

BIOGRAPHICAL SKETCH

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NAME: EMILIANI VALENTINA

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

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
Institut 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 obtained the European Young Investigator price (EURYI 2005) and I moved at the university Paris Descartes where I formed the "Wave front engineering microscopy" group. In 2014, I have been appointed Director of the Neurophotonics 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. 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 of the EMBO Practical Course "Optical interrogation of neural circuits", London, UK
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

2021 - Silver Medal from the CNRS
2020 - ERC Advanced grant (HOLOVIS)
2019 - Nomination for the 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 100 invited presentations at international conferences
- More than 50 specialized seminars at international research institutes or Universities

e. Teaching in international thematic school

2020 CAJAL Advanced Neuroscience Training Programme: *CAJAL Neuroscience Training Course on "Neural circuit basis of computation and behaviour"*, November 2020, 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 neuroscience*, July 2019, Bordeaux Neurocampus
2018 SfN's 2018 Short Course : *Functional, structural, and molecular imaging*, San Diego, CA
2018 CAJAL Advanced Neuroscience Training Programme: *Linking Neural Circuits and Behavior*, October 2018 , Bordeaux Neurocampus
2016, 2017 EMBO course: *New optogenetic paradigms in cell signalling: From design to in vivo application* EMBL, Heidelberg, Germany
2015 EMBO practical course: *Two photon imaging of Brain circuit function*, Munich, Germany
2015 NETT winter school on Neuronal engineering, Imperial College London, London, UK
2011-2018 Cold Spring Harbour Laboratory summer course: *Imaging Structure & function in the nervous system*, Cold Spring Harbour, USA
2011-2018 ENP Spring School: *Optical imaging and electrophysiological recording in Neuroscience*, Paris, France
2014 Neuroscience School of Advanced Studies: *Structural Plasticity in Neuropsychiatric Disorders*, Cortona, Italy
2014 Workshop UC Berkeley: *Advanced Imaging Methods*, Berkeley, USA
2013, 2017 EMBO practical course: *2P imaging of brain circuit function*, 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)

C. Contributions to Science

My lab has pioneered the use of wave-front shaping for neuroscience. In particular, we demonstrated a number of new techniques for 3D optogenetics neural control, techniques based on computer generated holography, generalized phase contrast and temporal focusing. Most of these systems are currently the only existing worldwide. With these approaches, my lab first demonstrated simultaneous 2P optogenetics stimulation of multiple cell, all optical neuronal control at cellular resolution in freely moving mice, and 3D neuronal circuits manipulation with sub-millisecond temporal precision and single cell resolution. These approaches are currently used in a series of collaborative projects, including the analysis of Zebrafish swim circuit, the investigation of short term memory, the study of calcium dynamics in respiratory-related neurons, the investigation of the pathophysiology of the visual system, the investigation of retinal circuits and the optical detection of neuronal membrane voltage. I have coordinated several consortium based research projects, at the national and international level. I have been co-author than more than 70 publications and presented in the last 10 years more than 50 invited talks.

Selected Peer-reviewed Publications (full list at pag.5)

- *New optical methods for optical brain control*

1. 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)
2. 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** (2018) **5**, 1478-1491
3. E. Ronzitti, C. Ventalon, M. Canepari, BC. Forget, E. Papagiakoumou, and V. Emiliani, Recent advances in patterned photostimulation for optogenetics, *Journal of Optics* (2017) **19**, 113001
4. O. Hernandez, E. Papagiakoumou, D. Tanese, K. Fidelin, C. Wyart, V. Emiliani, *Three-dimensional spatiotemporal focusing of holographic patterns*, **Nature Commun.** **7** (2016) 11928.
4. 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).
5. 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).
*Highlighted in News and Views, *Nature Methods* **7** (2010).
6. E. Papagiakoumou, V. De Sars, D. Oron, and V. Emiliani, *Patterned two-photon illumination by spatiotemporal shaping of ultrashort pulses* **Optics Express** **16**, 22039-22047 (2008).
7. 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).
* Highlighted in *Physics Today's* magazine (2008).

