

BIOGRAPHICAL SKETCH

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NAME: EMILIANI VALENTINA

eRA COMMONS USER NAME (credential, e.g., agency login): VEMILIANI

POSITION TITLE: Group leader and Department director, (Research Director, CNRS)

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University La Sapienza, Rome	B.S.	1991	Physics
EU Lab for non linear spectroscopy (Florence)	PhD	1996	Physics
Technical University Berlin	Postdoc	1996-97	Optics/semiconductors
Max-Born-Institute, Berlin, Germany	Postdoc	1997-00	Optics/semiconductors
Institute Jacques Monod, Paris, France	Postdoc	2002-04	Optics/cell biology

A. Personal Statement

I obtained my PhD in Physics (University 'La Sapienza' (Rome, Italy) working on the investigation of tunneling effect in quantum wells by ultrafast spectroscopy and immediately after I joined, as post doc, the group of Prof. Thomas Elsaesser (Max Born Institute, Berlin), working on the investigation of carrier transport in quantum wire by low temperature scanning near field optical microscopy (SNOM). In 2000, I formed a research team 'High resolution microscopy' at the European laboratory for nonlinear spectroscopy (Florence, Italy), focused on the investigation of light propagation in disordered structure by SNOM. From 2002 to 2004 I started working in interdisciplinary projects at the interface between physics and biology at the Institute Jacques Monod (Paris, France) where I studied the role of mechanical forces on the establishment of cell polarity by optical tweezers. In 2004 I have been recruited as researcher at the CNRS and promoted to research director in 2011. In the year 2005 I formed the "Wave front engineering microscopy" group. The group is an interdisciplinary research team with complementary skills in physics, computer science and neurophysiology, rarely seen elsewhere in the world. In 2014, I have been appointed Director of the Neurophotronics laboratory at the University Paris Descartes. In 2019 I moved the "Wave front engineering microscopy" group at the vision Institute in Paris where I became the head of the Photonics department. I have pioneered, with my group, the use of wave front shaping for all-optical brain manipulation, in a few very early and breakthrough papers, demonstrating spatiotemporal wave front shaping approaches such as computer-generated holography, generalized phase contrast and temporal focusing, and showing that such methods can be used to sculpt the excitation volume with a shape perfectly tailored on the selected target. Combining these approaches with newly developed optogenetics molecules and amplified lasers, we have demonstrated the capability to control hundreds of cells in mm³ volume at cellular resolution and millisecond temporal precision. Combining single photon holography and endoscopy we were also able to demonstrate simultaneous photostimulation and functional imaging with near-cellular resolution in freely moving mice and more recently we have been able to make this approach also compatible with two-photon excitation. We have recently demonstrated that scanless two-photon microscopy also provides enormous advantages for two-photon voltage imaging. Specifically, we have shown that, in combination with temporal focusing, parallel illumination enable high-contrast, high-resolution voltage imaging in densely labelled slices expressing the genetically encoded indicator JEDI-2P-Kv developed by St Pierre lab. My current research activity focuses on the use of wave front shaping and optogenetics for the investigation of the mechanisms regulating functional connectivity and signal processing across the main visual pathways.

B. Positions and Honors

a. Positions and Employments

2019 Director of the Photonics Department and group leader of *Wave front engineering microscopy group (WFEMO)*, Vision Institute, France
2014-2018 Director of the Neurophotonics Department and group leader of *Wave front engineering microscopy group (WFEMO)* University Paris Descartes, France
2011-2013 Research Director (DR, CNRS) and group leader of *WFEMO*, University Paris Descartes, France
2005-2013 Researcher, (CR, CNRS) and group leader of *WFEMO*, University Paris Descartes, France
2004-2005 Researcher, (CR, CNRS) Institute Jacques Monod, Paris, France
2003-2004 Fellow: Cancer Research Association (ARC), Institute Jacques Monod, Paris, France
2002-2003 Fellow: CNRS (*poste rouge*), Institute Jacques Monod, Paris, France
2000-2002 Researcher and group leader, Laboratory for non linear spectroscopy, LENS, Florence, Italy
1998-2000 Fellow: Marie Curie, Training and Mobility of Researchers, Max Born Institute, Berlin, Germany
1997-1998 Fellow: Alexander Von Humboldt, Technical University of Berlin and Max Born Institute, Germany

b. Other Experience and Professional Memberships

2020 Co-Organizer: OPTOGEN 2022, Paris, 2022
2021 Co-Org.: Fondation Treiller Seminar: Using light for targeted interrogation of neural circuits and behaviour, France, 2021
2018 Organizer of the annual training course "Optical control of brain functioning with optogenetics and wave front shaping" CNRS formation Enterprise, Vision Institute, Paris.
2016 Co-chair of the International Symposium: The Brain in focus: New approaches to imaging neurons and neural circuits; North Copenhagen- Denmark, April 2016
2015 Co-chair of the Neuroscience 2015 symposium: All-optical Interrogation of Neural Circuits- SfN Chicago-USA, October 2015
2015 Member of the scientific committee for the French Israeli Symposium of nonlinear and quantum optics (FRISNO)
2012 Co-chair of the International Conference of Nanoscience and Technology (ICN+T 2012)
2012 Co-chair of the symposium 'Advanced optical methods for patterned optogenetics' at FENS
2012 Co-chair of the INSERM workshop 'Photo control and optogenetic of biological systems and functions', Bordeaux
2006 Organizer of the conference 'Optical Microscopy in a good shape', Paris France

