Sofia Botti

Curriculum Vitae

Personal Information

Date of birth:	September 1995
Nationality:	Italy
Address:	Via la Santa, Lugano, Switzerland
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Employment history

11/2023-... **Postdoctoral Researcher at Università della Svizzera Italiana**, 2 years, supported by SNSF grant
Lugano (Switzerland)

11/2022-10/2023 **Postdoc Assistant at University of Pavia and Università della Svizzera Italiana**, 1 year, realized via H2020-EuroHPC Microcard project, Grant agreement ID: 955495
Pavia (Italy) and Lugano (Switzerland)

Education

11/2022 **PhD in Computational Mathematics and Decision Sciences**
Joint PhD Program UNIPV-USI, 2019 – 2022
Thesis: *Mathematical modeling of Human Induced Pluripotent Stem Cell-Derived Cardiomyocytes (hiPSC-CMs): from ionic currents to 3D ventricle models.*
Supervisor: Prof. Luca F. Pavarino

07/2019 **Master in Mathematics**
University of Pavia, Department of Mathematics, Pavia (Italy) 2017 – 2019
Thesis: *Mathematical and numerical modeling of Human Induced Pluripotent Stem Cell-Derived Cardiomyocytes (hiPSC-CMs).*
Supervisor: Prof. Luca F. Pavarino
Mark: 110/110 *cum laude*

07/2017 **Bachelor in Mathematics**
University of Pavia, Department of Mathematics, Pavia (Italy) 2014 – 2017
Thesis: *Sistemi dinamici: equivalenza topologica ed esempi di biforcazioni - Dynamic Systems: Topological Equivalence and Examples of Bifurcations.*
Supervisor: Prof. Giuseppe Savaré
Mark: 103/110

06/2014 **Secondary school certificate**
Scientific Lyceum Giovanni Gandini, Lodi (Italy) 2009 – 2014
Mark: 100/100 *cum laude*

Fundings and grants

11/2023-10/2025 **Swiss National Science Foundation (SNSF), Postdoctoral Fellowship grant**, *Cell-by-cell and bidomain models for cardiac derived stem cell tissue: innovative numerical and deep learning tools for regenerative medicine*, PI: Sofia Botti, Grant number: 217025, approx. 211 450 CHF

Scientific visiting periods

11/2024 **Tampere University**, Tampere (Finland)
Host: Prof. Jari Hyttinen
Project: Chamber-Specific Ionic Models in Regenerative Cardiology: Bridging Single-Cell Precision to Tissue-Level Heterogeneity

04/2022-06/2022 **Ente Ospedaliero Cantonale (EOC) - Cardiocentro Ticino (CCT)**, Bellinzona - Lugano (Switzerland)
Host: Prof. Lucio Barile and Dr. Claudia Altomare
Project: Dynamic Clamp setup and action–potential recording in stem cells

04/2021-10/2021 **Università della Svizzera Italiana (USI)**, Lugano (Switzerland)
Host: Prof. Rolf Krause
Project: Optimization tools for the calibration of the atrial–specific ionic model

Supervision of junior researchers

Supervised Ph.D. students:

09/2024-... **Tonali Sofia**, *Computational modeling of hiPSC-CMs MEAs*, Ph.D. student in *Computational Mathematics, Learning, and Data Science* at Università degli Studi di Pavia

04/2025-... **Granda Alexandra**, *CardioTwin: Precision Cardiology based on Digital Twins*, Ph.D. Student at Università della Svizzera Italiana

Co-supervised Master theses (MSc in Mathematics):

10/2023-4/2024 **Tonali Sofia**, *Mathematical modeling of Multielectrode Arrays with Pluripotent Stem Cell-Derived Cardiomyocytes*, Università degli Studi di Pavia

Teaching activities

Lecture list

08/2025-21/2026 **Algorithmics**, Department of Mathematics, (BSc, fall semester), FernUni-Unidistance, Brig, Switzerland

Lecture list (Lecturer in Ph.D. courses)

06/2025 **Modeling the electrophysiology of the cardiac tissue**, Intensive Summer School on Computational Cardiology: theory, applications and new trends, Milano (Italy)

Lecture list (Substitute lecturer)

10/2022-01/2023 **Sistemi dinamici - Substitute Lecturer**, Department of Industrial engineering and information and Department of Mathematics (MSc), Università degli Studi di Pavia, Pavia, Italy

Lecture list (Teaching assistant)

10/2022-01/2023 **Analisi 1**, Department of Industrial engineering and information (BSc), Università degli Studi di Pavia, Pavia, Italy

10/2021-01/2022 **Analisi 1**, Department of Industrial engineering and information (BSc) and Department of Civil engineering and Architecture (BSc), Università degli Studi di Pavia, Pavia, Italy

12/2020-02/2021 **Analisi 1 - Didactic seminars**, Department of Industrial engineering and information (BSc), Università degli Studi di Pavia, Pavia, Italy

11/2020-12/2020 **Mathematics - Precourse**, Faculty of nursing, Università degli Studi di Pavia, Pavia, Italy

Prizes, awards and fellowship

09/2024 Travel Grant for the Cardiac Physiome Workshop 2024 – 500€

Organization of conferences and events

6/2025 Co-organizer, *Intensive Summer School on Computational Cardiology: theory, applications and new trends*, at Università degli Studi di Milano

5/2024 Co-organizer, ICAM Workshop, *International Center for Advanced Computing in Medicine*, at Università della Svizzera Italiana

Personal skills

Languages	Italian (mother tongue), English (Fluent), French (Basic)
Operating systems	Linux, macOS, Microsoft Windows
Programming languages	MATLAB, C/C++, Python
Technical tools	bash, Vim, Git, Docker
Visualization tools	Paraview
Documentation	LaTeX/TikZ/Pgfplot/Beamer, Microsoft office, Keynote

