PERSONAL INFORMATION

Laura Perego

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Sex Female | Date of birth 21/01/1992 | Nationality Italian

CURRENT POSITION

Post-Doctoral Fellow

h-index
- h-index 2 (Scopus); 3 (Google Scholar)

Citations
- Citations : 133 (Scopus); 193 (Google Scholar)

WORK EXPERIENCE

From 01/06/2024 – To 31/05/2026

Post-Doctoral Fellow

"Development of light-sheet microscopy techniques for high-resolution volumetric imaging".
"Sviluppo di tecniche di microscopia a foglio di luce per imaging volumetrico ad alta risoluzione"- nell'ambito del Progetto NIH Connect.
Scientific supervisor: Prof. Francesco Saverio Pavone.

European Laboratory for Non-Linear Spectroscopy (LENS) – Sesto Fiorentino (FI) – Italy – Prot. N. 0000940

- Implementation of an advance optical system and of the electronic and computing interface needed for a custom-made dual-view inverted light-sheet fluorescence microscope to perform 3D high-resolution imaging of cleared human brain samples.
- Design and development of an advance optical system and of the electronic and computing interface of a custom-made four-colour light-sheet microscope to perform 3D imaging of cleared samples with an acquisition speed with a 11 fold improvement with respect to the dual-view inverted light-sheet microscope.
- Responsible for the daily maintenance of the microscope systems of the research group, which include three different light-sheet microscopes, one custom-built advanced two-photon microscope and a confocal spinning-disk system.
- Responsible for the extraordinary maintenance and repairs of the above mentioned system, including problems with the optical, optomechanical, electronic, and software-related components.
- Big data: Management of large quantities of data obtained through fluorescence microscopes through the use of specific software and scripts. In particular, stitching of consecutive stacks for volumetric reconstructions, deconvolution, 3D rendering, and data analysis.
- Study of the connectome of human brainstem using a multimodal approach involving light-sheet microscopy reconstructions and two-photon fluorescence microscopy for super-resolved images of expanded tissues.
- Characterization of the brain tumour (glioma) microenvironment through imaging of specific molecular markers by means light-sheet fluorescence microscopy for tumour grading for specific therapeutic target identification.
- Supervision of doctoral and master students.

Business or sector Optics, Microscopy, and Neuroscience

From 01/06/2022 – To 31/05/2024

Post-Doctoral Fellow

"Low-cost diagnostic systems for rapid and wide-range differential virological screening of the population through optical/molecular analysis of saliva".
"Sistemi diagnostici a basso costo per lo screening virologico differenziale rapido e ad ampio Raggio della popolazione attraverso l'analisi ottica/molecolare della saliva"

Scientific supervisor: Prof. Francesco Saverio Pavone.

Department of Physics and Astronomy – University of Florence - Sesto Fiorentino (FI) – Italy,
European Laboratory for Non-Linear Spectroscopy (LENS) – Sesto Fiorentino (FI) - Italy

- Design and implementation of a novel optical compact setup exploiting Evanescent-Wave Total Internal Reflection Scattering (TIRS) for the early-diagnosis and the mass-screening of various pathologies through optical and molecular analysis of biological fluids (liquid biopsy).
- Responsible for the daily maintenance and repair of the above mentioned system.
- Preparation and handling of samples involving biological fluids and selected markers and antibodies in ad-hoc microfluidic systems.
- Implementation of novel microfluidics chips made of polydimethylsiloxane (PDMS) by means of replica molding (REM) of negative stamps fabricated by 3D printing, and identification of the optimal features of the channels to control diffusive phenomena.
- Analysis of the liquid biopsy results including calibration against synthetic models, extraction of quantitative parameters and indexes from raw data through dedicated scripts, and assessment of their statistical reliability.
- Supervision of doctoral and master students.

Business or sector Optics, Microscopy, Microfluidics, 3D printing, Diagnostics

From 02/01/2022 – To 31/05/2022

Scientific Consultant

L4T – Light4Tech s.r.l. – Firenze (FI) - Italy

- Provide professional advices for the design and development of diagnostic technologies both in vitro and in vivo.
- Design and development of optical systems, miniaturized Lab-On-Chip (LOC) system, and microfluidics chips for biomarker, bacterial or viral agents, and pathological agents in fluids.
- Visit laboratories and research centres to evaluate the technological transfer of potentially innovative technologies.
- Supervision of junior personnel.