- *Two photon optogenetics*

1. Alexis Picot, Soledad Dominguez, Chang Liu, I-Wen Chen, Dimitrii 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 (2018) 24, 1243–1253

2. I-Wen Chen, Eirini Papagiakoumou, and V. Emiliani, *Towards circuit optogenetics*, *Current Opinion in Neurobiology* 50, (2018), 179-189
 3. O. Shemesh, D. Tanese, V. Zampini, L. Changyang, P. KirylIn, E. Ronzitti, E. Papagiakoumou, E.S. Boyden, V. Emiliani, *Temporally precise single-cell resolution optogenetics*, **Nature Neuroscience**, 20, (2017) 1796–1806
 4. 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 (2017) 10679-10689
 5. 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 (2016) 234.
 6. A. Begue, E. Papagiakoumou, B. Leshem, R. Conti, L. Enke, D. Oron, and V. Emiliani, *Two-photon excitation in scattering media by spatiotemporally shaped beams and their application in optogenetic stimulation* **Biomed Opt Express** 4, 2869-2879 (2013).
 - *All optical interrogation of neuronal circuits*
 1. 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, 1157-1169 (2014).
- *Highlighted by Nature Methods: N. Vogt, *All optical electrophysiology in behaving animals*, vol 12, 2015
2. V. Emiliani, A. Choen, K. Deisseroth, and M. Heusser, *All-optical interrogation of neural circuits* **Journal of Neuroscience** 35, 13917-13926 (2015).
 - *Three dimensional multispot 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. 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).
 3. 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).

Publication list (past 20 years)

in blue: invited articles

1. 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 Communication (2021)
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. M. Pascucci, S. Ganesan, A. Tripathi, O. Katz, V. Emiliani, M. Guillon *Compressive three-dimensional super-resolution microscopy with speckle-saturated fluorescence excitation.*
Nature communication, **10**, 1327 (2019)
5. I-Wen Chen, Emiliano Ronzitti, Brian R. Lee, Tanya L. Daigle, Hongkui Zeng, Eirini, Papagiakoumou, and Valentina Emiliani *Parallel holographic illumination enables sub-millisecond two-photon optogenetic activation in mouse visual cortex in vivo,*
Journal of Neuroscience **39**, 1785-18 (2019)
6. Hirose T, Cabrera-Socorro A, Chitayat D, Lemonnier T, Féraud O, Cifuentes-Diaz C, Gervasi N, Mombereau C, Ghosh T, Stoica L, Bacha JDA, Yamada H, Lauterbach MA, Guillon M, Kaneko K, Norris JW, Siriwardena K, Blasér S, Teillon J, Mendoza-Londono R, Russeau M, Hadoux J, Ito S, Corvol P, Matheus MG, Holden KR, Takei K, Emiliani V, Bennaceur-Griscelli A, Schwartz CE, Nguyen G, and Groszer M.
ATP6AP2 variant impairs CNS development and neuronal survival to cause fulminant neurodegeneration.
J Clin Invest, Apr 15, 130 (2019)
7. Emiliano Ronzitti, Valentina Emiliani and Eirini Papagiakoumou, *Methods for three-dimensional all-optical manipulation of neural circuits.*
Front. Cell. Neurosci **12**, 468 (2018),
8. Emiliano Ronzitti, Valeria Zampini, and Valentina Emiliani *Optimized Chronos sets the clock for optogenetic hearing restoration,*
EMBO journal (2018) News&Views
9. 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 (2018) **5**, 1478-1491 *COVER in Optica
10. Alexis Picot, Soledad Dominguez, Chang Liu, I-Wen Chen, Dimitrii 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**, 1243–1253 (2018).
11. I-Wen Chen, Eirini Papagiakoumou, and V. Emiliani, *Towards circuit optogenetics,*
Current Opinion in Neurobiology **50**, 179-189 (2018).
12. Papagiakoumou E, Ronzitti E, Chen I-W, Gajowa M, Picot A, Emiliani V (2018) Two-photon optogenetics by Computer-generated holography. In: *Optogenetics: a roadmap*, Neuromethods series, Vol 133 (Stroh A, ed), pp 1 75–197. New York: Humana Press.
13. O. Shemesh, D. Tanese, V. Zampini, L. Changyang, P. Kiryln, E. Ronzitti, E. Papagiakoumou, E.S. Boyden, V. Emiliani, *Temporally precise single-cell resolution optogenetics,*
Nature Neuroscience **20** 1796–1806 (2017).
14. E. Ronzitti, C. Ventalon, M. Canepari, BC. Forget, E. Papagiakoumou, and V. Emiliani, *Recent advances in patterned photostimulation for optogenetics*
Journal of Optics **19** , 113001 (2017).
15. 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 Neuroscience **37**, 10679-10689 (2017).
16. M. Guillon, B. C. Forget, A.J. Foust, V. De Sars, M. Ritsch-Martens and V. Emiliani
Vortex-free phase profiles for uniform patterning with computer generated holography