c. Awards

2022 - Michael S. Feld Biophotonics Award from Optical society of America
2021 - Maxime Dahan Prize for Innovation in Methods and Instrumentation at the Interface of Physics, Biology & Medicine
2021 - Silver Medal from the CNRS
2020 - ERC Advanced grant (HOLOVIS)
2019 - Presidential lecture at the SfN annual meeting 2019 (Chicago)
2018 - Axa Chair Coordinator Research Grant– Coordinator
2016 - Human Frontier Research Program – Coordinator
2015 - Prix Coups d' élan (Bettencourt-Shueller foundation)
2009 - Human Frontier Research Program – Coordinator
2005 - European Young Investigator Award (EURYI)

d. Publications, Invited talk, seminars

- More than 100 articles in international peer reviewed journals
- More than 80 invited presentations at international conferences
- More than 50 specialized seminars at international research institutes or Universities

e. Teaching in international thematic school

2022 CAJAL Course Interacting with Neural Circuits, July 2022, Lisbon
2022 CAJAL Advanced Neuroscience Training Programme: Neural Circuit Basis of Computation and Behaviour, May 2022, Bordeaux Neurocampus
2022 Atelier INSERM#263 OPTO-BIOLOGY, sensors and actuators for probing signaling in living cells Virtual, January
2021 CAJAL Advanced Neuroscience Training Programme: Optogenetics, chemogenetics and biosensors for cellular and circuit neuroscience, December 2021, Bordeaux Neurocampus 2020 *Advanced Neuroimaging Techniques*, Max Planck Florida Institute for Neuroscience, February 2020, Florida US
2019 CAJAL Advanced Neuroscience Training Programme: *Biosensors and actuators for cellular and systems*

	<i>neuroscience</i> , July 2019, Bordeaux Neurocampus
2018	SfN's 2018 Short Course : <i>Functional, structural, and molecular imaging</i> , San Diego, CA
2018	CAJAL Advanced Neuroscience Training Programme: <i>Linking Neural Circuits and Behavior</i> , October 2018 , Bordeaux Neurocampus
2016, 2017	EMBO course: <i>New optogenetic paradigms in cell signalling: From design to in vivo application</i> EMBL, Heidelberg, Germany
2015	EMBO practical course: <i>Two photon imaging of Brain circuit function</i> , Munich, Germany
2015	NETT winter school on Neuronal engineering, Imperial College London, London, UK
2011-2022	Cold Spring Harbour Laboratory summer course: <i>Imaging Structure & function in the nervous system</i> , Cold Spring Harbour, USA
2011-2022	ENP Spring School: Optical imaging and electrophysiological recording in Neuroscience, Paris, France
2014	Neuroscience School of Advanced Studies: <i>Structural Plasticity in Neuropsychiatric Disorders</i> , Cortona, Italy
2014	Workshop UC Berkeley: <i>Advanced Imaging Methods</i> , Berkeley, USA
2013, 2017	EMBO practical course: <i>2P imaging of brain circuit function</i> , Zurich Switzerland
2012	FENS-IBRO Summer Imaging School, EPFL Lausanne (2012)

f. Patents and licenses

2011 know how license agreement “with Intelligent Imaging Innovations, Inc (3i)
2013 patent: Microscope for high spatial resolution imaging a structure of interest; WO2013167479-A1; EP2847632-A1; US2015076333-A1; JP2015517681-W
2014 patent: Zero order suppression for spatial light modulators; EP14305253.8
2014 patent: Fast 2D and 3D phase modulation (US patent) WO2014152984-A1
2015 patent: Optical system for shaping the wavefront of the electric field of an input light beam; EP15305782.3
2017 patent: Spatio-temporal wavefront shaping of optical beams; EP17165572.3 (07-04-2017)
2020 know how license agreement “with Intelligent Imaging Innovations, Inc (3i)

