

PERSONAL INFORMATION

Irene Costantini



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Sex Female | Date of birth 06/04/1987 | Nationality Italian

Married, two daughters (born 01/03/2018, 12/03/2022)

POSITION

Researcher – Assistant Professor

h-index
citations

- H-index Scopus 13,
- Citation Scopus: 823

WORK EXPERIENCE

From 1/11/2020– 31/03/2024

Research fellow - Assistant professor

“Mapping the human brain cytoarchitecture in three dimensions through advanced microscopy and sample preparation techniques”

Scientific sector 05/B2 (Comparative Anatomy and Cytology), SSD BIO/06.

Biology Department – University of Florence – Italy Prot N. 0173315 - 30/10/2020 UNIFI affiliation with the European Laboratory for Non-Linear Spectroscopy

Research activity aiming at developing Imaging and Analysis Techniques to Construct a Cell Census Atlas of the Human Brain for the NIH BICCN project (Brain Initiative Cell Census Network) Number 1U01MH117023-01

- Development of tissue transformation techniques, staining and clearing methods for the study of the cytoarchitecture of various organs of human and mouse specimens in combination with advanced methods of optical imaging such as multi-photon and light sheet fluorescence microscopy
- Study of anatomical alterations in subjects affected by focal cortical dysplasia (FCD) for the development of new classification and diagnosis methods of the disease through the combination of clearing methods, high throughput imaging and image analysis with deep learning system
- Development of multiple staining techniques (multiplexing) for the molecular characterization of cleared tissues in three dimensions
- Development of correlative techniques between multi-photon microscopy, 3D-PLI (polarized light imaging) and MRI (magnetic resonance imaging) for the label-free study of the three-dimensional organization of neuronal fibers within brain slices of various species of mammal (mouse, rat, monkey, human).
- Mapping the neuronal activity of the entire murine brain by means of immediate early genes (cFos) markers for the study of diseases such as post-traumatic stress disorder, through the use of behavioral tests coupled with clearing and imaging techniques with light sheet microscopy..
- Application of correlative techniques between light sheet microscopy, OCT (Optical coherence tomography) and MRI (magnetic resonance imaging) for the census of cells within the human brain
- Big data: management of large quantities of data obtained through fluorescence microscopies through the use of specific software, in particular, stitching of consecutive stacks, deconvolution, 3D rendering and data analysis.
- Use of machine learning methodologies for the recognition, localization and characterization of cells in three dimensions in samples acquired with high resolution microscopy techniques (light sheet and two photon microscopy).
- Supervision of doctoral and master students
- Administration of chemical and biological laboratories

Business or sector Neuroscience

From 10/12/2020 to 24/12/2020

Consultant for National Research Council (CNR) – Istituto Nazionale di Ottica (INO-CNR).

“Pianificazione di tecniche di preparazione e analisi di campioni biologici di cervello umano da acquisire tramite microscopia a fluorescenza avanzata”

National Research Council (CNR) – Istituto Nazionale di Ottica (INO) – Sesto Fiorentino – Florence – Italy (www.ino.it)

Consultant contract stipulated as part of the European project Human Brain Project H2020 FET Flagship Project Specific Grant Agreement 945539 (SGA3, 2020-2023). Selection through a public competition based on qualifications. CNR-INO n. 9167 del 04/12/2020.

From 03/2018 – to 10/2020

Research fellow

“Development of new methodologies for neuroanatomical investigation of ex vivo samples of human brain through advanced optical microscopy” - “Sviluppo di nuove metodologie per l'indagine neuroanatomica di campioni ex vivo di cervello umano tramite microscopie ottiche avanzate”

National Research Council (CNR) – Istituto Nazionale di Ottica (INO) – Sesto Fiorentino – Florence – Italy (www.ino.it)

Research contract stipulated as part of the MMMI project. Project for the construction and maintenance of the multi-sited / Multi Modal Molecular Imaging Euro-Bioimaging Node. Selection through public competition based on qualifications and interview Protocol N. 42 of 03/01/2018 CNR-INO

Business or sector Neuroscience

From 11/2016 – to 02/2018

Research fellow

“Functional and structural brain imaging”

Physics department - European Laboratory for Non-Linear Spectroscopy - University of Florence – Italy (www.lens.unifi.it)

Post-doc contract stipulated as part of the "Functional and structural brain imaging - H2020 Flagship Human Brain Project - Specific Grant Agreement 1" project. Selection through public competition based on qualifications and interview Protocol Number 117962 (6180) of 2016.

Business or sector Neuroscience

From 12/2015 – to 11/2016

Research fellow

“Study of neuroanatomy through high resolution microscopic techniques” - “Studio della neuroanatomia attraverso tecniche microscopiche ad alta risoluzione”

Physics department - European Laboratory for Non-Linear Spectroscopy - University of Florence – Italy (www.lens.unifi.it)

Post-doc contract stipulated in the scientific area FIS03 as part of the Ente Cassa Technicolor project for the "Study of neuroanatomy through high resolution microscopic techniques". Selection through a public competition based on qualifications and interview Protocol Number 160108 (1819) of 25 November 2015.