- Optics Express** (2017).
17. 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).
 18. V. Emiliani *Opportunities for Technology and Tool Development*
Neuron Voices, **92**, 564 (2016).
 19. E. Chaigneau, R. Ronzitti, M. Gajowa, G. Soler-Llavina, D. Tanese, A. Brureau, E. Papagiakoumou, H. Zeng, V. Emiliani,
Two-photon holographic stimulation of ReaChR,
Front. Cell. Neurosci **10**, 234 (2016).
 20. R. Conti, O. Assayag, V. De Sars, M. Guillon, V. Emiliani,
Computer generated holography with intensity-graded patterns,
Front. Cell. Neurosci **10**, Article 236 (2016).
 21. M. Lauterbach, M. Guillon, C. Desnos, D. Khamsing, Z. Jaffal, F. Darchen and V. Emiliani
Superresolving dendritic spine morphology with STED microscopy under holographic photostimulation
Neurophotonics **3**, 041806 (2016).
 22. O. Hernandez, E. Papagiakoumou, D. Tanese, K. Felin, C. Wyart and V. Emiliani,
Three-dimensional spatiotemporal focusing of holographic patterns
Nature Communication, **7**, 11928 (2016).
 23. M. Pascucci, G. Tessier, V. Emiliani and M. Guillon
Superresolution Imaging of Optical Vortices in a Speckle Pattern,
Physical Review Letters **116**, 093904 (2016).
 24. M. A. Lauterbach, E. Ronzitti, J. R. Sternberg, C. Wyart, and V. Emiliani,
Fast Calcium Imaging with Optical Sectioning via HiLo Microscopy
PLoS One **10**, e0143681 (2015).
 25. V. Emiliani, A. Choen, K. Deisseroth, and M. Heusser,
All-optical interrogation of neural circuits
Journal of Neuroscience **35**, 13917-13926 (2015).
 26. D. Orduz, P. P. Maldonado, M. Balia, M. Velez-Fort, V. de Sars, Y. Yanagawa, V. Emiliani, and M. C. Angulo,
Interneurons and oligodendrocyte progenitors form a structured synaptic network in the developing neocortex
eLife **4** e06953 (2015).
 27. A. 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).
 28. 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).
 29. 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**, 1157-1169 (2014).
*Highlighted by Nature Methods: N. Vogt, *All optical electrophysiology in behaving animals*, vol 12, 2015
 30. B. Leshem, O. Hernandez, E. Papagiakoumou, V. Emiliani, and D. Oron,
When can temporally focused excitation be axially shifted by dispersion?
Optics Express **22**, 7087-7098 (2014).
 31. O. Hernandez, M. Guillon, E. Papagiakoumou, and V. Emiliani,
Zero-order suppression for two-photon holographic excitation
Optics letters **39**, 5953-5956 (2014).
 32. M. Bretou, O. Jouannot, I. Fanget, P. Pierobon, N. Larochette, P. Gestraud, M. Guillon, V. Emiliani, S. Gasman, C. Desnos, A. M. Lennon-Dumenil, and F. Darchen,
Cdc42 controls the dilation of the exocytotic fusion pore by regulating membrane tension
Mol Biol Cell (2014).
 33. 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).
 34. M. A. Lauterbach, M. Guillon, A. Soltani, and V. Emiliani,
STED microscope with spiral phase contrast
Sci Rep **3**, 2050 (2013).
 35. 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).
36. A. Begue, E. Papagiakoumou, B. Leshem, R. Conti, L. Enke, D. Oron, and V. Emiliani, *Two-photon excitation in scattering media by spatiotemporally shaped beams and their application in optogenetic stimulation* **Biomed Opt Express** **4**, 2869-2879 (2013).
 37. A. Vaziri, and V. Emiliani, *Reshaping the optical dimension in optogenetics* **Current Opinion in Neurobiology** **22**, 128-137 (2012).
 38. R. Ronzitti, M. Guillon, V. De Sars, and V. Emiliani, *LCoS nematic SLM characterization and modeling for diffraction efficiency optimization, zero and ghost orders suppression* **Optics Express** **20**, 17843-17855 (2012).
 39. D. Oron, E. Papagiakoumou, F. Anselmi, and V. Emiliani, *Two-photon optogenetics* **Prog Brain Res** **196**, 119-143 (2012).
 40. 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).
 41. F. Anselmi, C. Ventalon, A. Begue, D. Ogden, and V. Emiliani, *Three-dimensional imaging and photostimulation by remote-focusing and holographic light patterning* **Proc Natl Acad Sci U S A** **108**, 19504-19509 (2011).
 42. M. Zahid, M. Velez-Fort, E. Papagiakoumou, C. Ventalon, M. C. Angulo, and V. Emiliani, *Holographic photolysis for multiple cell stimulation in mouse hippocampal slices* **PLoS One** **5**, e9431 (2010).
 43. 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).
*Highlighted in News and Views, *Nature Methods* **7** (2010).
 44. E. Papagiakoumou, V. de Sars, V. Emiliani, and D. Oron, *Temporal focusing with spatially modulated excitation* **Optics Express** **17**, 5391-5401 (2009).
 45. E. Papagiakoumou, V. De Sars, D. Oron, and V. Emiliani, *Patterned two-photon illumination by spatiotemporal shaping of ultrashort pulses* **Optics Express** **16**, 22039-22047 (2008).
 46. 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).
* Highlighted in *Physics Today's* magazine (2008).
 47. A. Genovesio, T. Liedl, V. Emiliani, W. J. Parak, M. Coppey-Moisan, and J. C. Olivo-Marin, *Multiple particle tracking in 3-D+t microscopy: Method and application to the tracking of endocytosed quantum dots* **Ieee Transactions on Image Processing** **15**, 1062-1070 (2006).
 48. C. Goletti, V. Emiliani, S. Schintke, A. M. Frisch, N. Esser, and B. O. Fimland, *Detection of surface states anisotropies at GaAs(001)(2x4) decapped surfaces* **Physica Status Solidi B-Basic Solid State Physics** **242**, 2664-2670 (2005).
 49. V. Emiliani, D. Cojoc, E. Ferrari, V. Garbin, C. Durieux, M. Coppey-Moisan, and E. Di Fabrizio, *Wave front engineering for microscopy of living cells* **Optics Express** **13**, 1395-1405 (2005).
 50. V. Emiliani, D. Sanvitto, M. Zahid, F. Gerbal, and M. Coppey-Moisan, *Multi force optical tweezers to generate gradients of forces* **Optics Express** **12**, 3906-3910 (2004).
 51. E. Di Fabrizio, D. Cojoc, V. Emiliani, S. Cabrini, M. Coppey-Moisan, E. Ferrari, V. Garbin, and M. Altissimo, *Microscopy of biological sample through advanced diffractive optics from visible to X-ray wavelength regime* **Microscopy Research and Technique** **65**, 252-262 (2004).
 52. D. Cojoc, V. Emiliani, E. Ferrari, R. Malureanu, S. Cabrini, R. Zacharia, and E. Di Fabrizio, *Multiple optical trapping by means of diffractive optical elements* **Jpn. J. Appl. Phys.** **43**, 3910-3915 (2004).
 53. V. Emiliani, D. Sanvitto, M. Tramier, T. Pilot, Z. Petrasek, K. Kemnitz, C. Durieux, and M. Coppey-Moisan, *Low-intensity two-dimensional imaging of fluorescence lifetimes in living cells* **Applied Physics Letters** **83**, 2471-2473 (2003).

