

University Academic Curriculum Vitae

Personal information Name: Riccardo Zamboni

Education since leaving school

- 2014 Bachelor's degree in Physics at the University of Padova in the Department of Physics and Astronomy "Galileo Galilei", supervisor: Prof. C. Sada, thesis: "Microfluidic characterization of a T-junction droplet generator made of lithium niobate".
- 2016 Master's degree in Experimental Physics at the University of Padova in the Department of Physics and Astronomy "Galileo Galilei", supervisor: Prof. C. Sada, thesis: "Optofluidic application of a Mach-Zehnder interferometer integrated in lithium niobate for droplet sensing".
- 2020 PhD in Physics at the University of Padova in the Department of Physics and Astronomy "Galileo Galilei", supervisor: Prof. C. Sada, thesis: "Study of light driven phenomena for Applications in Opto-Microfluidic lithium niobate Lab-On-a-Chip Platforms".

Present appointment

- Walter Benjamin position
- 01.01.2023
- Independent researcher funded from DFG (Deutsche Forschungsgemeinschaft)
- Institute of Applied Physics, University of Muenster
- I was awarded the Walter Benjamin position to pursue my independent research project, entitled "Microfluidic Droplet dynamics Actuated by Light-Induced Virtual Electrodes - μ Drop ALIVE" to study optoelectronic manipulation of droplet within microfluidic devices.

Professional experience

From / to	Job title	Name of academic Institution	Academic level	responsibilities
09.2019/09.2020	Research Assistant	University of Padova	Master's degree	Experimental research project in Optofluidics.
10.2019/06.2020	Assistant Teacher	University of Padova	Master's degree	I assisted the teaching of the course Laboratory Physics 2 in the Physics Bachelor curriculum.
11.2020/12.2022	PostDoc	University of Muenster	PhD	Supervision the installation of a soft-lithography bench, Leadership of the microfabrication lab, Experimental research in the field of droplet microfluidics, 4 ECTS per semester of teaching duty.

Participation in exhibitions (where applicable)

N/A

Experience in academic teaching

- Estage project 2018-2019 - Supervisor of high schools students in the context of an outreach-didactical project. Under my supervision, the students performed an interferometric experiment for the measurement of the thermal expansion coefficient, including the realization of the optical setup.
- Supervising activity 2016-2024 - Laboratory supervisor of 5 Master's and 7 Bachelor students during their daily life in the laboratory. Supervisor of a Master student in Physics at University of Muenster.
- Assistant teacher 2019 - course Laboratory Physics 2 in the Physics Bachelor curriculum.
- 24 ECTS didactical formation 2019 - 4 exams, each of 6 ECTS of a multidisciplinary pathway in anthropological, psychological, methodological, and didactical technologies, required for the Italian national public exam for upper and lower secondary school teachers.
- Miniforschung supervisor 2020-2024 - supervising two students conducting cutting-edge research experiments with respect of the state of the art. valid 2 ECTS.
- Practicum 2020-2024 - responsible for the practical exercises on the "Leidenfrost effect" and "holographic volume data storage". Groups of students performed 1-week experiment under my supervision. Valid 2 ECTS in the Master curriculum of Nonlinear physics and Photonics and Magnonics.
- Seminar 2020-2024 - supervisor for student-seminars in "Optofluidics" and "Nonlinear microfluidics". valid 2 ECTS in the Master curriculum of Nonlinear physics and Photonics and Magnonics.

Other academic responsibilities

N/A

Memberships

N/A

Research and scholarships

- In the last five years, my research was in the field of optofluidics. I studied innovative light-liquid interactions emerging in novel optofluidic devices, which couple photonic structures with microfluidic channels. These advancements enabled the creation of unique optofluidic sensors, which allowed for the study of distinctive droplet transport phenomena, for the development of lab-on-a-chip and biological and chemical sensor.
- After my Ph.D., my interest shift towards the development of reliable methods for handling micro and nanosamples (liquid, particles, etc...). I developed an innovative optoelectronic method that combines advantages of both aspects, using photoconductive materials. On this topic, I was awarded by a Walter Benjamin position financed by DFG, which enabled me to establish as an independent researcher.