Business or sector Neuroscience

From 01/2014 – to 03/2016

Project worker

Associazione Culturale Tethys - Florence - Italy

- Educational activities on DNA fingerprinting for secondary schools in the OpenLab project of the University of Florence

Business or sector Education

From 03/2012 – to 04/2012

Project worker

Fondazione Farmacogenomica - FiorGen - Florence - Italy

- Spectroscopy analysis: developing new NMR metabolomics techniques

Business or sector Metabolomics

From 02/2012 – to 03/2012

Project worker

Pharma D&S S.r.l - Florence - Italy

Business or sector Pharmacovigilance

EDUCATION AND TRAINING

From 01/06/ 2021- to 31/05/2030

National Scientific Habilitation

Scientific sector 05/B2 (Comparative Anatomy and Cytology), SSD BIO/06

From 30/11/ 2012- to 14/03/2016

International doctorate in atomic and molecular photonics - FIS03

Excellent/Excellent

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

- Neuroscience, fluorescence microscopies, optics, biotechnology, chemistry, transgenic animal models.
- Thesis title: A morphological brain imaging study: a new versatile clearing agent for light sheet and two-photon fluorescence microscopy

June 2015

Biologist Professional Qualifications

Ministero dell'Istruzione, dell'Università e della Ricerca- Italy

From 30/11/ 2009- to 19/12/2011

Master degree in Medical and Pharmaceutical Biotechnology

110/110 cum laude

University of Florence - Italy

- Biotechnology, pharmacology, toxicology, molecular biology, microbiology, proteomics, medical chemistry, molecular modelling, study of chromatography (GC, HPLC), spectroscopy (UV, IR, NMR) and mass spectrometry techniques
- Thesis title: IL-32 promoter polymorphism modulates IL-32 expression and influences the outcome and the risk of epithelial cell derived thyroid cancer

From 02/ 2011- to 07/2011

Internship in immunology and oncology

Radboud University Nijmegen Medical Center - Nijmegen - Netherlands (lab of Prof. Mihai Netea)

- Analysis of the role of genetic variations of IL-32 in the development and severity of thyroid cancer. The techniques used include: isolation of PBMCs from blood samples, DNA and RNA extraction from PBMC, Real-time PCR, genotyping assays, immunohistochemistry, flow cytometry (FACS) and ELISA.

From 09/ 2006- to 11/2009

Bachelor Degree in Biotechnology

110/110 cum laude

University of Florence - Italy

- Biology, chemistry, pharmacology, toxicology, immunology, microbiology, biochemistry, molecular biology, enzymology, biophysics, ecology, physiology, chemical and biological laboratory techniques
- Thesis title: Characterization of fungal microflora in patients with inflammatory bowel diseases

From 01/ 2009- to 09/2009

Internship in microbiology

Biology Department - University of Florence - Italy (lab of Prof. Duccio Cavalieri)

- Analysis of the role of fungal microflora of pediatric patients with Crohn's disease (CD) and Ulcerative Colitis (UC). The techniques used include isolation of yeasts from stool samples, extraction of DNA from yeast cells, Colony-ITS-PCR (1-4), Colony-RAPD, sequencing, morphological and phenotypic characterization of yeast (invasiveness, sporulation, hyphae formation), wide-field and confocal microscopy.

From 09/ 2006- to 11/2009

High school diploma

100/100

Liceo Scientifico AME Agnoletti address PNI (National Plan Informatics), Florence, Italy

- Mathematics, Physics, Biology, Chemistry, Informatics, English

PERSONAL SKILLS

Mother tongue Italian

Other language

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1	C1	C1	B2

Communication skills

- Good communication skills developed participating at international congresses as a public speaker.
- Ability to work cross-culturally with global colleagues developed during the international PhD at the European Laboratory for Non-Linear Spectroscopy

Organisational / managerial skills

- Excellent teamwork and project organizer skills developed in years of work.
- Excellent project organizational skills and ability to maintain the overview of the big picture developed in yeas of research.
- Excellent skills in team leading developed in various projects for children education and activities for people with disabilities or social adaptation.

Job-related skills

- Good command of experiments design and testing in both biological and chemical lab
- Good writing skills developed writing scientific articles and project for research grants

Digital competence

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

- Good knowledge of image processing programs such as ImageJ/Fiji and Amira
- Good knowledge of graphic programs such as GIMP, Photoshop and Paint
- Base notions of LabView
- Good knowledge of Excel, Office and Latex
- Good knowledge of different operating systems: Windows, Mac OS X and Ubuntu

Publications

1. **I. Costantini**[†], M. Axer, C. Magnain, P. R Hof "Editorial: The Human Brain Multiscale Imaging Challenge" Front. Neuroanat., 2022 DOI: 10.3389/fnana.2022.1060405 [†]corresponding author
2. F. Cheli , S. Falsini, M. Cristina Salvatici, S. Ristori, S. Schiff, E. Corti, **I. Costantini**, C. Gonnelli, F. S. Pavone, A. Papini "Fluorescent Labeling of Lignin Nanocapsules with Fluorol Yellow 088" Methods Mol Biol. 2566:345-353 (2023).
3. L. Pesce, M. Scardigli, V. Gavryusev, A. Laurino, G. Mazzamuto, N. Brady, G. Sancataldo, L. Silvestri, C. Destrieux, P. Hof, **I. Costantini**[†] and F. S. Pavone "3D molecular phenotyping of cleared human brain tissues with light-sheet fluorescence microscopy", Communication Biology, **5**, 447 (2022). <https://doi.org/10.1038/s42003-022-03390-0> [†]corresponding author
4. A.Abdelfattah, ... **I. Costantini**, et al. "Neurophoton tools for microscopic measurements and manipulation: status report," Neurophoton. 9(S1) 013001 (27 April 2022)
5. Menzel, M., Reuter, J.A., Gräßel, **I. Costantini**, Katrin Amunts & Markus Axer Automated computation of nerve fibre inclinations from 3D polarised light imaging measurements of brain tissue. Sci Rep 12, 4328 (2022). <https://doi.org/10.1038/s41598-022-08140-0>
6. Giardini F, Lazzeri E, Olianti C, Beconi G, **Costantini I**, Silvestri L, Cerbai E, Pavone FS, Sacconi L. Mesoscopic Optical Imaging of Whole Mouse Heart. J Vis Exp. 2021 Oct 14;(176). doi: 10.3791/62795. PMID: 34723943.