54. V. Emiliani, F. Intonti, M. Cazayous, D. S. Wiersma, M. Colocci, F. Aliev, and A. Lagendijk, *Near-field short range correlation in optical waves transmitted through random media* **Phys Rev Lett** **90**, 250801 (2003).
55. F. Intonti, V. Emiliani, C. Lienau, T. Elsaesser, V. Savona, E. Runge, R. Zimmermann, R. Notzel, and K. H. Ploog, *Quantum mechanical repulsion of exciton levels in a disordered quantum well evidenced by near-field spectroscopy* **Physica E-Low-Dimensional Systems & Nanostructures** **13**, 178-181 (2002).
56. V. Emiliani, A. M. Frisch, C. Goletti, N. Esser, W. Richter, and B. O. Fimland, *Ge growth on GaAs(001) surfaces studied by reflectance anisotropy spectroscopy* **Physical Review B** **66**, 853051-853056 (2002).
57. U. Zeimer, F. Bugge, S. Gramlich, V. Smirnitski, M. Weyers, G. Trankle, J. Grenzer, U. Pietsch, G. Cassabois, V. Emiliani, and C. Lienau, *Evidence for strain-induced lateral carrier confinement in InGaAs quantum wells by low-temperature near-field* **Applied Physics Letters** **79**, 1611-1613 (2001).
58. F. Intonti, V. Emiliani, C. Lienau, T. Elsaesser, V. Savona, E. Runge, R. Zimmermann, R. Notzel, and K. H. Ploog, *Quantum mechanical repulsion of exciton levels in a disordered quantum well* **Phys Rev Lett** **87**, 076801 (2001).
59. F. Intonti, V. Emiliani, C. Lienau, T. Elsaesser, R. Notzel, and K. H. Ploog, *Near-field optical spectroscopy of localized and delocalized excitons in a single GaAs quantum wire* **Physical Review B** **63**, 0753131-0753135 (2001).
60. V. Emiliani, F. Intonti, C. Lienau, T. Elsaesser, R. Notzel, and K. H. Ploog, *Near-field optical imaging and spectroscopy of a coupled quantum wire-dot structure* **Physical Review B** **64**, 1553161-1553169 (2001).