Date granted	Award Holder(s)	Funding Body	Title	Amount received
01.2023	Riccardo Zamboni	Deutsche Forschungsgemeinschaft - DFG	Walter Benjamin program	201.900 Eur
06.2024	Riccardo Zamboni	European Union	Erasmus +	1395 Eur
04.2022	Riccardo Zamboni	Deutscher Akademischer Austauschdienst - DAAD	Kongressreiseprogramm	ca. 1200 Eur

Publications

My ORCID: <https://orcid.org/0000-0001-8087-7539>

My Web of Science ResearcherID: ABA-6605-2020

- "Photovoltaic charging of passive dielectric substrates for droplet manipulation" *Zamboni, R., Sadasivan, A., Sebastián-Vicente, C., A. García-Cabañes, A., Carrascosa, M. & Imbrock, J.* (2025) in preparation for *J. Colloid Interface Sci.*
- "All-optical integrated optofluidic light modulator" *Zamboni, R., Lucchetti, L., Sada, C. & Zaltron, A.* (2025). under review in *Advanced Optical Materials.*
- "Lab-on-a-chip device for microfluidic trapping and TIRF imaging of single cells" *Dzikonski, D., Zamboni, R., Bandyopadhyay, A., Paul, D., Wedlich-Söldner, R., Denz, C. & Imbrock, J.* (2025) accepted in *Biomedical Microdevices.*
- "Transition between light-induced attraction and repulsion of nanoparticles on lithium niobate surface" *Asché, E., Zamboni, R., Denz, C. & Imbrock, J.* (2025). accepted in *Physical Review B.*
- "Hybrid Microfluidic Chip Design with Two-Photon Polymerized Protein-Based Hydrogel Microstructures for Single Cell Experiments" *Dzikonski, D., Bekker, E., Zamboni, R., Ciechanska, D., Schwab, A., Denz, C. & Imbrock, J.* (2024). *Advanced Materials Technologies*, 202401571. <https://doi.org/10.1002/admt.202401571>
- (*) "Optoelectric-driven wetting transition on artificially micropatterned surfaces with long-range virtual electrodes" *Zamboni, R., Ray, D., Denz, C., & Imbrock, J.* (2024). *Advanced Materials Interfaces*, 12, 1, 2400459. <https://doi.org/10.1002/admi.202400459>
- (*) "Photovoltaic Charge Lithography on Passive Dielectric Substrates Using Fe:LiNbO₃ Stamps" *Sebastián-Vicente, C., Zamboni, R., et al.* (2024). *Advanced Electronic Materials*, 2400327. <https://doi.org/10.1002/aelm.202400327>
- "Polarization Coupling between Ferroelectric Liquids and Ferroelectric Solids: Effects of the Fringing Field Profile" *Marni, S., Barboza, R., Oluwajoba, A. S., Zamboni, R., & Lucchetti, L.* (2024). *Crystals*, 14, 5, 425. doi: 10.3390/cryst14050425
- "Photo-Induced Electric Field Effects on Water Droplets Generated in a LiNbO₃ Opto-Microfluidic Platform" *Bragato, G., Zaltron, A., Zanardi, M., Zamboni, R., ... & Sada, C.* (2024). *Adv. Mater. Interfaces*, 11, 12, 2301008. doi: 10.1002/admi.202301008
- (*) "Light-Induced Virtual Electrodes for Microfluidic Droplet Electro-Coalescence" *Zamboni, R., Sebastián-Vicente, C., Denz, C. & Imbrock, J.* (2024). *Adv. Funct. Mater.*, 34, 13, 2305286. doi: 10.1002/adfm.202305286
- (*) "Opto-microfluidic coupling between optical waveguides and tilted microchannels in lithium niobate" *Zamboni, R., Gauthier-Manuel, L., Zaltron, A., Lucchetti, L., Chauvet, M. & Sada, C.* (2023). *Opt. Express*, 31, 12. doi: 10.1364/OE.495406
- "Droplet transition from non-axisymmetric to axisymmetric shape: Dynamic role of lubrication film in a rectangular microfluidic channel" *Zamboni, R., Zaltron, A., Ferraro, D. & Cinzia, C.* (2022). *Phys. Fluids*, 34, 12. doi: 10.1063/5.0123900
- "Light actuated merging of confined microfluidic droplets by virtual photovoltaic electrodes" *Zamboni, R., Imbrock, J. & Denz, C.* (2022). *Photosensitive Materials and their Applications II* 12151, 98-106. doi: 10.1117/12.2624579
- "Enhanced sensing to characterize microdroplets through induced optical phenomena in integrated optomicrofluidic lab-on-a-chip" *Zanini, L., Zaltron, A., Turato, E., Zamboni, R., Sada, C.* (2022). *Optical Sensing and Detection VII*, 12139, 106-114. doi: 10.1117/12.2623802
- "Opto-Microfluidic Integration of the Bradford Protein Assay in Lithium Niobate Lab-on-a-Chip" *Zanini, L., Zaltron, A., Turato, E.,*