7. M. Scardigli*, L. Pesce*, N. Brady, G. Mazzamuto, V. Gavryusev, L. Silvestri, P. R. Hof, C. Destrieux, **I. Costantini**[†] and F. S. Pavone "Comparison of Different Tissue Clearing Methods for Three-Dimensional Reconstruction of Human Brain Cellular Anatomy Using Advanced Imaging Techniques". *Frontiers in Neuroanatomy* 2021 [†]*corresponding author*
8. F. Giardini, E. Lazzeri, G. Vitale, C. Ferrantini, **I. Costantini**, F. S. Pavone, C. Poggesi, L. Bocchi, L. Sacconi. "Quantification of Myocyte Disarray in Human Cardiac Tissue" *Front. Physiol.* 2021
9. L. Pesce, A. Laurino, M. Scardigli, J. Yang, D. A. Boas, P. R. Hof, C. Destrieux, **I. Costantini**[†], F. S. Pavone, "Exploring the human cerebral cortex using confocal microscopy" ISSN 0079-6107, *Progress in Biophysics and Molecular Biology*, 2021. [†]*corresponding author*
10. Olianti C., Giardini F., Lazzeri E., **Costantini I.**, Silvestri L., Coppini R., Cerbai E., Pavone F.S., Sacconi L., "Optical clearing in cardiac imaging: A comparative study" *Progress in Biophysics and Molecular Biology* 2021
11. L. Silvestri, M. C. Müllenbroich, **I. Costantini**, A. P. Di Giovanna, G. Mazzamuto, A. Franceschini, D. Kutra, A. Kreshuk, C. Checcucci, L. O. Toresano, P. Frasconi, L. Sacconi, and F. S. Pavone "Universal autofocus for quantitative volumetric microscopy of whole mouse brains" *Nature Methods*, 2021
12. **Costantini, I.**^{* †}, Mazzamuto, G.* , Roffilli M, Laurino A, Castelli FM, Neri M, Lughi G., Simonetto A, E Lazzeri, L Pesce, C Destrieux, L Silvestri, V Conti, R Guerrini, FS Pavone "Large-scale, cell-resolution volumetric analysis allows layer-specific investigation of human brain cytoarchitecture" *Biomed. Opt. Express* 2021 [†]*corresponding author*
13. **Costantini, I.**[†], Baria, E., Sorelli, M., Matuschke, F., Giardini, F., Menzel, M., Mazzamuto, G., Silvestri, L., Cicchi, R., Amunts, K., Axer, M., Pavone, F.S., 2021. "Autofluorescence enhancement for label-free imaging of myelinated fibers in mammalian brains". *Scientific Reports* 2021 [†]*corresponding author*
14. Franceschini A, **Costantini I**, Pavone FS, Silvestri L. "Dissecting Neuronal Activation on a Brain-Wide Scale With Immediate Early Genes" *Front. Neurosci* 2020
15. Yang J, Chen IA, Chang S, Tang J, Lee B, Kılıç K, Sunil S, Wang H, Varadarajan D, Magnain CV, Chen S, **Costantini I**, Pavone FS, Fischl B, Boas DA "Improving the characterization of ex vivo human brain optical properties using high numerical aperture optical coherence tomography by spatially constraining the confocal parameters". *Neurophotonics* 2020.
16. **Costantini, I.**^{*}; Olianti, C.^{*}; Giardini, F.; Lazzeri, E.; Crocini, C.; Ferrantini, C.; Pavone, F S; Camici, P G; Sacconi, L. "3D imaging and morphometry of the heart capillary system in spontaneously hypertensive rats and normotensive controls" *Scientific Reports*, 2020
17. Menzel M, Axer M, De Raedt H, **Costantini I**, Silvestri L, Pavone F S, Amunts K, Michielsen K. "Toward a High-Resolution Reconstruction of 3D Nerve Fiber Architectures and Crossings in the Brain Using Light Scattering Measurements and Finite-Difference Time-Domain Simulations." *Physical Review X.* 2020.
18. **Costantini I**, Cicchi R, Silvestri L, Vanzi F, Pavone FS "In-vivo and ex-vivo optical clearing methods for biological tissues" *Bio. Optics Exp.* 2019
19. Di Bona A, Vita V, **Costantini I**, Zaglia T. "Towards a clearer view of sympathetic innervation of cardiac and skeletal muscles" *Prog Biophys Mol Biol.* 2019
20. Pianca N, Di Bona A, Lazzeri E, **Costantini I**, Franzoso M, Prando V, Armani A, Rizzo S, Fedrigo M, Angelini A, Basso C, Pavone FS, Rubart M, Sacconi L, Zaglia T, Mongillo M. "Cardiac sympathetic innervation network shapes the myocardium by locally controlling cardiomyocyte size through the cellular proteolytic machinery." *J Physiol.* 2019
21. **Costantini I.**^{*}, Mazzamuto G.* , Neri M., Roffilli M., Silvestri L., Pavone F. S. (2018). "Automatic Segmentation of Neurons in 3D Samples of Human Brain Cortex." Book Chapter in *Lecture Notes in Computer Science: LECTURE NOTES IN ARTIFICIAL INTELLIGENCE*, 2018
22. Müllenbroich MC, Silvestri L, Di Giovanna AP, Mazzamuto G, **Costantini I**, Sacconi L, Pavone FS. High-Fidelity Imaging in Brain-Wide Structural Studies Using Light-Sheet Microscopy *eNeuro.* 2018
23. Di Giovanna AP, Tibo A, Silvestri L, Müllenbroich MC, **Costantini I**, Allegra Mascaro AL, Sacconi L, Frasconi P, Pavone FS. "Whole-Brain Vasculature Reconstruction at the Single Capillary Level" *Sci Rep.* 2018
24. Silvestri L, **Costantini I**, Sacconi L, Pavone FS. "Clearing of fixed tissue: a review from a microscopist's perspective" *Journal of Biomedical Optics* 2016
25. Allegra Mascaro AL, **Costantini I**, Margoni E, Iannello G, Bria A, Sacconi L, Pavone F.S. "Label-free NIR reflectance microscopy as a complimentary tool for two-photon fluorescence brain imaging" *Biomedical Optics Express* 2015
26. Müllenbroich MC, Silvestri L, Onofri L, **Costantini I**, Hoff MV, Sacconi L, Iannello G, Pavone FS. "Comprehensive optical and data management infrastructure for high-throughput light-sheet microscopy of whole mouse brains." *Neurophotonics* 2015
27. **Costantini I**, Ghobril JP, Di Giovanna AP, Allegra Mascaro AL, Silvestri L, Müllenbroich MC, Onofri