C. Contributions to Science

My lab has pioneered the use of wave-front shaping for neuroscience. In particular, I demonstrated with my group, in a first pioneering paper in 2008 (*Lutz et al. Nature Methods*), that wave front shaping, based on the principle of holography, allows the sculpting of the excitation volume with a shape perfectly adapted to the chosen target: a single neuron or a group of neurons. This paper has been cited over 200 times. Right after in 2010, in a paper cited over 400 times, (*Papagiakoumou et al. Nature methods* 2010) I demonstrated for the first time that wave front shaping combined with temporal focusing and two-photon optogenetics enables the simultaneous control of neuronal firing in defined neuronal sub-populations with millisecond precision. These pioneering papers were followed by a series of breakthrough demonstrations reporting the optical control of neuronal firing with single-spike and sub-millisecond temporal resolution both in cortical slices (*Ronzitti et al. J. Neuroscience* 2016) and *in vivo* (*Cheng et al. J. Neuroscience* 2019) and multitarget optical stimulation with single-cell resolution (*Shemesh et al. Nature Neuroscience* 2017). Combining single photon (1P) holography and endoscopy we were able to demonstrate for the first time simultaneous photostimulation and functional imaging with near-cellular resolution in freely moving mice (*Szabo et al. Neuron* 2014) and more recently we have been able to make this approach also compatible with two-photon excitation (*Accanto et al. Neuron* 2022). Using *ad hoc* combinations of spatial and temporal phase modulation approaches, we demonstrated the generation of multiple targets at multiple planes (*Hernandez et al. Nature Communication* 2017) and kHz sequential light patterning (*Faini et al. Nature Communication* 2023). In collaboration with the group of Peter Hegemann (Humboldt University, Berlin, Germany), we could demonstrate bidirectional control of neuronal activity under 2P excitation using the newly developed opsin BiPOLES (*Vierock et al. Nature Communication* 2022), which activates or inhibits neuronal activity depending on the used wavelength and demonstrated *in vitro* and *in vivo* neuronal inhibition through a newly discovered light-activated potassium-conducting opsin WiChR (*Vierock et al. Science Advanced* 2022). We have recently demonstrated that scanless two-photon microscopy also provides enormous advantages for two-photon voltage imaging. Specifically, we have shown that, in combination with temporal focusing, the three light-sculpting approaches previously used for scanless two-photon optogenetics — low numerical aperture (NA) Gaussian beams, Computer-Generated Holography (CGH) and Generalized Phase Contrast (GPC), — enable high-contrast, high-resolution voltage imaging in densely labelled slices expressing the genetically encoded indicator JEDI-2P-Kv developed by St Pierre lab. (manuscript currently available as a pre-print (Research Square, “Scanless two-photon voltage imaging”; Sims et al., 2023). The combination of these approaches, that I termed “circuit optogenetics,” have propelled optogenetics into a new dimension, where it is now possible to mimic with light specific patterns of brain activity and relate them to animal behavior, a key step towards the methodological foundation of computational neuroscience.

Selected Peer-reviewed Publications

- *1P and 2P scanless voltage imaging*

1. Ruth R. Sims*, Imane Bendifallah*, Christiane Grimm, Aysha Mohamed-Lafirdeen, Xiaoyu Lu, François St-Pierre, Eirini Papagiakoumou, and Valentina Emiliani
Scanned voltage imaging
Under revision: Nature Comm.
2. D.Tanese, Ju-Yun Weng, V. Zampini, V. De Sars, M. Canepari, B. Rozsa, V.Emiliani, and D. Zecevic
Imaging membrane potential changes from dendritic spines using computer-generated holograph
Neurophotonics 4, 031211 (2017).
3. J. Foust, V. Zampini, D. Tanese, E. Papagiakoumou, and V. Emiliani,
Computer-generated holography enhances voltage dye fluorescence discrimination in adjacent neuronal structures
Neurophotonics 2, 021007 (2015).

- *New optical methods for optical brain control*

1. Giulia Faini*, Dimitrii Tanese*, Clément Molinier, Cécile Telliez, Massilia Hamdani, F. Blot, Christophe Tourain, Vincent de Sars, Filippo Del Bene, Benoît C. Forget, Emiliano Ronzitti #, and Valentina Emiliani #
Ultrafast Light Targeting for High-Throughput Precise Control of Neuronal Networks
Nature Comm. (2023)
2. E. Papagikoumou, E.Ronzitti and V. Emiliani *Scanless two-photon excitation with temporal focusing*
Nature Methods 17, 571–581 (2020)
3. Nicolò Accanto, I-Wen Chen, Emiliano Ronzitti, Clément Molinier, Christophe Tourain, Eirini Papagiakoumou and Valentina Emiliani *Multiplexed temporally focused light shaping through a GRIN lens for precise in-depth optogenetic photostimulation*
Scientific Reports 9, 7603 (2019)
4. Nicolò Accanto, Clément Molinier, Dimitrii Tanese, Emiliano Ronzitti, Zachary L. Newman, Claire Wyart, Ehud Isacoff, Eirini Papagiakoumou and Valentina Emiliani
Multiplexed temporally focused light shaping for high-resolution multi-cell targeting
Optica 5, 1478 (2018)
5. O. Hernandez, E. Papagiakoumou, D. Tanese, K. Fidelin, C. Wyart, V. Emiliani,
Three-dimensional spatiotemporal focusing of holographic patterns,
Nature Comm. 7, 11928 (2016)
6. V. Szabo, C. Ventalon, V. De Sars, J. Bradley, and V. Emiliani,
Spatially selective holographic photoactivation and functional fluorescence imaging in freely behaving mice with a fiberscope
Neuron 84, 1157 (2014)
*Highlighted by Nature Methods: N. Vogt, *All optical electrophysiology in behaving animals*, vol 12, 2015
7. E. Papagiakoumou, A. Begue, B. Leshem, O. Schwartz, B. M. Stell, J. Bradley, D. Oron, and V. Emiliani,
Functional patterned multiphoton excitation deep inside scattering tissue
Nature Photonics 7, 274-278 (2013)
8. E. Papagiakoumou, F. Anselmi, A. Begue, V. de Sars, J. Gluckstad, E. Y. Isacoff, and V. Emiliani,
Scanless two-photon excitation of channelrhodopsin-2
Nature Methods 7, 848-854 (2010)

