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Research interests

Cerebral blood flow
Numerical modeling
Vascular networks

Hemodynamics
Fluid dynamics
Metabolism

Biological flows and transport
Biomedical imaging
Neurodegenerative diseases

Employment history

- 07/2022 - present **Group Leader | SNF Ambizione Fellow**
ARTORG Center for Biomedical Engineering Research, University of Bern, Switzerland.
- 03/2023 – 06/2023 **Visiting Researcher,**
Chair: Nicolas Renier, Laboratory of Structural Plasticity, ICM Brain and Spine Institute, Paris, France.
- 09/2020 – 03/2022 **Postdoctoral Researcher,**
Chair: Prof. Patrick Jenny, Institute of Fluid Dynamics, ETH Zurich, Switzerland.
- 10/2019 – 11/2019 **Visiting Researcher,**
Chair: Prof. Rainer Helmig, Institute for Modeling Hydraulic and Environmental Systems, University of Stuttgart, Stuttgart, Germany.
- 09/2017 – 08/2020 **Postdoctoral Researcher,**
Chair: Prof. Bruno Weber, Institute of Pharmacology and Toxicology, University of Zurich, Switzerland.
- 11/2012 – 06/2017 **Research Assistant,**
Chair: Prof. Patrick Jenny, Institute of Fluid Dynamics, ETH Zurich, Switzerland.

Education

- 12/2025 **Habilitation - *Venia docendi* in Biofluidynamics**
Medical Faculty, University of Bern, Switzerland
- 11/2012 – 06/2017 **PhD in Mechanical Engineering,**
Institute of Fluid Dynamics, ETH Zurich, Switzerland
Thesis title: *Cerebral blood flow modeling with discrete tracking of red blood cells - analyzing microvascular networks and their perfusion.*
Supervisor: Prof. Patrick Jenny, Defense date: June 15, 2017
- 10/2006 – 07/2012 **Mechanical Engineering, Diploma** (equivalent to M.Sc.)
University of Stuttgart, Germany, Grade: 1.4 (*excellent*)

Approved research projects

- 02/2025 – 01/2027 **Fondation Pierre Mercier pour la Science, Switzerland**
2-year research project. Salaries and project funds (CHF 240'000)
Title: *Vascular mural cells: key players for the brain's energy supply – in silico approaches to quantify their regulatory relevance in health and disease.*

- 07/2024 – 12/2024 **Hartmann Müller - Stiftung**, University of Zurich, Switzerland
0.5-year research project. Salaries (CHF 30'300)
Title: *Leptomeningeal collaterals during stroke – quantitative insights from blood flow modeling in whole brain vascular networks*.
Joint application with Prof. Susanne Wegner (University Hospital Zurich, Switzerland).
- 07/2022 – 06/2027 **SNF Ambizione Fellow**, University of Bern, Switzerland
4-year research project. Salaries and project funds (CHF 918'480)
Title: *Energy supply in whole brain microvascular networks in health and disease – quantifying the relevance of small-scale disturbances*.
- 08/2019 – 08/2020 **Forschungskredit Postdoc**, University of Zurich, Switzerland
13-month research project. Salary and expenses (CHF 125'274)
Title: *In-depth characterization of the brain microvasculature focusing on layer-specificity in topology, perfusion and nutrient supply*.
- 10/2019 – 11/2019 **GRC Travel Grant**, Graduate Campus, University of Zurich, Switzerland
Two-month research stay. Matching fund for travel and living costs (CHF 2'000)
Title: *Oxygen discharge from one-dimensional red blood cells to tissue*.

Publications & presentations - summary

- Publications 15 publications (including: 1 last author, 5 first author and, 1 review) all in Q1 journals with impact factors ranging from 4.5-18.7. Resulting in a total of 822 citations with a steadily increasing number of citations per year. 4 submitted manuscripts and 3 in preparation. The full publication is available in a separate document.
- Presentations 19 invited talks at international conferences and workshops. 18 conference contributions. 9 seminar presentations.

Teaching activities

- Since 2018 Class on *Blood flow modeling in the microcirculation* (part of the lecture *Biofluid dynamics*). Master level (~30 students). ETH Zurich, Switzerland.
- 01/2019 Guest lecture on *Blood flow modeling in the microcirculation*, University of Stuttgart, Germany.
- 09/2013 – 03/2016 Teaching assistant for *Computational Methods for Flow, Heat and Transport problems*. Bachelor level (~60 students). ETH Zurich, Switzerland.
- 09/2013 – 07/2016 Teaching assistant for *Computational Fluid Dynamics with OpenFOAM*. Bachelor level (~30 students). ETH Zurich, Switzerland.