- L, Conti V, Vanzi F, Sacconi L, Guerrini R, Markram H, Iannello G, Pavone FS. "A versatile clearing agent for multi modal brain imaging" *Scientific Reports* 2015
28. Rosentul DC, Delsing CE, Jaeger M, Plantinga TS, Oosting M, **Costantini I**, Venselaar H, Joosten LAB, van der Meer JWM, Dupont B, Kullberg BJ, Sobel JD and Netea MG. *Front.* "Gene polymorphisms in pattern recognition receptors and susceptibility to idiopathic recurrent vulvovaginal candidiasis" *Microbiology* 2014
29. Silvestri L, Bria A, **Costantini I**, Sacconi L, Peng H, Iannello G, Pavone FS. "Micron-scale resolution optical tomography of entire mouse brains with confocal light sheet microscopy." *J Vis Exp.* 2013
30. Silvestri L, Allegra Mascaro AL, **Costantini I**, Sacconi L, Pavone FS. "Correlative two-photon and light sheet microscopy." *Methods* 2013
31. Plantinga TS, **Costantini I**, Heinhuis B, Huijbers A, Semango G, Kusters B, Netea MG, Hermus AR, Smit JW, Dinarello CA, Joosten LA, Netea-Maier RT. "A promoter polymorphism in human interleukin-32 modulates its expression and influences the risk and the outcome of epithelial cell-derived thyroid carcinoma." *Carcinogenesis.* 2013

Datasets

1. Mazzamuto, G. et al. <https://dandiarchive.org/dandiset/000026/draft>. U01MH117023 (Version draft) [Data set] DANDI archive (2021).
2. Pavone, F., Mazzamuto, G., & Costantini, I. (2020). Layer-specific excitatory and inhibitory neuronal maps of hippocampus (v1.0) [Data set]. Human Brain Project Neuroinformatics Platform. DOI: 10.25493/1GZV-ZU

Conference Proceeding

1. Costantini I. et al. "High-resolution human brain 3D reconstruction with light-sheet fluorescence microscopy" *SPIE BiOS 2023*
2. Mazzamuto G. et al. "High-speed light-sheet microscopy imaging and data post-processing using custom hardware and software solutions" *SPIE BiOS 2023*
3. Scardigli et al. "3D molecular phenotyping of the human brain Broca's area using light-sheet fluorescence microscopy" *Photonics Europe 2022*
4. V Gavryusev, L Pesce, A Laurino, G Mazzamuto, G Sancataldo, M Scardigli, M Roffilli, L Silvestri, I Costantini, and F S Pavone "Swift light sheet volumetric charting of large human brain portions" *Biomedical Optics 2020*
5. L.Pesce, A. Laurino, V. Gavryusev, G. Mazzamuto, G. Sancataldo, M. Roffilli, L. Silvestri, I. Costantini, F. S. Pavone "Fast volumetric mapping of human brain slices" *SPIE Photonics West February 2020*
6. I Costantini, G Mazzamuto, A Laurino, E Lazzeri, L Sacconi, M Neri, A Simonetto, M Roffilli, L Silvestria, F. S. Pavone. "Three-dimensional analysis of human brain cytoarchitectonics by means of a SWITCH/TDE-combined clearing method". *Advances in Microscopic Imaging II 11076, 110760B*
7. Costantini I, Menzel M., Silvestri L., Schubert N., Axer M., Amunts K., Pavone F.S. "Correlative Polarized Light Imaging and Two-Photon Fluorescence Microscopy for 3D myelinated fibers reconstruction" *Conf Proceeding ECBO 2017*
8. Acciai L, Costantini I, Pavone FS, Conti V, Guerrini R, Soda P, Iannello G "Towards automated neuron tracing via global and local 3d image analysis" *Conf Proceeding IEEE ISBI 2016*
9. Costantini I, Allegra Mascaro AL, Margoni E, Iannello G, Bria A, Sacconi L, Pavone F.S "Combination of two-photon fluorescence microscopy and label-free near-infrared reflectance: A new complementary approach for brain imaging" *Conf Proceeding OSA 2016*
10. Silvestri L, Mascaro ALA, Costantini I, Sacconi L, Pavone, FS "Brain imaging from the nano- to the macro-scale" *Conf Proceeding IEEE NER 2015*
11. Soda P, Acciai L, Cordelli E, Costantini I, Sacconi L, Pavone FS, Conti V, Guerrini R, Frasconi P, Iannello G. "Computer-based automatic identification of neurons in gigavoxel-sized 3D human brain images." *Conf Proceeding IEEE Eng Med Biol Soc.* 2015
12. Costantini, I, Di Giovanna AP, Mascaro ALA, Silvestri L, Mullenbroich MC, Sacconi L, Pavone FS "A versatile new technique to clear mouse and human brain" *Conf Proceeding SPIE ECBO 2015*
13. Mascaro, ALA, Silvestri, L, Costantini, I, Sacconi, L, Maco, B, Knott, GW, Pavone, FS "Multiphoton microscopy in brain imaging" *Conf Proceeding SPIE BiOS 2015*
14. Silvestri L, Mascaro ALA, Costantini I, Sacconi L, Pavone, FS "Whole brain optical imaging" *Conf Proceeding SPIE BiOS 2015*
15. Costantini, I, Di Giovanna AP, Mascaro ALA, Silvestri L, Mullenbroich MC, Sacconi L, Pavone FS "A new versatile clearing method for brain imaging" *Conf Proceeding SPIE BiOS 2015*
16. Silvestri L, Allegra Mascaro AL, Costantini I, Sacconi L, Pavone FS "Brain imaging from the nano- to the macro-scale" *Conf Proceeding IEEE/EMBS 2015*
17. Costantini, I, Mascaro ALA, Di Giovanna AP, Silvestri L, Mullenbroich MC, Sacconi L, Pavone FS "A multi modal clearing method for brain imaging" *Conf Proceeding OSA 2015*