- *Two photon optogenetics*

1. Johannes Vierock*, Enrico Peter*, Christiane Grimm*, Andrey Rozenberg, I-Wen Chen, Linda Tillert, Alejandro G. Castro Scalise, Marilù Casini, Sandra Augustin, Dimitrii Tanese, Benoît C. Forget, Rémi Peyronnet, Franziska Schneider-Warme, Valentina Emiliani, Oded Bèjà, Peter Hegemann
WiChR, a highly potassium selective channelrhodopsin for low-light, two-photon inhibition.
Science Advances, Dec 9;8(49):eadd 7729(2022)
2. V. Emiliani, E. Entcheva, R. Hedrich, P. Hegemann, K. R. Konrad, C. Lüscher, M. Mahn, Z-H. Pan, R. Sims J. Vierock, O. Yizhar.
OPTOGENETICS: shaping biological functions with light.
Nature Reviews | Methods Primers, Vol.2, 55 (2022)
3. Nicolò Accanto*, François G. C. Blot*, Antonio Lorca Camara*, Valeria Zampini, Florence Bui, Christophe Tourain, Noam Badt, Ori Katz, and Valentina Emiliani *A flexible two-photon endoscope for fast activity imaging and cell-precise optogenetic photo-stimulation neurons in freely moving animals.*
Neuron, Nov 7:S0896-6273(22)00963-1 (2022).
4. Spampinato G.L.B.*, Ronzitti E.*, Zampini V., Ferrari U., Trapani F., Khabou H., Dalkara D., Picaud S., Papagiakoumou E., Marre O., Emiliani V.
All-optical inter-layers functional connectivity investigation in the mouse retina

- Cell Report Methods** 2(8):100268 (2022).
5. J. Vierock, SR-Rozada, A. Dieter, F. Pieper, R. Sims, F. Tenedini, A. Bergs, I. Bendifallah, F. Zhou, N. Zeitzschel, J. Ahlbeck, S. Augustin, K. Sauter, E. Papagiakoumou, A. Gottschalk, P. Soba, V. Emiliani, Andreas K. Engel, Peter Hegemann, J. Simon Wiegert
BiPOLES: a tool for bidirectional dual-color optogenetic control of neurons
Nature Comm. 12, 4527 (2021)
 6. Alexis Picot, Soledad Dominguez, Chang Liu, I-Wen Chen, Dimitri Tanese, Emiliano Ronzitti, Pascal Berto, Eirini Papagiakoumou, Dan Oron Gilles Tessier, Benoît C. Forget, and Valentina Emiliani,
Temperature rise under two-photon optogenetics brain stimulation,
Cell Report 24, 1243 (2018)
 7. I-Wen Chen, Eirini Papagiakoumou, and V. Emiliani,
Towards circuit optogenetics,
Current Opinion in Neurobiology 50, 179 (2018)
 8. O. Shemesh, D. Tanese, V. Zampini, L. Changyang, P. Kiryl, E. Ronzitti, E. Papagiakoumou, E.S. Boyden, V. Emiliani,
Temporally precise single-cell resolution optogenetics,
Nature Neuroscience, 20, 1796 (2017)
 9. E. Ronzitti, R. Conti, V. Zampini, N.C. Klapoetke, D. Tanese, E. Papagiakoumou, E.S. Boyden, V. Emiliani,
Sub-millisecond optogenetic control of neuronal firing by two-photon holographic photoactivation of Chronos
J Neurosci 37, 10679 (2017)
 10. E. Chaigneau, E. Ronzitti, A.M. Gajowa, J.G. Soler-Llavina, D. Tanese, Y.B.A. Brureau, E. Papagiakoumou, H. Zeng, V. Emiliani,
Two-photon holographic stimulation of ReaChR
Front. Cell. Neurosci. 10, 234 (2016)
 11. V. Emiliani, A. Choen, K. Deisseroth, and M. Heusser,
All-optical interrogation of neural circuits
Journal of Neuroscience 35, 13917 (2015)
- *Two and three dimensional multi-spot uncaging*
1. S. Yang, V. Emiliani, and C. M. Tang,
The kinetics of multibranch integration on the dendritic arbor of CA1 pyramidal neurons
Front Cell Neurosci 8, 127 (2014)
 2. K. Kam, J. W. Worrell, C. Ventalon, V. Emiliani, and J. L. Feldman,
Emergence of population bursts from simultaneous activation of small subsets of preBotzinger complex inspiratory neurons
J Neurosci 33, 3332-3338 (2013)
 3. S. Yang, E. Papagiakoumou, M. Guillon, V. de Sars, C. M. Tang, and V. Emiliani,
Three-dimensional holographic photostimulation of the dendritic arbor
J Neural Eng 8, 046002 (2011)
 4. C. Lutz, T. S. Otis, V. DeSars, S. Charpak, D. A. DiGregorio, and V. Emiliani,
Holographic photolysis of caged neurotransmitters
Nature Methods 5, 821-827 (2008)

Special lectures and invited presentations

(V. Emiliani: presenting author)