Leadership & management experience

- 05/2025 - present Deputy Representative of the Intermediate Staff Association in the **Commission for the Promotion of Early Career Researchers**. University of Bern.
- 11/2024 Course on **Essentials for teaching in higher educations** (2 days), University of Bern.
- 07/2022 - present **Group leader** including personnel, budget, and reporting responsibilities.
- 2013 - present **Supervision** of 4 PhD, 26 undergraduate and graduate students (for details see below).
- 06/2023 – 02/2024 **COMET** – career program – including workshops on Leadership and Time management, University of Bern.
- 02/2023 Training for **PhD Supervisors** (2 days), University of Bern.

Invited talks

- 09/2025 *ConFlowNet2025 conference*. Raitenhaslach. Germany.

05/2025	<i>European Society for Microcirculation – Biennial Meeting</i> . Szeged. Hungary.
04/2025	Webinar for the <i>Interpore Academy</i> .
03/2025	PhD advanced course on <i>Neurovascular and Neurometabolic Regulation in Health and Disease</i> . University of Coimbra. Portugal.
12/2024	Workshop on <i>Brain Microcirculation Aarhus CTH Workshop</i> . Aarhus. Denmark.
11/2024	11 th International Symposium on Neuroprotection and Neurorepair. Potsdam. Germany
10/2024	Workshop on <i>Image processing, modelling of porous media flow and parameter estimation in medicine and geo-sciences</i> . UHnett Vest workshop. Ullensvang. Norway.
03/2024	PhD advanced course on <i>Neurovascular Unit: Structure and Function in Health and Disease</i> . University of Coimbra. Portugal.
09/2022	Workshop on <i>Bridging the Gap: from Brain Mechanics to Brain Dynamics</i> . Lorentz Center. Leiden. Netherlands.
05/2022	Educational Course on <i>Cutting-edge technologies for understanding cerebral microcirculation functions</i> . 30 th International Symposium on Cerebral Blood Flow, Metabolism and Function. Glasgow. UK.
05/2022	Online educational pre-workshop on <i>Bridging the Gap: from Brain Mechanics to Brain Dynamics</i> . Lorentz Center. Leiden. Netherlands.
05/2022	Online workshop on <i>Microrheology and Transport in Complex Biological Media</i> . Institute of Physics (IOP). London. UK.
11/2021	Webinar on <i>Small and mighty: Brain capillaries in Health and Disease</i> , Frontiers in Molecular Neuroscience - Research topic.
07/2020	Webinar on <i>Numerical Modeling Applications in Fluid Dynamics and Solid Mechanics</i> . Lingaya's Vidyapeeth. Faridabad. India.
11/2019	Workshop on <i>Modeling flow in live tissues</i> at the University of Bergen. Bergen. Norway.
09/2019	American Physiological Society Conference on <i>The Interface of Mathematical Models and Experimental Physiology: Organ Function from the Microvascular Perspective</i> . Scottsdale. USA.
07/2019	ISCBFM-sponsored Satellite Symposium on <i>Advances in Multi-Scale Imaging of Cerebral Blood Flow and Metabolism in relation to Brain Activity</i> . Suwon. South Korea.
09/2018	11 th World Congress for Microcirculation. Vancouver. Canada.
10/2017	Workshop on <i>fNIRS: use and perspective in rehabilitation</i> . Fondazione Don Carlo Gnocchi. Milan. Italy.

Conference participations

06/2026	16 th International Conference on Brain Energy Metabolism. Barcelona. Spain. (<i>poster presentation</i>)
09/2025	Dreiländertagung Biomedical Engineering. Muttenz. Switzerland. (<i>oral presentation</i>)
07/2025	30 th Congress of the European Society of Biomechanics. Zurich. Switzerland. (<i>oral presentation</i>)
09/2023	12 th World Congress for Microcirculation. Beijing, China. (<i>oral presentation, online</i>)
04/2023	22 nd Computational Fluids Conference. Cannes. France. (<i>oral presentation</i>)
05/2022	30 th International Symposium on Cerebral Blood Flow. Metabolism and Function. Glasgow. UK. (<i>poster & flash presentation</i>)
05/2021	Interpore 2021. 13 th Annual Meeting. Virtual Conference. (<i>oral presentation</i>)
11/2020	73 rd Annual Meeting of the APS Division of Fluid Dynamics. Virtual Conference. (<i>oral presentation</i>)
07/2019	29 th International Symposium on Cerebral Blood Flow, Metabolism and Function. Yokohama. Japan. (<i>poster & poster chair</i>)