Business or sector Scientific consultancy, Optics, Microfluidics, Diagnostic, Technological transfer

From 01/05/2019 – To Present Date

Coach of Paralympic Water polo Team

Rari Nantes Florentia a.s.d. & Italian Paralympic Water polo Team

- Coach of the team playing in the National Major League.
- Palmares: 2 Italian championships, 5 Italian Cups, 1 Italian Super-Cup

Business or sector Sport

From 08/08/2007 – To 31/05/2022

Professional Water polo Athlete

Rari Nantes Florentia a.s.d. , Como Nuoto a.s.d., Varese Olona Nuoto a.s.d. - Italy

- Athlete in the Italian Major League Championship for different teams in Italy.

Business or sector Sport

EDUCATION AND TRAINING

01/11/2019 – 15/04/2022

International Doctorate in Atomic and Molecular Photonics – FIS03

Excellent/Excellent

European Laboratory for Non-Linear Spectroscopy – University of Florence - Italy

- Title of the dissertation: “Combining optical manipulation and FRET-based Molecular Tension Microscopy to study mechano-transduction in living cells”. Scientific Supervisor: Prof. Marco Capitanio.

- Design and implementation of a highly innovative optical setup combining optical tweezers and different kind of fluorescence microscopy, such as wide-field (WF), total internal reflection fluorescence (TIRF) and highly-inclined laminar optical (HILO) microscopy to manipulate proteins and cells through optical tweezers and study their biological response through Fluorescence Resonance Energy Transfer (FRET) sensors.
- Handling of cell cultures, including human-induced Pluripotent Stem Cells (hiPSCs) and of basic transfection techniques.
- Handling of microfluidic devices and incubation systems for microscopes for in-vivo imaging.
- Development of super-resolution microscopy techniques, in particular Stochastic Optical Reconstruction Microscopy (STORM) for the detailed study of the actin network organization in the cytoskeleton of cells.
- Development of the system software (LabVIEW).
- Data analysis.
- Supervision of master students.

24/09/2018 **Master Degree in Physics and Astronomy** 110/110

Università degli Studi di Milano – Bicocca, Milano, Italy

- Master Thesis Title: "Misura di forze intramolecolari tramite microscopia FRET". Scientific supervisor: Prof. Francesco Mantegazza.
- Design and implementation of optical setup for fluorescence microscopy, Design and implementation of optical manipulation techniques (optical tweezers), handling of cell cultures, microfluidics, optics, data analysis, super-resolution microscopy, FRET sensors, software development.

15/10/2015 **Bachelor Degree in Physics and Astronomy** 97/110

Università degli Studi di Milano, Milano, Italy

- Bachelor Thesis Title: "Sensori magnetici innovative in biomedicina". Scientific supervisor: Prof. Alessandro Lascialfari
- Superparamagnetic nanoparticles, nanoparticle functionalization, sensors, Nuclear Magnetic Resonance (NMR), surface functionalization.

11/07/2006 **Scientific High School Diploma** 11/07/2006

Liceo G. Ferraris – Varese (VA) - Italy

RESEARCH ACTIVITY

Publications in peer review journals

1. **Perego, L.** † et al., "Quad-SPIM: a high-speed, multi-color light-sheet microscope for 3D imaging of large cleared human brain tissues" Laser & Photonics Reviews 2025
2. Di Meo, D.,…**Perego, L.**, ..& Costantini, I. "Quantitative cytoarchitectural phenotyping of deparaffinized human brain tissues". *Communications Biology*, 2025, 8.1: 1527.
3. Sorelli, M., …, **Perego, L.**, ... & Costantini, I. (2025). Myelinated fiber labeling and orientation mapping of the human brain with light-sheet fluorescence microscopy. *NeuroImage*, 121581.
4. **Perego, L.***, et al. "A Compact Prism-Based Microscope for Highly Sensitive Measurements in Fluid Biopsy." *Journal of Biophotonics* 18.4 (2025): e202400519.
5. Sergides, M., **Perego, L.**, …., Pavone, F. S., & Capitanio, M. (2021). Probing mechanotransduction in living cells by optical tweezers and FRET-based molecular force microscopy. *The European Physical Journal Plus*, *136*(3), 316.
6. Arbore, C., **Perego, L.**, Sergides, M., & Capitanio, M. (2019). Probing force in living cells with optical tweezers: from single-molecule mechanics to cell mechanotransduction. *Biophysical reviews*, *11*(5), 765-782.

Preprints

Dallari, C., Ladurner, G., Kendrisic,., .. **Perego, L.**,.. & Pavone, F. S. (2025). Ultrasensitive saliva-based detection of early Alzheimer's disease biomarkers via nanoparticle-enhanced evanescent scattering microscopy. *bioRxiv*, 2025-12.