Special Lectures

1. V. Emiliani, *Holographic manipulation of neuronal circuits*
European optical society Annual Meeting (EOSAM), Dijon France, September (2023)
**Plenary Lecture*
2. V. Emiliani, *Holographic manipulation of neuronal circuits: circuit optogenetics*
Congres général de 150 ans de la Société Française de Physique, Paris, July (2023)
**Plenary Lecture*
3. V. Emiliani, *Two-photon scanless manipulation of neuronal circuits*
8th International Workshop on Technologies for Optogenetics and Neurophotonics OPTOGEN 2023, Lecce, Italy, May (2023)
**Plenary Lecture*
4. V. Emiliani, *Holographic manipulation of neuronal circuits: circuit optogenetics*
15th Göttingen meeting of the German neuroscience society, Göttingen, March (2023)
**Plenary Lecture*
5. V. Emiliani, *All-optical interrogation of brain circuits with wavefront shaping and optogenetics*
14th European Conference on Atoms, Molecules, and Photons (ECAMP14), Vilnius, Lithuania, July (2022),
**Plenary Lecture*
6. V. Emiliani, *Holographic manipulation of neuronal circuits*, The 17th European Molecular Imaging Meeting (EMIM 2022),
Thessaloniki, Greece (March 2022)
**Plenary Lecture*
7. V. Emiliani, *Holographic control of brain circuits* Spanish Society for Neuroscience biennial meeting,
Lleida, Spain (November 2021)
**Plenary Lecture*
8. V. Emiliani, *Holographic control of brain circuits* OPTIQUE Dijon 2021 – Optics French Society biennial meeting, Dijone, France
(July 2021)
**Plenary Lecture*
9. V. Emiliani, *Circuit optogenetics and wave front shaping*, International symposium on Biomedical Imaging, IEEE ISBI, virtual
(March 2021)
**Keynote speaker (Plenary talk)*
10. V. Emiliani, *Circuit optogenetics and wave front shaping*, International symposium on Bomedical Imaging, *Dean's
Distinguished Seminar Series, University of Colorado, (February 2021)
11. V. Emiliani, *Wave front engineering and circuits optogenetics*, 2019 BIST Conference: *Frontier research for the medicine of
the future*, Barcelona, Spain (November 2019)
**Keynote speaker*
12. *Wavefront Engineering: illuminating the Neural Landscape*, Neuroscience 2019 (SfN),
Chicago, US, (October 2019)
**Presidential Lecture*
13. V. Emiliani, *Toward circuits Optogenetics*, Symposium: *“How tools and models resolve the neuronal networks in the
mammalian brain: six years of collaborative research*, Hamburg Germany, (June 2019)
**Keynote speaker*
14. V. Emiliani, *Toward circuits Optogenetics*, OSA Biophotonics Congress: Optics in the Life Sciences Tucson AZ, US, (Avril 2019)
**Plenary Lecture*

15. V. Emiliani, *Toward circuits optogenetics*, CBS 25th anniversary, Montpellier, (May 2018)
*Keynote speaker
16. V. Emiliani, *Two-Photon Optogenetics with Millisecond Temporal Precision and Single Cell Resolution*, Focus on Microscopy (FOM), Bordeaux (April 2017)
*Plenary Lecture
17. V. Emiliani, *Two-Photon Optogenetics with Millisecond Temporal Precision and Single Cell Resolution* Neurotechnologies: plenary session BIOS/Photonics West, (January 2017)
*Plenary Lecture
18. V. Emiliani, *Optogenetics and wave front shaping*, 3rd Imaging Zebrafish Neuronal Circuits symposium, Paris, (December 2014)
*Plenary Lecture
19. V. Emiliani, *Optogenetics and wave front shaping*, Workshop Emerging Imaging Technologies in Neuroscience, Gif sur Yvette, (December 2014)
*Plenary Lecture
20. V. Emiliani, *Controlling brain signalling with wave front shaping and optogenetics*, 13th International Meeting of the European Calcium Society, Aix en Provence, (September 2014)
*Plenary Lecture

Invited talks

1. V. Emiliani, *Two-photon scan-less reading-out and writing-in of neuronal signals*. Neurotechnology 2023: Precision Approaches for Studying and Treating the Brain, Weitzman Insitut, Rovholt, Israel April 2023
2. V. Emiliani, *All-optical interrogation of neuronal circuits*, *The Brain Across the Lifespan: Tools and Methodologies for Measuring the Changing Brain Virtual Workshop* A virtual workshop co-organized by the National Institutes of Health and the Bill and Melinda Gates Foundation April 18-19, 2022
3. V. Emiliani, *Holographic control of neuronal circuits* 2nd Symposium tribute to Maxime DAHAN, Paris, France, December (2021)
4. V. Emiliani, *Ultrafast light targeting for high-throughput precise control of neuronal networks*, 2021 OSA Imaging & Sensing Congresses, Session: Novel Applications of 3D Imaging, Virtual, July 20th 2021
5. V. Emiliani, *Holographic Manipulation of Brain Circuits: How many targets?*, International Conference on Photochemistry - 30th Edition, Virtual, July 19th 2021
6. V. Emiliani, *Holographic manipulation of brain circuits*, Nature Conferences: *Technologies for neuroengineering*, Virtual May 26th 2021
7. V. Emiliani, *Circuit optogenetics and wave front shaping*; Cluster of Excellence "Multiscale Bioimaging" (MBExC) Virtual Mini Symposium "Excitable cell networks in heart and brain", November 30th 2020
8. V. Emiliani, *Circuit optogenetics and wave front shaping*; *Virtual meeting*: Spanish and Portuguese Optical Microscopy (SPAOM2020), November 24-27th 2020
9. V. Emiliani, *Holographic control of neuronal circuits*; *Online Workshop: Novel Features and Applications of Optical Manipulation*, School of Nano Science, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran, September, 2020
10. V. Emiliani, *All-optical circuits manipulation using optogenetics and wave front shaping*, FENS 2020 virtual forum, July 2020