- 05/2019 Interpore2019. 11th Annual Meeting. Valencia. Spain. (*poster*)
- 10/2018 2nd Swiss Vascular Research Symposium. Lugano. Switzerland. (*oral presentation & poster chair*)
- 12/2017 School of Brain Cells & Circuitry *Camillo Golgi*. Erice. Italy. (*oral presentation*)
- 10/2017 Blood flow: Current state and prospects. Paris. France. (*poster*)
- 04/2017 28th International Symposium on Cerebral Blood Flow, Metabolism and Function. Berlin. Germany. (*oral presentation*)
- 07/2016 44th Annual Meeting of the International Society of Oxygen Transport to Tissue. Chicago. USA. (*oral presentation*)
- 06/2015 27th International Symposium on Cerebral Blood Flow, Metabolism and Function. Vancouver. Canada. (*oral presentation*)
- 12/2014 Aarhus CTH Meeting. Aarhus. Denmark. (*poster*)
- 06/2014 42nd Annual Meeting of the International Society of Oxygen Transport to Tissue. London. UK. (*poster*)

Seminar presentations

- 01/2026 Department of Mathematical Sciences (DISMA). Politecnico di Torino. Italy.
- 01/2026 Scientific Stroke Lunch. Department of Neurology. University Hospital Bern. Switzerland.
- 11/2024 Research Unit FOR 2688 Instabilities, Bifurcations and Migration in Pulsating Flow, Saarbrücken, Germany. (*online*)
- 04/2024 Biological Physics and Morphogenesis. TU München. Germany.
- 06/2023 Seminaire du Vendredi, Paris Brain Institute – ICM. Paris. France.
- 01/2023 CBBM-Lecture, Center of Brain, Behavior and Metabolism. University of Luebeck. Germany.
- 09/2019 Medical Flow Physics Laboratory. University of Southern California. USA.
- 01/2019 Department of Hydromechanics and Modeling of Hydrosystems. University of Stuttgart. Germany.
- 10/2018 Laboratory of Neurophysiology and New Microscopy. Université Paris Descartes. France.

Conference participations of PhD students and postdocs

- 07/2026 14th European Conference on Mathematical and Theoretical Biology. Graz. Austria. (*invited minisymposia speaker: CL, SF, presentation: SF, poster: GS*)
- 06/2026 16th International Conference on Brain Energy Metabolism. Barcelona. Spain. (*SF poster presentation*)
- 11/2025 14th CARNet Meeting on Cerebral Hemodynamic Regulation. Fort Worth. Texas. USA. (*CL oral presentation*)
- 09/2025 20th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering | CMBBE. Barcelona. Spain. (*CL & GS, both oral presentations, best student presentation price for GS*)
- 12/2024 Workshop on *Brain Microcirculation* | Aarhus CTH Workshop. Aarhus. Denmark. (*CL & GS, both poster presentations*)
- 06/2024 8th International Conference on Computational and Mathematical Biomedical Engineering | CMBE24. Arlington. Virginia. USA (*CL & GS, both oral presentations*)
- 05/2024 10th European Stroke Organization Conference. Basel. Switzerland. (*CL, poster presentation*)
- 04/2023 9th European Stroke Organization Conference. Munich. Germany. (*CL, poster presentation*)

- 09/2022 30th International Symposium on Cerebral Blood Flow. Metabolism and Function. Glasgow. UK. (RE, *poster presentation*)
- 06/2021 Interpore 2021. online. (RE, *oral presentation*)
- 11/2020 APS Division of Fluid Dynamics. 73rd Annual Meeting. online. (RE, *oral presentation*)
- 07/2019 29th International Symposium on Cerebral Blood Flow, Metabolism and Function. Yokohama. Japan. (RE, *poster presentation*)
- 05/2019 Interpore 2019. Valencia. Spain (RE, *oral presentation*)
- 09/2018 11th World Congress for Microcirculation. Vancouver. Canada (RE, *poster presentation*)

SF: Sofia Farina, CL: Chryso Lambride, GS: Gaia Stievano, RE: Robert Epp

Scientific outreach

- 03/2026 Flash presentation @*Mother in Science networking event*. Online.
- 09/2025 *Nacht der Forschung* (Night of research). University of Bern. Switzerland.
- 06/2024 *Interview Berner Anzeiger*. University of Bern. Switzerland.
- 12/2023 *Open door* at sitem-insel. University of Bern. Switzerland.
- 04/2023 *Diverse Teams @ARTROG*. University of Bern. Switzerland.
- 02/2023 *Women in Science Day*. University of Bern. Switzerland.
- 09/2022 *Nacht der Forschung* (Night of research). University of Bern. Switzerland.

