GIUSEPPE CHINDEMI

Postdoctoral Fellow | ETH AI Center

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PROFESSIONAL EXPERIENCE

ETH AI Center Postdoctoral Fellow
ETH Zurich

📅 Sep 2025 – Today   📍 Zurich, Switzerland

- Investigating learning algorithms in biological and artificial neural networks
- Mentored by Benjamin Grewe and Richard Hahnloser (ETH/UZH) and Giorgia Ramponi (UZH)

Postdoctoral Researcher
Bellone Lab, Université de Genève

📅 Mar 2021 – Aug 2025   📍 Geneva, Switzerland

- Developed *LISBET*, a Transformer-based model for social behavior discovery in videos
  - Trained with self-supervision on body pose tracking sequences
  - PyTorch and (legacy) TensorFlow implementations
- Responsible for the computing resources of the lab (i.e., HPC nodes, local servers)

BNF Project Intern
Holtmaat Lab, Université de Genève

📅 Jul 2020 – Jan 2021   📍 Geneva, Switzerland

- Deployed machine learning pipelines for body pose tracking across projects
- Gained hands-on experience with two-photon calcium imaging techniques

Junior Group Leader
Blue Brain Project, EPFL

📅 Mar 2019 – Dec 2019   📍 Geneva, Switzerland

- Established and managed the Synaptic Plasticity and Learning group
  - Oversaw the work of two PhD students

Postdoctoral Researcher
Blue Brain Project, EPFL

📅 Feb 2018 – Feb 2019   📍 Geneva, Switzerland

- Optimized and expanded the modeling pipeline, in preparation for structural and cortex-wide plasticity simulations

PhD Candidate
Blue Brain Project, EPFL

📅 Sep 2012 – Jan 2018   📍 Lausanne, Switzerland

- Led the effort to model, parameterize and simulate synaptic plasticity
- Co-authored *BluePyOpt*, a gradient-free optimization library in Python
- Designed and optimized computational models in C and NMODL for efficient execution on different HPC systems, including Blue Gene/Q and HPE SGI 8600
- Contributed to the development and writing of an awarded INCITE grant
  - Responsible for running simulations on the MIRA supercomputer

SKILLS AND INTERESTS

Autonomous Intelligence   Hierarchical Control
HPC   Learning Algorithms   MARL
Neural Networks   Optimization   Simulation

OPEN SOURCE PROJECTS

LISBET
Social behavior Transformer

🔗 https://github.com/BelloneLab/lisbet
👤 Main developer and maintainer

LISBET is a machine learning model for the automatic segmentation of social behavior motifs, based on the Transformer architecture.

BluePyOpt
Python optimization library

🔗 https://github.com/BlueBrain/BluePyOpt
👤 Developer

BluePyOpt is a framework that simplifies model parameter optimization, designed to run efficiently on both personal computers and HPC resources.

EDUCATION

Ph.D. in Neuroscience
Ecole Polytechnique Fédérale de Lausanne

📅 12 Jan 2018   📍 Lausanne, Switzerland

Thesis title: "Towards a unified understanding of synaptic plasticity: parsimonious modeling and simulation of the glutamatergic synapse life-cycle"

Supervisor: Prof. Henry Markram
Co-supervisor: Prof. Eilif B. Muller

M.Sc. in Computer Science
University of Illinois at Chicago

📅 5 Aug 2012   📍 Chicago, US

M.Sc. in Engineering of Computing Systems
Politecnico di Milano

📅 25 July 2012   📍 Milan, Italy

B.Sc. in Engineering of Computing Systems
Politecnico di Milano

📅 22 Sept 2009   📍 Milan, Italy

GRANTS

INCITE
US Department of Energy

📅 Jan 2017 – Dec 2018

Project title: "Biophysical principles of functional synaptic plasticity in the neocortex"

Role: Synapse modeling lead

PUBLICATIONS

👥 Preprints

- Chindemi, G., Girard, B., & Bellone, C. (2023). Lisbet: A machine learning model for the automatic segmentation of social behavior motifs. arXiv: 2311.04069 `[cs.CV]`

- Rössert, C., Pozzorini, C., Chindemi, G., Davison, A. P., Eroe, C., King, J., ... Muller, E. (2016). Automated point-neuron simplification of data-driven microcircuit models. arXiv: 1604.00087.