Zamboni, R., Sada, C. (2022). *Sensors* 22, 1144. doi: 10.3390/s22031144

- "Real-time precise microfluidic droplets label-sequencing combined in a velocity detection sensor" *Zamboni, R., Zaltron, A., Chauvet M. & Sada C.* (2021). *Sci. Rep.*, 11.1, 1-12. doi: 10.1038/s41598-021-97392-3
- "Optofluidic Platform based on Liquid Crystals in X-Cut Lithium Niobate: Thresholdless All-Optical Response" *Ciciulla, F., Zaltron, A., Zamboni, R., Sada, C., Simoni, F. Reshetnyak, V. Y., & Lucchetti, L.* (2021). *Crystals*, 11.8, 908. doi: 10.3390/CRYST11080908
- "Manipulating aqueous droplets by light-induced virtual electrodes" *Zamboni, R., Imbrock, J. & Denz, C.* (2021). *Optical Trapping and Optical Micromanipulation XVIII*, 11789. doi: 10.1117/12.2594165
- "Opto-microfluidic System for Absorbance Measurements in Lithium Niobate Device Applied to pH Measurements" *Zamboni, R., Zaltron, A., Izzo, E., Bottaro, G., Ferraro, D. & Sada C.* (2020). *Sensors* 20 (18), 5366. doi: 10.3390/s20185366
- (*) "LiNbO3 integrated system for opto-microfluidic sensing." *Bettella, G., Zamboni, R., Pozza, G., Zaltron, A., ... & Chauvet, M.* (2019) *Sens. Actuators B: Chem.*, 282, 391-398. doi: 10.1016/j.snb.2018.10.082
- "Lithium niobate micromachining for the fabrication of microfluidic droplet generators" *Bettella, G., Pozza, G., Kroesen, S., Zamboni, R., ... & Chauvet, M.* (2017) *Micromachines*, 8(6), 185. doi: 10.3390/mi8060185
- "Integrated optics on lithium niobate for sensing applications." *Zaltron, A., Bettella, G., Pozza, G., Zamboni, R., ... & Denz, C.* (2015). *Optical Sensors*, 9506, 950608. doi: 10.1117/12.2178457

Publications about the applicant

N/A

Further data

Participation at scientific conferences:

- Microfluidics 2018: New Technologies and Applications in Biology, Biochemistry and Single-Cell Analysis July 15-17, Heidelberg (Germany) 2 poster presentations;
- Italian Soft Days 2018, September 13-14, Padova (Italy), poster presentation;
- NanoBioTech-Montreux: October 29-31 2018, Montreux (Switzerland) poster presentation;
- PR' photorefractive photonics and beyond: June 18-21 2019, Gérardmer (France), oral presentation;
- SPIE Nanoscience +Engineering, August 1-5 2021, San Diego (USA), proceeding and oral presentation;
- microTAS October 10-14 2021, San Francisco (USA), poster presentation;
- SPIE Photonics Europe 2022, April 3-7, Strasbourg (France), proceeding and oral presentation;
- PR' photorefractive photonics and beyond: September 5-9 2022, Monastier di Treviso (Italy), oral presentation;
- NanoBioTech-Montreux: November 12-15 2023, Montreux (Switzerland) poster presentation;
- PR' photorefractive photonics and beyond: July 2-5 2024, San Lorenzo de El Escorial (Spain), oral presentation;

Entrepreneurship

N/A

Statement of interest

With a strong background in optofluidics and micromanipulation, my expertise aligns closely with the advertised position at unibz,

particularly in the development of unconventional electronic materials, flexible sensors, and wearable devices.

My research has focused on integrating photonic structures with microfluidic channels, leading to novel sensing technologies with applications in healthcare and environmental monitoring. Additionally, my work on light-induced electric fields for microfluidic droplet manipulation demonstrates my ability to innovate in the design and fabrication of functional materials and devices. Leveraging this experience, I am eager to contribute to unibz's efforts in developing thin-film processes, deformable electronic components, and smart textiles for next-generation applications, providing my technical microfabrication skills and my strong expertise in microfluidics. The combination of flexible electronics and microfluidics opens indeed new opportunities of research and application. My interdisciplinary approach and hands-on experience in device fabrication will support the university's research initiatives in sensor integration, environmental monitoring, and smart assistance systems, strengthening its position at the forefront of flexible and sustainable electronics.

**Language
competence**

Italian mother tongue
English C1
German B2

Date 06/02/2025