Supervision of PhD students

- 01/2026 - present Giorgia Barra, *Modeling the cerebral blood flow in human and mouse by combining in vivo imaging with light sheet microscopy*. Joint supervision with Dr. Nicolas Renier (Paris Brain and Spine Institute, France).
- 11/2022 - present Gaia Stievano, *Modeling of oxygen transport in realistic microvascular networks – Studying the impact of perfusion heterogeneities and microvascular alterations*.
- 06/2022 - present Chryso Lambride, *In silico modeling of reperfusion dynamics after ischemic stroke and during treatment*.
Joint supervision with Prof. Susanne Wegener (University Hospital Zurich).
- 10/2016 – 12/2022 Robert Epp, *Inverse model for bi-phasic blood flow in the microcirculation*.
Co-Supervision. Main supervisor: Prof. Patrick Jenny (ETH Zurich).

Supervision of graduate & undergraduate students

- 03/2026 – 08/2026 Yassine Frani (Master student). Project: *Modelling blood flow, stroke and autoregulation in semi-realistic vascular whole brain datasets*. (Co-Supervision with CL)
- 03/2026 – 08/2026 Letizia Greco (Master student). Project: *Deciphering penetrating tree characteristics in vascular whole brain datasets*. (Co-Supervision with SF)
- 12/2025 – 05/2026 Dominic Campbell-Pitt (Master student). Project: *Impact of mass transfer coefficients on oxygen transport in microvascular networks*. (Co-Supervision with GS)
- 10/2025 – 03/2026 Ana Barrio (Master student). Project: *The impact of regional brain vascular architectures (cortex vs hippocampus) on oxygen transport and delivery*. (Co-Supervision with GS)
- 09/2025 – 12/2025 Tim Eicher (Bachelor student). Project: *Computational blood flow modelling in arterial whole brain vascular networks*. (Co-Supervision with CL)
- 03/2025 – 08/2025 Giorgia Barra (Master student). Project: *Quantification of the impact of mass transfer coefficients on oxygen transport in microvascular networks*. (Co-Supervision with GS)

- 03/2025 – 08/2025 Emilio Zorzi (Master student). Project: *Quantification of the role of local vascular topologies on oxygen delivery.* (Co-Supervision with GS)
- 11/2024 – 04/2025 Ketan Gupta (Master student). Project: *Differentiation of surface and penetrating vessels in arterial vascular whole brain data sets.* (Co-Supervision with CL)
- 08/2024 – 01/2025 Manuel Fernandez Lopez (Master student). Project: *Implementation of optimized bi-phasic blood flow model for realistic microvascular networks (microBlooM).*
- 08/2023 – 01/2024 Javier Tejeda Chas (Master student). Project: *Numerical modeling of microvascular flow in small realistic microvascular networks in case of single capillary occlusions.*
- 05/2023 – 12/2023 Artemisia Sarteschi (Internship). Project: *Implementation of bi-phasic blood flow model for microvascular flow and application in simulation study (microBlooM).*
- 09/2022 – 12/2022 Pushkin Nagpure (Master student). Project: *Quantifying the impact of the number of constraints on the solution of inverse problems in the context of microvascular blood flow.*
- 02/2021 – 08/2021 Marco Heim (Master student). Project: *Reperfusion dynamics in microvascular networks with and without collaterals.*
- 02/2020 – 08/2020 Luke Prakash Idiculla (Master student). Project: *Quantifying oxygen partial pressure heterogeneity within individual red blood cells.*
- 02/2019 – 10/2019 Alexander Held (Master student). Project: *Automation & optimization of algorithms to compute the red blood cell velocity from two-photon microscopy images.*
- 02/2019 – 08/2019 Giulia Conti (Master student). Project: *Investigating the effect of microstrokes on the perfusion of the cortical microvasculature.*
- 04/2018 – 06/2020 Five student assistants (Master students). Project: *Manual segmentation of microvascular networks acquired by two-photon imaging as training data for automated image segmentation based on machine learning.*
- 09/2016 – 12/2016 Felix Thaler (Master student). Project: *Optimization of artificial capillary beds to obtain a high degree of well-balancedness.*
- 02/2016 – 06/2016 Sophie Lohmann (Master student). Project: *Optimization of artificial capillary beds to obtain a high degree of well-balancedness.*
- 02/2015 – 06/2015 Alexander Garbin (Master student). Project: *Construction of 3D artificial vascular networks & investigating possible vascular mechanisms during neuronal activation.*
- 02/2015 – 06/2015 Edoardo Rossi (Master student). Project: *Validation of discrete RBC model to simulate the flow in the cerebral vasculature during baseline and activation.*
- 02/2013 – 05/2013 Robert Knell (Bachelor student). Project: *Experimental investigation of the distribution of red blood cells in simplified capillary networks.*

SF: Sofia Farina, CL: Chryso Lambride, GS: Gaia Stievano,