Proceedings

1. Costantini I. et al. “Cyto- and myeloarchitectonics characterization of human cortex and brainstem with light sheet fluorescence microscopy” SPIE BIOS 2025
2. Sorelli M, ….. Costantini I “Automated 3D quantitative cyto- and myeloarchitectural analysis of human brain fluorescence microscopy reconstructions” SPIE BIOS 2025
3. Perego, L., et al. "Quad-SPIM: a novel light-sheet microscope for high-speed imaging of human brain tissue." *European Conference on Biomedical Optics*. Optica Publishing Group, 2025.
4. C. Dallari, L. Perego, L. Gardini, C. Credi, Francesco S. Pavone, "High throughput evanescent-wave biosensor for the early-stage detection of biomarkers in liquid biopsies (Conference Presentation)," Proc. SPIE PC13316, Optical Diagnostics and Sensing XXV: Toward Point-of-Care Diagnostics, PC133160G (20 March 2025);
5. C. Dallari, L. Perego, L. Gardini, C. Falciani, C. Credi, and F. S. Pavone, "High throughput evanescent-wave biosensor for the early-stage detection of biomarkers in liquid biopsies," in *Optica Biophotonics Congress: Biomedical Optics 2024 (Translational, Microscopy, OCT, OTS, BRAIN)*, Technical Digest Series (Optica Publishing Group, 2024), paper JM4A.23.

Scientific Projects

- **Scientific member** (LENS unit) of the international project “BRAIN CONNECTS: Mapping Connectivity of the Human Brainstem in a Nuclear Coordinate System” (U01NS132181) of the National Institutes of Health, USA. From 09/2023 to 08/2025. LENS funding $565.140,00.
- **Scientific member** of the project “DIVISA: Sistemi DIagnostici a basso costo per lo screening VIrologico differenziale rapido e ad ampio raggio della popolazione attraverso l’analisi ottica/molecolare della Saliva” di Regione Toscana.
- **Scientific member** of the PNRR project Tuscany Health Ecosystem THE – Spoke 3: “Advanced technologies, methods and materials for human health and well-being”, Subproject 17: “Multifunctional optofluidic devices for early diagnosis of Alzheimer’s disease by screening for biomarkers in cerebrospinal fluids.”

Honors and awards

- 2019, Grant award received by the “**BIO-BRILLOUIN cost action**” to attend the “Emerging Tools in Biomechanics” training school held at Palazzo Franchetti in Venice, Italy.
- 2021, Grant award received by the **“EBSA – European Biophysical Societies Association”** to attend the 13th European Biophysics Conference, held in July 2021 in Vienna, Austria.
- 2022, Awarded with “Premio Alfredo Martini” by “**Associazione Nazionale Stelle, Palme e Collari D’Oro al Merito Sportivo del CONI e del CIP**”, for sport results and engagement in social activities.
- 2024, Awarded with the “Premio Pegaso per lo Sport” of **Regione Toscana**.

Institutional roles

Member of the **Gender Equality Plan committee (GEP)** of the European Laboratory for Non-Linear Spectroscopy (LENS), University of Florence set up by the Directive Council on 17/10/2024, duration 3 years. GEP has the aim to promote and implement gender equality, within the LENS institute.

Dissemination activity for Gender equality

- 2025, Organizer for the GEP committee of the Margherita Hack seminar “ Contrasto alla violenza di genere in ambito lavorativo: come comportarsi, come riconoscerla e come intervenire” that will be held by Associazione No.Vio. at LENS on November 28, 2025 in the context of the International Week for the Elimination of Violence against Women.
- 2025, Organizer for the GEP committee of the Margherita Hack seminar “Genere e lavoro: le radici storico-culturali delle discriminazioni e il cammino del diritto antidiscriminatorio in Europa e in Italia” which will be held by Prof. Elettra Stradella at LENS on October 31, 2025.
- 2025, Promoter with the GEP committee of the call for 10 rewarded scholarship to support women in STEM disciplines.
- 2025, Promoter with the GEP committee of the “GEP Library”, a small collection of books dealing with gender equality themes within the LENS library free and available for the whole personnel.