18. Silvestri L, Rudinskiy N, Paciscopi M, Müllenbroich M.C, Costantini I, Sacconi L, Frasconi P, Hyman B.T., Pavone F.S. "Brain-wide charting of neuronal activation maps with cellular resolution" Conf Proceeding OSA 2015
19. Silvestri L, Allegra Mascaro AL, Costantini I, Sacconi L, Pavone FS "Exploring the brain on multiple scales with correlative two-photon and light sheet microscopy" Conf Proceeding SPIE BIOS 2014
20. Mascaro, ALA, Silvestri, L, Costantini, I, Sacconi, L, Maco, B, Knott, GW, Pavone, FS "Neural plasticity explored by correlative two-photon and electron/SPIIM microscopy" Conf Proceeding SPIE ECBO 2013

Project

- **Scientific leader**, European Laboratory for Non-Linear Spectroscopy (LENS), of the Project: Ordinary Project of Research Finalized Call 2013 of the Ministry of Health, Project Code: RF-2013-02355240 "New strategies for diagnostic, therapeutic and clinical care in Neurologic diseases " 16/06/2016-16/06/2020
- **Scientific leader**, European Laboratory for Non-Linear Spectroscopy (LENS), of the Project: "Studio del consolidamento della memoria avversiva attraverso l'utilizzo di microscopia avanzata ad alta risoluzione per la mappatura tridimensionale dell'attivazione neuronale nell'intero cervello murino" by Ente cassa di Risparmio di Firenze private foundation. Number #24135, 01/08/2019 to 31/07/2020.
- Scientific member of Eurobioimaging Italian Nodes (ESFRI research infrastructure) - Advanced Light Microscopy Italian Node
- Scientific member of the European Human Brain Project H2020 FET Flagship Project Specific Grant Agreement 7202070 (SGA1). Contribution to the tasks: T1.3.3 "Methodical Development in Optical Imaging, Data Analysis, Integration and Atlasing", T1.3.4 "Whole-Brain Cell-Resolution Activity Maps ", T2.2.2" Cell Types, Synapses, and their Quantitative Characterization in the Human Brain ", T2.2.3" Transmitter Receptors in Cortical and Subcortical Regions and Layers of the Human Brain ", T2.6.4" Big Data Methods for Extracting Quantitative Data in High-Resolution Imagery " 01/04/2016 to 01/04/2018
- **Scientific coordinator** of Task 2.3.1 "Distribution and morphological characterization of neurons and fibers of different layers of the human hippocampus" of the European Human Brain Project H2020 FET Flagship Project Specific Grant Agreement 785907 (SGA2). Contribution to tasks T2.3.2 "Three-dimensional multiple staining of neuronal structures ", T 2.3.4" Integration of high-resolution connectivity across scales and modalities ", T2.5.2" Integration of physiological with morphological data of interneurons in selected regions of human brain ", T2.6.4" A machine learning / image analysis toolbox to high-resolution histological data label ", T1.3.2" Technological development in both imaging and data analysis ", T1.3.3" Whole-brain cell-resolution activity mapping ". From 01/04/2018 to 01/10/2020
- Scientific member of the European Human Brain Project H2020 FET Flagship Project Specific Grant Agreement 945539 (SGA3, 2020-2023). **Co-Deputy** Task T1.3 "Nested structural connectomes enriched with region-specific features". Contribution to the task T1.1 "Human brain region-specific molecular and cellular data organisation". From 01/04/2020 to 01/10/2023
- Scientific member of the international project RFA-MH-17-210, BRAIN Initiative Cell Census Network (BICCN) of the National Institutes of Health, USA, "Imaging and Analysis Techniques to Construct a Cell Census Atlas of the Human Brain". From 01/11/2018 to 01/11/2023
- Scientific member of the project of the Fondazione Cassa Risparmio di Firenze (private foundation) "Human Brain Optical Mapping". From 01/01/2021 to 31/12/2025.