11. V. Emiliani, *Circuit optogenetics, Symposium 8 - Emerging High-Throughput Microscopy Methods for Imaging Brain Activity*, Virtual 6th Annual BRAIN Initiative Investigators Meeting, June (2020)
12. V. Emiliani, *Circuit optogenetics: toward all-optical neuronal circuits manipulation using spatiotemporally shaped light and optogenetics*, 8th Annual virtual symposium Optogenetics 2020, Columbia University, May (2020)
13. V. Emiliani, *Neurophotonics: reading and writing neuronal activity at the relevant spatiotemporal scales*, OSA Career lab, https://www.osa.org/en-us/meetings/member_events/all-optical_investigation_of_neuronal_circuits_by/, Avril (2020) Web seminar
14. V. Emiliani, *Circuit optogenetics: toward all-optical neuronal circuits manipulation using spatiotemporally shaped light and optogenetics*, Optogen 2019, Venice, Italy, December (2019)
15. V. Emiliani, *Holographic manipulation of visual circuits*, The European retina meeting 2019, Helsinki, Finland, September (2019)
16. V. Emiliani, *Toward circuits Optogenetics*, Symposium: "Sculpted Light in the Brain" London, UK, June 2019
17. V. Emiliani, *Toward circuits optogenetics (a multidisciplinary story)* : American Association for the Advancement of Science) Annual Meeting, February (2019)
18. V. Emiliani, *Holographic voltage imaging*, 7th NTC Symposium, Voltage Imaging: A Next--Generation Technology for Neuroscience, Columbia University, NY, December (2018)
19. V. Emiliani, *Toward circuits Optogenetics*, Neuralnet GDR 2018 , Conference Understanding Neural Networks : From Dynamics to Function, Paris, December (2018)
20. V. Emiliani, *Temperature rise under two-photon optogenetic stimulation*, Genetic Manipulation of Neuronal Activity V, Janelia Farm Research Campus, Ashburn, USA, October (2018)
21. V. Emiliani, *Toward circuits Optogenetics*, SPP 1926 Next Generation, Research Center Caesar Bonn, Germany, September (2018)
22. V. Emiliani, *In vivo two-photon optogenetics with millisecond temporal resolution and single cell precision*, BRAIN Initiative Symposium, *Exciting new technologies emerging from the U.S. National Institutes of Health BRAIN Initiative*, 11th FENS Forum on Neuroscience, Berlin July (2018)
23. V. Emiliani, *Multiplexed Temporally Focused Light Shaping for High-Resolution, Multi Cell Optogenetics Neuronal Control*, Gordon research conference: Optogenetic Approaches to Understanding Neural Circuits and Behavior Grand Summit Hotel at Sunday River in Newry ME United States, July (2018)
24. V. Emiliani , *New Approaches for Optical Brain Manipulation*, Gordon research conference: Image Science Stonehill College in Easton MA United States, June (2018)
25. V. Emiliani, *Two-photon optogenetics with millisecond temporal precision and single cell resolution*, 2018 Justen Passwell Memorial Symposium: Brain interfaces - bridging basic and translational neuroscience, Rehovot, Israel, January (2018)
26. V. Emiliani, *Optical manipulation of neuronal circuits by optical wave front shaping* , Royal society symposium : Light transport and imaging through complex media, Kavli Royal Society Centre, Buckinghamshire, MK16 9JJ, January (2018)
27. V. Emiliani, *Two-photon optogenetics with millisecond temporal precision and single cell resolution*, Optogen 2017, Lecce Italy, Decembre 2017
28. V. Emiliani, *In vivo millisecond two-photon Optogenetics*, Multiphoton Excitation Microscopy to Optical Nanoscopy, Biophotonics, Marseille - Nov 2017
29. V. Emiliani, *In vivo two-photon Optogenetics*, International conference: Frontiers in neurophotonics Bordeaux Octobre 2017