📄 Journal Articles

- Ecker, A., Santander, D. E., Abdellah, M., Alonso, J. B., Bolaños-Puchet, S., Chindemi, G., ... Reimann, M. W. (2024). Assemblies, synapse clustering and network topology interact with plasticity to explain structure-function relationships of the cortical connectome. *eLife*, *13*. doi:10.7554/eLife.101850.1

- Isbister, J. B., Ecker, A., Pokorny, C., Bolaños-Puchet, S., Santander, D. E., Arnaudon, A., ... Reimann, M. W. (2024). Modeling and Simulation of Neocortical Micro- and Mesocircuitry. Part II: Physiology and Experimentation. *eLife*, *13*. doi:10.7554/eLife.99693.1

- Chindemi, G., Abdellah, M., Amsalem, O., Benavides-Piccione, R., Delattre, V., Doron, M., ... Muller, E. B. (2022). A calcium-based plasticity model for predicting long-term potentiation and depression in the neocortex. *Nature Communications*, *13*(1), 3038. Number: 1 Publisher: Nature Publishing Group. doi:10.1038/s41467-022-30214-w

- Barros-Zulaica, N., Rahmon, J., Chindemi, G., Perin, R., Markram, H., Muller, E., & Ramaswamy, S. (2019). Estimating the Readily-Releasable Vesicle Pool Size at Synaptic Connections in the Neocortex. *Frontiers in Synaptic Neuroscience*, *11*. doi:10.3389/fnsyn.2019.00029

- Doron, M., Chindemi, G., Muller, E., Markram, H., & Segev, I. (2017). Timed Synaptic Inhibition Shapes NMDA Spikes, Influencing Local Dendritic Processing and Global I/O Properties of Cortical Neurons. *Cell Reports*, *21*(6), 1550–1561. doi:10.1016/j.celrep.2017.10.035

- Reimann, M. W., Nolte, M., Scolamiero, M., Turner, K., Perin, R., Chindemi, G., ... Markram, H. (2017). Cliques of Neurons Bound into Cavities Provide a Missing Link between Structure and Function. *Frontiers in Computational Neuroscience*, *11*. doi:10.3389/fncom.2017.00048

- Van Geit, W., Gevaert, M., Chindemi, G., Rössert, C., Courcol, J.-D., Muller, E. B., ... Markram, H. (2016). BluePyOpt: Leveraging Open Source Software and Cloud Infrastructure to Optimise Model Parameters in Neuroscience. *Frontiers in Neuroinformatics*, *10*. doi:10.3389/fninf.2016.00017

- Markram, H., Muller, E., Ramaswamy, S., Reimann, M. W., Abdellah, M., Sanchez, C. A., ... Schürmann, F. (2015). Reconstruction and Simulation of Neocortical Microcircuitry. *Cell*, *163*(2), 456–492. doi:10.1016/j.cell.2015.09.029

- Ramaswamy, S., Courcol, J.-D., Abdellah, M., Adaszewski, S. R., Antille, N., Arsever, S., ... Markram, H. (2015). The neocortical microcircuit collaboration portal: A resource for rat somatosensory cortex. *Frontiers in Neural Circuits*, *9*. doi:10.3389/fncir.2015.00044

REFERENCES

Prof. Camilla Bellone (Postdoc supervisor)

University of Geneva

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1 rue Michel Servet
1211 Geneva, Switzerland

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Prof. Eilif B. Muller (Ph.D. co-supervisor)

University of Montréal and Mila

@ eilif.muller@umontreal.ca

✉ CHU Sainte-Justine
3175 Côte-Sainte-Catherine Road
Montréal, Quebec, H3T 1C5, Canada

LANGUAGES

English ●●●●●
French ●●●●○
Italian ●●●●●