Honours and awards

- [2018] Carl Zeiss Award for Young Researchers - Ernst Abbe Foundation - Zeiss International
- [2018] Edmund Optics Educational Award 2018 - Edmund Optics Ltd
- [2017] Congress Grant Award - SPIE/OSA - Optics and the Brain - Optics in the Life Sciences Congress
- [2016] Biomedical Optics Student Poster Presenter Finalist Award - SPIE/OSA - Optics and the Brain
- [2015] PhD student best poster award – LENS poster session – University of Florence
- [2010 - 2011] ERASMUS Placement mobility -University of Florence
- [2008 - 2009] Award for graduated with merit at the University of Florence

Editor

- Scientific Reports

Guest editor

- Frontiers In Neuroanatomy

- Board reviewer member
 - Photonics

- Peer reviewer activity
 - Acta Neuropathologica journal
 - Biomedical Optics Express
 - Microscopy Research and Technique
 - SoftwareX
 - Neurophotonics
 - Microscopy Research and Technique
 - Journal of Biophotonics
 - Scientific Reports
 - Biomaterials
 - Brain research
 - Frontiers In Neuroanatomy
 - Communication Biology
 - Advanced Drug Delivery
 - Nature protocols

- Conferences organization
 - Organizer and chair of the plenary session “Brain atlas services: navigate the brain in 3D - find, contribute, and analyze brain data, based on location” at the HBP Summit 2020 congress held from February 3rd to 6th in Athens, Greece.
 - Member of the organizing committee of the "HBP - Young Researchers Event 2017" congress held on 12-13 September 2017 in Geneva, Switzerland

- Institutional role

Member of the GEP (Gender Equality Plan) committee of the European Laboratory for Non-Linear Spectroscopy (LENS), University of Florence set up by the Directive Council on 21/05/2021, duration 3 years. GEP has the aim to promote and implement gender equality, within LENS structure.

- Dissemination activity

[2021-2022] Participation to “Sarò Matricola!” event with a presentation titled: “Alla scoperta del cervello umano” . University of Florence – Scuola di Scienze Matematiche Fisiche e Naturali. Link: <https://www.unifi.it/cmpro-v-p-10885.html>

[2021] participation to the “Bright night” – “La notte dei ricercatori” with the talk entitled: “Alla scoperta del cervello umano” link: www.bright-night.it; <https://www.unifi.it/p11886.html>

[2014 - 2016] Creation of training courses for kindergartens, primary and lower secondary schools within the OpenLab project of the University of Florence on the topic of DNA fingerprinting

- Project reviewer activity

[2020] Evaluator designated by the members of the technical-scientific committee of the project proposals in response to the extraordinary covid-19 emergency call published by the artes 4.0 competence center "ARTES 4.0 - 2020 Extraordinary Call for the financing of industrial research and experimental development projects that provide for the use of 4.0 technologies in response to the covid-19 pandemic "

- Teaching activity
 - [2021 to date] Assistant professor, Advanced morpho-functional imaging, Department of Biology, University of Florence, Italy.
 - [2021 to 2022] Assistant professor, Developmental biology, Department of Biology, University of Florence, Italy.
 - [2017 - 2019] Seminars on optical clearing of tissue at the Faculty of Engineering at the University of Florence and at the European Laboratory for Non-Linear Spectroscopy.

- Training
 - [2015] Participation at “Connectomics” Neuroscience School of Advanced Studies. NSAS - Florence – Italy.
 - [2014] Participation at “ZEISS on Your Campus” LENS European Laboratory for Non-Linear Spectroscopy - Sesto Fiorentino – Italy
 - [2014] Participation at “Interdisciplinary school on clinical biophotonics” Photonics4Life - Jena – Germany
 - [2013] Participation at “ZEISS Lightsheet Z.1 Technology Workshop” Carl Zeiss S.p.A - Arese – Italy
 - [2012] Participation at “Helium microscope ORION ® PLUS operator training course” Carl Zeiss S.p.A – NTS – LLC - Peabody - Boston -USA

- Conference

Invited:

1. **Costantini Irene** “Advanced tissue transformation methods for tissue clearing and labeling” CENN on advanced microscopy 2021
2. **Costantini I**, M. Scardigli, L. Pesce, V. Gavryusev, F. M. Castelli, L. Silvestri, G. Mazzamuto, F S Pavone “Tissue clearing for human brain imaging”, IEEE-ISBI 2021
3. **Costantini I**, Silvestri L., Menzel M., Axer M., Amunts K., Pavone F.S. “Correlative Polarized Light Imaging and Two-Photon Fluorescence Microscopy for 3D myelinated fibers reconstruction” ECBO 2017
4. **Costantini I**, Silvestri L., Pavone F.S “High-resolution structural imaging of the hippocampus in mice and humans” HBP Hippocampal meeting 2017
5. **Costantini I**, Di Giovanna AP, Allegra Mascaro AL, Silvestri L, Muellenbroich MC, Sacconi L, Pavone FS “A new approach for brain clearing: clarity method” GISN 2014

Oral presentation:

6. **Costantini I**, G Mazzamuto, A Laurino, E Lazzeri, A Simonetto, M Roffilli, L Silvestri, F S. Pavone. “Three-dimensional analysis of human brain cytoarchitectonics by means of a SWITCH/TDE-combined clearing method”. ECBO 2019
7. **Costantini I**, G Mazzamuto, A Laurino, E Lazzeri, L Sacconi, V Conti, R Guerrini, M Roffilli, L Silvestri, F S. Pavone “A SWITCH/TDE -combined clearing method to reconstruct the three-dimensional cytoarchitectonics of human brain” FOM 2019
8. **Costantini I**, “A label-free fluorescence approach for high resolution imaging of myelinated fiber” INO annual symposium 2019
9. **Costantini I**, Silvestri L., Menzel M., Axer M., Amunts K., Pavone F.S. “Correlative label-free two-photon fluorescence microscopy and polarized light imaging” FOM 2017.
10. **Costantini I**, Silvestri L., Menzel M., Axer M., Amunts K., Pavone F.S. “Correlative label-free two-photon fluorescence microscopy and polarized light imaging for 3D reconstruction of myelinated fibers orientation “OSA – Optics and the brain 2017.
11. **Costantini I**, Menzel M, Silvestri L, Schubert N, Axer M, Amunts K, Pavone FS “Correlative Polarized Light Imaging and Two-Photon Fluorescence Microscopy for 3D myelinated fibers reconstruction” ECBO 2017
12. **Costantini I**, Silvestri L., Menzel M., Axer M., Amunts K., Pavone F.S “Correlative label-free two-photon fluorescence microscopy and polarized light imaging for 3D reconstruction of myelinated fibers orientation” GISN 2016.
13. **Costantini I**, Di Giovanna AP, Allegra Mascaro AL, Silvestri L, Sacconi L, Pavone FS. “Tde: a new versatile method for brain clearing” FOM 2015
14. **Costantini I**, Di Giovanna AP, Allegra Mascaro AL, Silvestri L, Sacconi L, Pavone FS. “New clearing method for one- and two-photon imaging” SIF 2014
15. **Costantini I**, Silvestri L, Allegra Mascaro AL, Sacconi L, Pavone FS “Brain imaging with correlative two-photon and light sheet microscopy” MAF 2013.

Poster:

16. **Costantini Irene**, Marina Scardigli, Luca Pesce, Josephine Ramazzotti, Niamh Brandy, Mohamed Baghdad, Vladislav Gavryusev, Giacomo Mazzamuto, Filippo Maria Castelli, Curzio Checucci, Ludovico Silvestri, Paolo Frasconi, Francesco S. Pavone “3D molecular phenotyping of the human brain with light-sheet fluorescence microscopy”. Sfn 2021.
17. Michele Sorelli, **Irene Costantini**, Giacomo Mazzamuto, Leonardo Bocchi and Francesco Saverio Pavone “3D single-fiber orientation analysis in two photon fluorescence microscopy” HBP summit 2021
18. **Costantini I** et al. “3D sub-cellular reconstruction of human Broca area by means of light-sheet fluorescence microscopy” BRAIN Initiative Investigators Virtual Meeting 2021
19. **Costantini I** et al. “Stereologic quantification of immunohistochemically identified neuronal populations on LSFM high-resolution volumetric datasets” BRAIN Initiative Investigators Virtual Meeting 2021
20. **Costantini I** et al. “ Human brain cell census: sample preparation for multimodal analysis including MRI, OCT, LSFM and cell-type specific stereology” BRAIN Initiative Investigators Virtual Meeting 2020
21. **Costantini I** et al. “ A multi-modality imaging infrastructure linking histology to MRI” BRAIN Initiative Investigators Virtual Meeting 2020
22. **Costantini I** et al. “A multi-modal image analysis pipeline for cellular typology in the framework of an MRI-based atlas coordinate system of the human cerebral cortex” BRAIN Initiative Investigators Virtual Meeting 2020
23. **Costantini I**, G Mazzamuto, A Laurino, E Lazzeri, A Simonetto, M Roffilli, L Silvestri, F S. Pavone. “Three-dimensional cytoarchitectonic analysis of the human brain”. Sfn 2019.