30. V. Emiliani, Two-Photon Optogenetics with Millisecond Temporal Precision and Single Cell Resolution Focus on Microscopy, 11th European Biophysical Societies' Association (EBSA) Congress, Edinburgh, Scotland July 2017-invited talk
31. V. Emiliani, Two-Photon Optogenetics, International workshop: Symposium Sculpting light in the brain, Berkeley Juin 2017
32. V. Emiliani, Three-dimensional simultaneous photoconversion of neuronal ensembles with single-cell resolution, Photonics West, BIOS/Photonics West, January (2017) - invited talk
33. V. Emiliani, Remote axial displacement of spatiotemporal focused patterns through neural systems, Photonics West, BIOS/Photonics West, January (2017) - invited talk
34. V. Emiliani, Three Dimensional Computer-Generated Holography for Neural Circuit Reverse Engineering; Global efforts in Neurotechnology", BRAIN Initiative Investigators meeting December (2016)
35. V. Emiliani, Optical control of brain activity by wave front shaping; Symposium: "Quantifying the behaving brain" Max Plank Insitut Bonn, November (2016)
36. V. Emiliani, In vivo all-optical readout and manipulation of neuronal activity by optical wave front shaping Champalimaud Neuroscience Symposium, Lisbon September 2016- invited talk
37. V. Emiliani, In vivo all-optical readout and manipulation of neuronal activity by optical wave front shaping, 10th FENS formu of Neuroscience; Special symposium: Using light to probe neural circuit dynamics in behaving animals - Copenhagen June 2016–invited talk
38. V. Emiliani, Three-dimensional spatiotemporal focusing of holographic patterns Conference Jacques Monod: Optical imaging of brain connectivity: from synapses to networks in activity Roscoff (Brittany), France, June (2016)
39. V. Emiliani, Two photon optogenetics, International Symposium The Brain in focus: New approaches to imaging neurons and neural circuits, North Copenhagen- Denmark, April 2016
40. V. Emiliani, Two photon optogenetics Lorentz Workshop: Optogenetics: From molecules to applications, Leiden, Netherlands, March 2016
41. V. Emiliani, Spatiotemporal wavefront shaping for 3D volume illumination Trends in microscopy, Dresden Germany, February 2016
42. V. Emiliani, Spatiotemporal wavefront shaping for 3D volume illumination, Emerging Tools for Acquisition and Interpretation of Whole-Brain Functional Data, Janelia Research Campus, November (2015)
43. V. Emiliani, All-optical readout and manipulation of neuronal activity by optical wave front shaping, Neuroscience 2015 symposium: All-optical Interrogation of Neural Circuits, Chicago-USA, October 2015
44. V. Emiliani, Three-dimensional spatiotemporal focusing of holographic patterns, Cell Symposia: Engineering the Brain: Technologies for Neurobiological Applications, Chicago-USA, October 2015
45. V. Emiliani, All-optical readout and manipulation of neuronal activity by optical wave front shaping, 5th Cambridge Neuroscience Symposium : Imaging the Nervous System, Cambridge, UK September (2015)
46. V. Emiliani, Wave front shaping and optogenetics, Special symposium: Advanced Optical Microscopy for Brain Imaging, CLEO, in San Jose, CA May (2015)
47. V. Emiliani, Optogenetics and wave front shaping, Keystone Symposia: Optogenetics, Denver, Colorado, USA Mars (2015)
48. V. Emiliani, Holographic photostimulation in freely behaving mice, 7th International IEEE EMBS Conference on Neural Engineering (NER), Montpellier April (2015)
49. V. Emiliani, Wave front shaping and optogenetics, 2nd INT neuroscience conference Marseille, May (2014)

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52. V. Emiliani, Wave front shaping and optogenetics, Conference Jacques Monod: Optical imaging of brain structure and function on multiple spacial scales, Roscoff (Brittany), France, June (2014)
53. V. Emiliani, Two-photon Optogenetics by Wave Front Shaping of Ultra Fast Pulses, Neurotechnology Symposium, Leuven, Belgium, May (2014)
54. V. Emiliani, Wave front shaping and optogenetics Journées d'Imagerie Optique Non Conventiionnelle, ESPCI, Paris Mars (2014)
55. V. Emiliani, Two-photon Optogenetics by Wave Front Shaping of UltraFast Pulses, 11th Annual Advanced Imaging Methods (AIM) Workshop UC Berkeley USA, January (2014)
56. V. Emiliani, Optogenetics in a good shape, Shaping the Waves: Engineering Optical Wavefront for Biomedical Imaging, Janelia Farm Research Campus, Ashburn, USA, November (2013)
57. V. Emiliani, Two-photon optogenetics by wave front shaping of ultrafast pulses, Frontiers in Neurophotonics, Bordeaux, October (2013)
58. V. Emiliani, Two-photon Optogenetics by Wave Front Shaping of Ultra Fast Pulses, ELMI conference European Light Microscopy Initiative, Arcachon, France, May (2013)
59. V. Emiliani, Two-photon Optogenetics by Wave Front Shaping of Ultra Fast Pulses Novel Techniques in Microscopy - Optics in the Life Sciences OSA , Waikoloa, Hawaii, April (2013)
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61. V. Emiliani, Wave front shaping for two photon optogenetics, 8th FENS forum for Neuroscience, Barcellona, Spain, June (2012)
62. V. Emiliani, Spatiotemporal control of neuronal activity by wave front shaping, International Molecular Nano- and Biophotonics Conference Giens Peninsula, France (2012)
63. V. Emiliani, Advanced optical methods for two photon optogenetics, Neuroscience French Society Annual meeting, Marseille, France (2011)
64. V. Emiliani, Two-photon optogenetics Multiphoton imaging: the next 6x10²³ femtoseconds, Janelia Farm Research Campus, Ashburn, USA, April (2011)
65. V. Emiliani, Advanced optical methods for two photon optogenetics, Neuroscience French Society Annual meeting, Marseille, France (2011)
66. V. Emiliani, Two-photon optogenetics, Multiphoton imaging: the next 6x10²³ femtoseconds, Janelia Farm Research Campus, Ashburn, USA, April (2011)
67. V. Emiliani, Shining light into the Brain, Conference Neurosciences Sorbonne Paris Cité, Paris, France, November (2010)
68. V. Emiliani, Spatiotemporal control of brain activity by spatiotemporal shaping of ultra-short pulses, Franco Japonais Frontiers of Engineering (FOE), Grenoble, France, September (2010)
69. V. Emiliani, Patterned illumination to control brain activity, Frontiers in Neurophotonics, Quebec City, Canada, September (2010)