Scientific society memberships

- 2025, Optica SPIE International Membership

CONFERENCES

Oral presentations

1. Di Meo D., **Perego L**.,…Costantini I. “Quantitative cytoarchitectural phenotyping of Malformations of Cortical Development with 3D imaging” SINS 2025
2. Costantini I**., Perego L.,** et al. “Cyto- and myeloarchitectonics characterization of human cortex and brainstem with light sheet fluorescence microscopy” BIOS SPIE 2025
3. Costantini I**., Perego L.,**… et al. “High-resolution human brain 3D reconstruction with light-sheet fluorescence microscopy” OSA SPIE 2024
4. C. Dallari, **L. Perego**,.., F.S. Pavone “High-throughput evanescent-wave biosensor for the early-stage detection of biomarkers in liquid biopsies” in Optica Biophotonics Congress: Biomedical Optics 2024
5. C. Dallari, L. Perego, L. Gardini, C. Credi, Francesco S. Pavone, "High throughput evanescent-wave biosensor for the early-stage detection of biomarkers in liquid biopsies (Conference Presentation)," Proc. SPIE PC13316, Optical Diagnostics and Sensing XXV: Toward Point-of-Care Diagnostics, PC133160G (20 March 2025)
6. **L. Perego**, …, F.S. Pavone, M. Capitanio “Optical manipulation and force microscopy to reveal the mechanisms of human stem cells differentiation”, in Emerging Tools in Biomechanics Training School, Palazzo Franchetti, Venice, Italy, 2019

Poster presentations

1. **Perego, L**., Cheli, F., Bradley, S., Di Meo, D., Giannoni, L., Ramazzotti, J., ... & Pavone, F. S. (2025, June). Quad-SPIM: a novel light-sheet microscope for high-speed imaging of human brain tissue. In *European Conference on Biomedical Optics* (pp. W3A-40). Optica Publishing Group.
2. Sorelli, M., Di Meo, D., Bradley, S., Ramazzotti, J., Lorenzon, B., Cheli, F., **Perego, L**. ... & Pavone, F. S. (2025, March). Automated 3D quantitative cyto-and myeloarchitectural analysis of human brain fluorescence microscopy reconstructions. In *Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues XXIII* (Vol. 13323, pp. 144-147). SPIE.
3. Danila Di Meo, **Laura Perego**… Irene Costantini **"**3D reconstruction and cellular phenotyping on deparaffinized human brain tissues” SfN 2024
4. Mazzamuto, G., …**Perego, L**.,…, Pavone, F.S. and Costantini, I**.** “Mapping neuronal populations with Light-Sheet Fluorescence Microscopy” FENS 2024
5. L. Perego, C. Arbore, M. Sergides, F.S. Pavone, M. Capitanio (2019) “Combining Optical Tweezers and Molecular Tension Microscopy to study mechano-transduction in living cells”, SIBPA Conference 2019.

TEACHING ACTIVITY

University Course

Appointed “Cultore della Materia” for the teaching activities of :
- B03198L, Laboratorio di biofisica e biofotonica, SSD FIS/03;
- B034732, Laboratory of biophysics and Biophotonics, SSD PHYS-03/A.

of the following University courses:
- B058-LM17, Scienze Fisiche e Astrofisiche, a.a. 2024/2025;
- B411-LM17, Physical and Astrophysical Sciences, a.a. 2025/2026.

Participation in teaching session with Prof. M. Capitanio (see letter in attachment).

Thesis supervision

May, 2024. Co- supervisor of Matilde Cortigiani for her Bachelor Thesis in Physics and Astronomy “Characterization and full validation of a compact Total Internal Reflection optical setup for scattering measurements in liquid bio samples”. SSD FIS/03.

PERSONAL SKILLS

Mother tongue: Italian

Other language

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1	C1	C1	C1

FCE certification, Grade A.

Communication skills

- Excellent communication skills gained through my participation at international congresses and my daily work with foreign people.
- Cross-cultural and cross-disciplinary communications and working abilities developed during the international doctorate attended at the European Laboratory for non-linear spectroscopy.

Organisational / managerial skills

- Excellent teamwork and organisational skills developed during my year of work in the research field
- Excellent self-organisational abilities developed by performing a high-level professional sport career during university, Ph.D. and post-Doc.
- Excellent team leading skills developed both by supervising students and by coaching the paralympic water polo team of Firenze and Italy.

Job-related skills

- Excellent writing skills of scientific manuscripts and projects developed during the years of work in the research field
- Excellent design and project skills of optical systems developed during the years of work in the research field

Digital competence

SELF-ASSESSMENT				
Information processing	Communication	Content creation	Safety	Problem solving
Proficient user	Proficient user	Proficient user	Independent user	Proficient user

- Excellent command of Office suite (Word, Excel, Power Point)
- Good command of image processing programs such as Fiji-ImageJ
- Excellent knowledge of LaTeX, Inkscape, and Micromanager.
- Good command of different languages: C++, LabView, MATLAB, Phyton
- Good knowledge of different operating systems: Windows, Linux, Ubuntu

Other skills

- First aid skills and defibrillator use (BLSD Certificate)

Driving licence

B

I hereby authorize the processing of my personal data contained in this curriculum vitae pursuant to Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016, as well as the applicable national legislation on personal data protection, for the sole purpose of recruitment and selection.

Place and Date: Florence, Italy – October 21, 2025

Signature