Max Planck Research School (IMPRS) for Neural Circuits, MPI for Brain Research, Frankfurt am Main (DE)
Jul 2018 - Aug 2018	**Erasmus+ Grant**
	Erasmus program (EU)