PUBLICATIONS

Sofia Botti

Publications

Journal Articles:

[J3] **S. Botti**, R. Krause, L. F. Pavarino (2025). *In-silico* Modeling of Multi-Electrode Arrays for Enhancing Cardiac Drug Testing on hiPSC-CMs Heterogeneous Tissues. *Journal of Physiology*, Published article

[J2] **S. Botti**, C. Bartolucci, C. Altomare, M. Paci, L. Barile, R. Krause, L. F. Pavarino, S. Severi (2024). A novel ionic model for matured and paced atrial–like hiPSC–CMs integrating IKur and IKCa currents. *Computers in Biology and Medicine*, Preprint, Published article

[J1] **S. Botti**, M. Torre (2023). Isogeometric simulation of a derived stem cell engineered ventricle. *Advances in Computational Science and Engineering*, 1(3), 298-319. Published article

Peer-reviewed Conference Proceedings, Book Chapters:

[C3] **S. Botti**, R. Krause, L. F. Pavarino (2025). Advanced Bidomain Framework for Drug Testing in Heterogeneous Cardiac hiPSC Tissues. *Under review in Cardiovascular Modeling, in Springer INdAM series*

[C2] **S. Botti**, C. Bartolucci, R. Krause, et al. (2023). An in silico Study of Cardiac hiPSC Electronic Maturation by Dynamic Clamp. In *Functional Imaging and Modeling of the Heart*, 171-183. Published article

[C1] **S. Botti**, C. Bartolucci, et al. (2022). Numerical Simulations Indicate IK1 Dynamic Clamp Can Unveil the Phenotype of Cardiomyocytes Derived from Induced Pluripotent Stem Cells. In *2022 Computing in Cardiology (CinC)*, Published article

PhD thesis:

[T1] **S. Botti** (2022) Mathematical modeling of Human Induced Pluripotent Stem Cell-Derived Cardiomyocytes (hiPSC-CMs): from ionic currents to 3D ventricle models, PhD thesis, Published thesis

Presentations

Plenary and invited talks:

[T12] **S. Botti**, Chamber-Specific Ionic Models in Regenerative Cardiology: Bridging Single-Cell Precision to Tissue-Level Heterogeneity. **Invited seminar** at MET International Seminar Series, Tampere (Finland), 2024.

[T11] **S. Botti**, *In-silico* modeling of multi-electrode arrays to enhance cardiac drug testing on heterogeneous hiPSC-CMs tissues. **Selected oral presentation** at Cardiac Physiome, Freiburg (Germany), 2024.

[T10] **S. Botti**, Mathematical and Numerical Modeling of cardiac stem cells and regenerative medicine, **Invited speaker** at CompMath2023 Spring Workshop, Pavia (Italy), 2023.

Conference talks:

[T9] **S. Botti**, M. Favino, Steklov-Poincaré domain decomposition for hiPSC-CMs multi-electrode arrays models. 29th International Conference on Domain Decomposition Methods (DD29), Milano (Italy), 2025.

[T8] **S. Botti**, R. Krause, L.F. Pavarino, Modeling hiPSC-CM Electrophysiology on Multi-Electrode Arrays: A Coupled Bidomain and Electrode Approach. Coupled Problems, Villasimius (Italy), 2025

[T7] **S. Botti**, A novel atrial–specific ionic model for stem cells–derived CMs. 16th World Congress on Computational Mechanics and 4th Pan American Congress on Computational Mechanics (WCCM-PANACM), Vancouver (Canada), 2024.

[T6] **S. Botti**, A novel atrial–specific ionic model for stem cells–derived CMs. (INdAM Workshop), Rome (Italy), 2024.

[T5] **S. Botti**, Numerical modeling of cardiac derived stem cells and isogeometric simulation of an engineered tissue. European Conference on Numerical Mathematics and Advanced Applications (ENUMATH), Lisbon (Portugal), 2023.

[T4] **S. Botti**, M. Torre, Isogeometric solvers for cardiac reaction-diffusion equations coupled with Induced Pluripotent Stem Cell ionic models, 10th International Congress on Industrial and Applied Mathematics (ICIAM), Tokyo (Japan), 2023.

[T3] **S. Botti**, C. Bartolucci, C. Altomare, et al., Numerical Simulations Indicate IK1 Dynamic Clamp Can Unveil the Phenotype of Cardiomyocytes Derived from Induced Pluripotent Stem Cells, Computing in Cardiology (CinC),Tampere (Finland), 2022.

[T2] **S. Botti**, From cardiac stem cell ionic models to isogeometric simulations of 3D cardiac tissue, CompMath2022 Spring Workshop, Pavia (Italy), 2022.

[T1] **S. Botti**, M. Torre, Isogeometric simulations of hiPSC-CM cardiac tissue, Young Researchers Workshop on Mathematical and Numerical Cardiac Modeling, Pavia (Italy), 2021.

Posters:

[P2] **S. Botti**, R. Krause, et al., Modelling Atrial Fibrillation in Stem Cell-Derived CMs: *in-silico* approaches for Personalized Medicine, Gordon Research Conference (GRC), Lucca (Italy), 2025.

[P1] **S. Botti**, C. Bartolucci, R. Krause, et al., An *in silico* Study of Cardiac hiPSC Electronic Maturation by Dynamic Clamp, Functional Imaging and Modeling of the Heart (FIMH), Lyon (France), 2023.

Other products with documented use

[G1] **AL_hiPSC_ionic_model**, Open-source MATLAB code hor the atrial-specific ionic model for human induced pluripotent stem cells. Code repository (Core developer)