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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: <i>Leptomeningeal collaterals during stroke – quantitative insights from blood flow modeling in whole brain vascular networks</i> . 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: <i>Energy supply in whole brain microvascular networks in health and disease – quantifying the relevance of small-scale disturbances</i> .
08/2019 – 08/2020	Forschungskredit Postdoc , University of Zurich, Switzerland 13-month research project. Salary and expenses (CHF 125'274) Title: <i>In-depth characterization of the brain microvasculature focusing on layer-specificity in topology, perfusion and nutrient supply</i> .
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: <i>Oxygen discharge from one-dimensional red blood cells to tissue</i> .

Publications & presentations - summary

Publications	17 publications (including: 2 last author, 5 first author, 1 review, 2 commentaries) all in Q1 journals with impact factors ranging from 4.5-18.7. Resulting in a total of 880 citations with a steadily increasing number of citations per year. 2 submitted manuscripts and 3 in preparation. The full publication is available in a separate document.
Presentations	19 invited talks at international conferences and workshops. 19 conference contributions. 9 seminar presentations.

Teaching activities

Since 2018	Class on <i>Blood flow modeling in the microcirculation</i> (part of the lecture <i>Biofluid dynamics</i>). Master level (~30 students). ETH Zurich, Switzerland.
01/2019	Guest lecture on <i>Blood flow modeling in the microcirculation</i> , University of Stuttgart, Germany.
09/2013 – 03/2016	Teaching assistant for <i>Computational Methods for Flow, Heat and Transport problems</i> . Bachelor level (~60 students). ETH Zurich, Switzerland.
09/2013 – 07/2016	Teaching assistant for <i>Computational Fluid Dynamics with OpenFOAM</i> . 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	<i>ConFlowNet2025 conference</i> . Raitenhaslach. Germany.
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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

09/2026	9 th International Conference on the Virtual Physiological Human. Milano. Italy. (<i>oral presentation</i>)
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. 11 th Annual Meeting. Valencia. Spain. (<i>poster</i>)
10/2018	2 nd Swiss Vascular Research Symposium. Lugano. Switzerland. (<i>oral presentation & poster chair</i>)
12/2017	School of Brain Cells & Circuitry <i>Camillo Golgi</i> . Erice. Italy. (<i>oral presentation</i>)
10/2017	Blood flow: Current state and prospects. Paris. France. (<i>poster</i>)
04/2017	28 th International Symposium on Cerebral Blood Flow, Metabolism and Function. Berlin. Germany. (<i>oral presentation</i>)
07/2016	44 th Annual Meeting of the International Society of Oxygen Transport to Tissue. Chicago. USA. (<i>oral presentation</i>)
06/2015	27 th International Symposium on Cerebral Blood Flow, Metabolism and Function. Vancouver. Canada. (<i>oral presentation</i>)
12/2014	Aarhus CTH Meeting. Aarhus. Denmark. (<i>poster</i>)
06/2014	42 nd Annual Meeting of the International Society of Oxygen Transport to Tissue. London. UK. (<i>poster</i>)

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

presentation)

04/2023	9 th European Stroke Organization Conference. Munich. Germany. (CL, <i>poster presentation</i>)
09/2022	30 th International Symposium on Cerebral Blood Flow. Metabolism and Function. Glasgow. UK. (RE, <i>poster presentation</i>)
06/2021	Interpore 2021. online. (RE, <i>oral presentation</i>)
11/2020	APS Division of Fluid Dynamics. 73 rd Annual Meeting. online. (RE, <i>oral presentation</i>)
07/2019	29 th International Symposium on Cerebral Blood Flow, Metabolism and Function. Yokohama. Japan. (RE, <i>poster presentation</i>)
05/2019	Interpore 2019. Valencia. Spain (RE, <i>oral presentation</i>)
09/2018	11 th World Congress for Microcirculation. Vancouver. Canada (RE, <i>poster presentation</i>)