24. **Costantini I**, Silvestri L, Lazzeri, R Cicchi, E Baria, G Mazzamuto, L Sacconi, M Menzel M Axer, K Amunts, F S. Pavone "A label-free, effective approach for high-resolution myelin imaging in the mammal brain". SPIE/BIOS 2019
25. **Costantini I**, Mazzamuto G, Silvestri L, M. Neri, M. Roffilli, Conti V, Sacconi L, Guerrini R, Pavone "3D human brain digital histopatology" SPIE/OSA 2018
26. Lazzeri E., **Costantini I.**, Vitale G. Giardini F., Mazzamuto G., Crocini C., Ferrantini C., Bocchi L., Cerbai E., Poggesi C., Pavone F. S., Sacconi L "Whole heart cytoarchitecture at sub-cellular resolution" Frontiers in CardioVascular Biology (FCVB) Congress 2018.
27. Lazzeri E., **Costantini I.**, Vitale G. Giardini F., Mazzamuto G., Crocini C., Ferrantini C., Bocchi L., Cerbai E., Poggesi C., Pavone F. S., Sacconi L "Reconstructing the three-dimensional organization of cardiac tissue at the mesoscale level" at 42nd Annual Meeting of the European Working Group on Cardiac Cellular Electrophysiology 2018
28. **Costantini I**, Silvestri L, Lazzeri E., Conti V, Mazzamuto G, Sacconi L, Guerrini R, Pavone "Three-dimensional reconstruction of the human brain cortex by means of a SWITCH/TDE-combined clearing method" SPIE BIOS 2018.
29. Lazzeri E., **Costantini I.**, Cannazzaro S., Ferrantini C., Mazzamuto G., Crocini C., Coppini R., Bocchi L., Cerbai E., Poggesi C., Pavone F. S., Sacconi L. "Whole heart cytoarchitecture at micron-scale resolution" SPIE BiOS 2018
30. **Costantini I**, Silvestri L, Del Torto C., Conti V, Mazzamuto G, Sacconi L, Guerrini R, Pavone FS "Three-dimensional investigation of neuronal layer distribution in human brain cortex" SfN 2017.
31. Lazzeri E., **Costantini I.**, Mazzamuto G., Cannazzaro S., Ferrantini C., Crocini C., Coppini R., Bocchi L., Cerbai E., Poggesi C., Pavone F. S., Sacconi L "Mesoscale imaging of the cardiac conduction system" 41st Annual Meeting of the European Working Group on Cardiac Cellular Electrophysiology, 2017.
32. Mazzamuto G, Silvestri L, **Costantini I**, Orsini F, Frascioni P, Roffilli M, Mattia C, Neri M, Sacconi L, Pavone F.S. Software tools for high-throughput stitching processing of micron-resolution 3D images of brain samples. SfN 2017.
33. Lazzeri E., **Costantini I.**, Cannazzaro S., Ferrantini C., Crocini C., Coppini R., Cerbai E., Poggesi C., Pavone F. S., Sacconi L. "Mesoscale imaging of the heart conduction system" Fotonica 2017
34. **Costantini I**, Menzel M, Silvestri L, Schubert N, Axer M, Amunts K, Pavone FS "Correlative label-free two-photon fluorescence microscopy and polarized light imaging for 3D reconstruction of myelinated fibers orientation" SPIE /BiOS 2017
35. **Costantini I**, Silvestri L., Menzel M., Axer M., Amunts K., Pavone F.S. "Integrated dual approach for 3D reconstruction of myelinated fibers orientation: combination of polarized light imaging and two-photon fluorescence microscopy" SfN 2016
36. **Costantini I**, Allegra Mascaro AL, Margoni E, Iannello G, Bria A, Sacconi L, Pavone F.S "Combination of two-photon fluorescence microscopy and label-free near-infrared reflectance: a new complementary approach for brain imaging" Optical Tomography and Spectroscopy SPIE/OSA 2016
37. Allegra Mascaro AL, **Costantini I**, Margoni E, Iannello G, Bria A, Sacconi L, Pavone F.S "Label-free NIR reflectance imaging as a complimentary tool for two-photon fluorescence microscopy: multimodal investigation of stroke" SPIE/Bios 2016
38. Silvestri L, Rudinskiy L, Paciscopi M, Müllenbroich MC, **Costantini I**, Sacconi L, Frascioni P, Pavone FS "Mapping whole-brain activity with cellular resolution by light-sheet microscopy and high-throughput image analysis" SPIE/Bios 2016
39. Soda P, Acciai L, Cordelli E, **Costantini I**, Sacconi L, Pavone FS, Conti V, Guerrini R, Frascioni P, Iannello G. "Computer-based automatic identification of neurons in gigavoxel-sized 3D human brain images." IEEE Engineering in Medicine and Biology Society (EMBC). 2015
40. Silvestri L, Rudinskiy L, Paciscopi M, Müllenbroich MC, **Costantini I**, Sacconi L, Frascioni P, Pavone FS "Brain-wide charting of neuronal activation maps with cellular resolution" Optics and the Brain SPIE/OSA 2015
41. **Costantini I**, Di Giovanna AP , Allegra Mascaro AL, Silvestri L, Müllenbroich MC, Sacconi L, Pavone FS. "A multi modal clearing method for brain imaging" Optics and the Brain SPIE/OSA 2015
42. **Costantini I**, Di Giovanna AP , Allegra Mascaro AL, Silvestri L, Sacconi L, Pavone FS. "A new versatile clearing method for brain imaging" SPIE /BiOS 2015
43. Silvestri L, Mascaro ALA, **Costantini I**, Sacconi L, Pavone FS "Brain imaging from the nano-to the macro-scale" 7th International IEEE/EMBS Conference on Neural Engineering (NER) 2015
44. Silvestri L, Mascaro ALA, **Costantini I**, Sacconi L, Pavone FS "Whole brain optical imaging"

- SPIE/BiOS 2015
45. **Costantini I**, Di Giovanna AP, Allegra Mascaro AL, Silvestri L, Sacconi L, Pavone FS. "Tde: a new versatile method for brain clearing" Fotonica 2015
 46. Mascaro ALA, Silvestri L, **Costantini I**, Sacconi L, Maco B, Knott GW, Pavone FS "Multiphoton microscopy in brain imaging" SPIE/BiOS 2015
 47. Silvestri L, Mascaro ALA, **Costantini I**, Sacconi L, Pavone FS "Exploring the brain on multiple scales with correlative two-photon and light sheet microscopy" SPIE/BiOS 2014
 48. **Costantini I**, Di Giovanna AP, Allegra Mascaro AL, Silvestri L, Sacconi L, Pavone FS. "New clearing method for serial two-photon imaging" Fotonica 2014
 49. **Costantini I**, Silvestri L, Mascaro ALA, Sacconi L, Pavone FS "Multiple-scales brain imaging with correlative two-photon and light sheet microscopy" FENS 2014
 50. ALA Mascaro, L Silvestri, **I Costantini**, L Sacconi, B Maco, GW Knott, Pavone FS "Neural plasticity explored by correlative two-photon and electron/SPIM microscopy" European Conferences on Biomedical Optics 2013

Autorizzo il trattamento dei miei dati personali presenti nel cv ai sensi del Decreto Legislativo 30 giugno 2003, n. 196 e dell'art. 13 del GDPR (Regolamento UE 2016/679)