70. V. Emiliani, Spatiotemporal control of brain activity by spatiotemporal shaping of ultra-short pulses, 5th Workshop on Advanced Multiphoton and Fluorescence Lifetime Imaging Techniques, Saarbrücken, Germany, June (2010)
71. V. Emiliani, Shining light into the brain, Journee GDR Ondes «Ondes et imagerie en milieux complexes et biologiques », Institut Fresnel Marseille, May (2010)
72. V. Emiliani, Patterned illumination to control brain activity, Trends in Optical Micromanipulation, Obergurgl, Tirol, Austria (2010)
73. V. Emiliani, Spatio temporal control of neuronal activity by holographic photoactivation patterns, Second Japanese – French workshop on Nanobiophotonics joint with the First American – French meeting on Nanobiophotonics Marseille France, October (2009)
74. V. Emiliani, Spatiotemporal control of neuronal activity by holographic patterns, ENI network meeting: Cell-type specific manipulation of neuronal network, Geneva, Swiss -September (2009)
75. V. Emiliani, Single and two-photon holographic patterns generation by controlled spatio-temporal shape of optical wave-fronts, 6th Annual Advanced Imaging Methods (AIM) Workshop UC Berkeley USA January (2009)
76. V. Emiliani, Wave-front engineered microscopy to reproduce complex environments of living cells 19th Ion Channel Meeting, September, Presqu'île de Giens, France (2008)
77. V. Emiliani, Holographic photolysis of cage neurotransmitters, Workshop on Bioimaging and Applications, Thales Research and technology, Orsay, France (2008)
78. V. Emiliani, Holographic photolysis of cage neurotransmitters, Conference Jacques Monod: Investigating brain function using light, Roscoff (Brittany), France (2008)
79. V. Emiliani, Holographic photolysis of cage neurotransmitters, Symposium Optical microscopy in a good shape, Paris, France (2008)
80. V. Emiliani, Wave-front engineered microscopy for the mechanical and chemical control of cell environment, USGEB (Biology Meets Engineering) Lausanne, Swiss (2008)
81. V. Emiliani, Wave-front engineered microscopy to investigate signal transmission in neurons and glial cells, Société de Neuroscience: 8 colloque, Montpellier, France (2007); (plenary talk)
82. V. Emiliani, Wave-front engineered microscopy results and prospective for live sciences, COLOQ'10 , Grenoble, France (2007)
83. V. Emiliani, 2D and 3D optical tweezers to investigate cell mechano transduction, Workshop on Nanobiophysics, Szeged (Hungary) (2006)
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85. V. Emiliani, T. Günther, F. Intonti, Ch. Lienau, T. Elsaesser, M. Ramseiner, R. Nötzel, and K. H. Ploog Femtosecond near-field spectroscopy of GaAs nanostructures, Quantum Optoelectronics, Snomass Conference Center, Aspen Colorado USA, Avril (1999)

Full Publication list

in black: research articles

in blue: invited review articles

in red: views articles

1. Giulia Faini*, Dimitrii Tanese*, Clément Molinier, Cécile Telliez, Massilia Hamdani, F. Blot, Christophe Tourain, Vincent de Sars, Filippo Del Bene, Benoît C. Forget, Emiliano Ronzitti #, and Valentina Emiliani #
Ultrafast Light Targeting for High-Throughput Precise Control of Neuronal Networks
Nature Comm, **14**, 1888 (2023)
2. Johannes Vierock*, Enrico Peter*, Christiane Grimm*, Andrey Rozenberg, I-Wen Chen, Linda Tillert, Alejandro G. Castro Scalise, Marilù Casini, Sandra Augustin, Dimitrii Tanese, Benoît C. Forget, Rémi Peyronnet, Franziska Schneider-Warme, Valentina Emiliani, Oded Béjà, Peter Hegemann
WiChR, a highly potassium selective channelrhodopsin for low-light, two-photon inhibition.
Science Advances, Dec 9;8(49):eadd7729(2022)
3. Nicolò Accanto*, François G. C. Blot*, Antonio Lorca Camara*, Valeria Zampini, Florence Bui, Christophe Tourain, Noam Badt, Ori Katz, and Valentina Emiliani
A flexible two-photon endoscope for fast activity imaging and cell-precise optogenetic photo-stimulation neurons in freely moving animals.
Neuron, Jan 18;111(2):176-189.e6 (2023)
4. Spampinato G.L.B. *, Ronzitti E. *, Zampini V., Ferrari U., Trapani F., Khabou H., Dalkara D., Picaud S., Papagiakoumou E., Marre O., Emiliani V.
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6. A. Abdelfattah et al., *Neurophotonic Tools for Microscopic Measurements and Manipulation: Status Report*
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7. Gokul Rajan, Julie Lafaye, Giulia Faini, Martin Carbo-Tano, Karine Durore, Dimitrii Tanese, Thomas Panier, Raphaël Candelier, Jörg Henninger, Ralf Britz, Benjamin Judkewitz, Christoph Gebhardt, Valentina Emiliani, Georges Debregeas, Claire Wyart, Filippo Del Bene
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9. E. Papagiakoumou, E. Ronzitti and V. Emiliani
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10. Nicolò Accanto, I-Wen Chen, Emiliano Ronzitti, Clément Molinier, Christophe Tourain, Eirini Papagiakoumou and Valentina Emiliani
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11. M. Pascucci, S. Ganesan, A. Tripathi, O. Katz, V. Emiliani and M. Guillon
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15. Emiliano Ronzitti, Valeria Zampini, and Valentina Emiliani
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