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

Scientific outreach

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

Supervision of PhD students

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

Supervision of graduate & undergraduate students

07/2026 – 12/2026	Muhtaseen Hafiz (Master student). Project: <i>Validation of a Graph-Based Pipeline for the Extraction and Classification of Surface Vasculature in Whole-Brain Vascular Networks</i> . (Co-Supervision with SF)
07/2026 – 01/2027	Anna Greg (Master student). Project: <i>Flow modelling in human whole brain vascular datasets</i> .
03/2026 – 08/2026	Yassine Frani (Master student). Project: <i>Modelling blood flow, stroke and autoregulation in semi-realistic vascular whole brain datasets</i> . (Co-Supervision with CL)
03/2026 – 08/2026	Letizia Greco (Master student). Project: <i>Deciphering penetrating tree characteristics in vascular whole brain datasets</i> . (Co-Supervision with SF)

02/2026 – 04/2026 07/2026 – 12/2026	Nicolas Müller (Master student). Project: <i>Large-Scale Vascular Segmentation and Topology Reconstruction of the Mouse Brain</i> (Co-Supervision with SF)
12/2025 – 05/2026	Dominic Campbell-Pitt (Master student). Project: <i>Impact of mass transfer coefficients on oxygen transport in microvascular networks</i> . (Co-Supervision with GS)
10/2025 – 03/2026	Ana Barrio (Master student). Project: <i>The impact of regional brain vascular architectures (cortex vs hippocampus) on oxygen transport and delivery</i> . (Co-Supervision with GS)
09/2025 – 12/2025	Tim Eicher (Bachelor student). Project: <i>Computational blood flow modelling in arterial whole brain vascular networks</i> . (Co-Supervision with CL)
03/2025 – 08/2025	Giorgia Barra (Master student). Project: <i>Quantification of the impact of mass transfer coefficients on oxygen transport in microvascular networks</i> . (Co-Supervision with GS)
03/2025 – 08/2025	Emilio Zorzi (Master student). Project: <i>Quantification of the role of local vascular topologies on oxygen delivery</i> . (Co-Supervision with GS)
11/2024 – 04/2025	Ketan Gupta (Master student). Project: <i>Differentiation of surface and penetrating vessels in arterial vascular whole brain data sets</i> . (Co-Supervision with CL)
08/2024 – 01/2025	Manuel Fernandez Lopez (Master student). Project: <i>Implementation of optimized bi-phasic blood flow model for realistic microvascular networks (microBlooM)</i> .
08/2023 – 01/2024	Javier Tejeda Chas (Master student). Project: <i>Numerical modeling of microvascular flow in small realistic microvascular networks in case of single capillary occlusions</i> .
05/2023 – 12/2023	Artemisia Sarteschi (Internship). Project: <i>Implementation of bi-phasic blood flow model for microvascular flow and application in simulation study (microBlooM)</i> .
09/2022 – 12/2022	Pushkin Nagpure (Master student). Project: <i>Quantifying the impact of the number of constraints on the solution of inverse problems in the context of microvascular blood flow</i> .
02/2021 – 08/2021	Marco Heim (Master student). Project: <i>Reperfusion dynamics in microvascular networks with and without collaterals</i> .
02/2020 – 08/2020	Luke Prakash Idiculla (Master student). Project: <i>Quantifying oxygen partial pressure heterogeneity within individual red blood cells</i> .
02/2019 – 10/2019	Alexander Held (Master student). Project: <i>Automation & optimization of algorithms to compute the red blood cell velocity from two-photon microscopy images</i> .
02/2019 – 08/2019	Giulia Conti (Master student). Project: <i>Investigating the effect of microstrokes on the perfusion of the cortical microvasculature</i> .
04/2018 – 06/2020	Five student assistants (Master students). Project: <i>Manual segmentation of microvascular networks acquired by two-photon imaging as training data for automated image segmentation based on machine learning</i> .
09/2016 – 12/2016	Felix Thaler (Master student). Project: <i>Optimization of artificial capillary beds to obtain a high degree of well-balancedness</i> .
02/2016 – 06/2016	Sophie Lohmann (Master student). Project: <i>Optimization of artificial capillary beds to obtain a high degree of well-balancedness</i> .
02/2015 – 06/2015	Alexander Garbin (Master student). Project: <i>Construction of 3D artificial vascular networks & investigating possible vascular mechanisms during neuronal activation</i> .
02/2015 – 06/2015	Edoardo Rossi (Master student). Project: <i>Validation of discrete RBC model to simulate the flow in the cerebral vasculature during baseline and activation</i> .
02/2013 – 05/2013	Robert Knell (Bachelor student). Project: <i>Experimental investigation of the distribution of red blood cells in simplified capillary networks</i> .

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