Invited talks

(V. Emiliani: presenting author)

Special Lectures

1. 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*
2. V. Emiliani, , The 17th European Molecular Imaging Meeting (EMIM 2022), Thessaloniki, Greece (March 2022) **Plenary Lecture*
3. V. Emiliani, *Holographic control of brain circuits* Spanish Society for Neuroscience biennial meeting, Lleida, Spain (November 2021) **Plenary Lecture*
4. V. Emiliani, *Holographic control of brain circuits* OPTIQUE Dijon 2021 – Optics French Society biennial meeting, Dijone, France (July 2021) **Plenary Lecture*
5. V. Emiliani, *Circuit optogenetics and wave front shaping*, International symposium on Biomedical Imaging, IEEE ISBI, virtual (March 2021) **Keynote speaker (Plenary talk)*
6. V. Emiliani, *Circuit optogenetics and wave front shaping*, International symposium on Bomedical Imaging, *Dean's Distinguished Seminar Series, University of Colorado, (February 2021)
7. 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*
8. *Wavefront Engineering: illuminating the Neural Landscape*, Neuroscience 2019 (SfN), Chicago, US, (October 2019)

***Presidential Lecture**

9. 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
10. V. Emiliani, *Toward circuits Optogenetics*, OSA Biophotonics Congress: Optics in the Life Sciences Tucson AZ, US, (Avril 2019)
*Plenary talk
11. V. Emiliani, *Toward circuits optogenetics*, CBS 25th anniversary, Montpellier, (May 2018)
*Keynote speaker
12. V. Emiliani, *Two-Photon Optogenetics with Millisecond Temporal Precision and Single Cell Resolution*, Focus on Microscopy (FOM), Bordeaux (April 2017)
*Plenary talk
13. V. Emiliani, *Two-Photon Optogenetics with Millisecond Temporal Precision and Single Cell Resolution* Neurotechnologies: plenary session BIOS/Photonics West, (January 2017)
*Plenary talk
14. V. Emiliani, *Optogenetics and wave front shaping*, 3rd Imaging Zebrafish Neuronal Circuits symposium, Paris, (December 2014)
*Plenary talk
15. V. Emiliani, *Optogenetics and wave front shaping*, Workshop Emerging Imaging Technologies in Neuroscience, Gif sur Yvette, (December 2014)
*Plenary talk
16. 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 talk

Invited talks

1. 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
2. V. Emiliani, *Holographic Manipulation of Brain Circuits: How many targets?*, International Conference on Photochemistry - 30th Edition, Virtual, July 19th 2021
3. V. Emiliani, *Holographic manipulation of brain circuits*, Nature Conferences: *Technologies for neuroengineering*, Virtual May 26th 2021
4. 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
5. V. Emiliani, *Circuit optogenetics and wave front shaping*; *Virtual meeting*: Spanish and Portuguese Optical Microscopy (SPAOM2020), November 24-27th 2020
6. 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
7. V. Emiliani, *All-optical circuits manipulation using optogenetics and wave front shaping*, FENS 2020 virtual forum, July 2020
8. V. Emiliani, *Circuit optogenetics*, *Symposium 8 - Emerging High-Throughput Microscopy Methods for Imaging Brain Activity*, Virtual 6th Annual BRAIN Initiative Investigators Meeting, June (2020)

9. 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)
10. 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
11. V. Emiliani, *Circuit optogenetics: toward all-optical neuronal circuits manipulation using spatiotemporally shaped light and optogenetics*, *Optogen 2019, Venice, Italy, December (2019)*
12. V. Emiliani, *Holographic manipulation of visual circuits*, *The European retina meeting 2019, Helsinki, Finland, September (2019)*
13. V. Emiliani, *Toward circuits Optogenetics*, Symposium: "Sculpted Light in the Brain" London, UK, June 2019
14. V. Emiliani, *Toward circuits optogenetics (a multidisciplinary story)* : American Association for the Advancement of Science) Annual Meeting, February (2019)
15. V. Emiliani, *Holographic voltage imaging*, *7th NTC Symposium, Voltage Imaging: A Next-Generation Technology for Neuroscience*, Columbia University, NY, December (2018)
16. V. Emiliani, *Toward circuits Optogenetics*, Neuralnet GDR 2018 , Conference Understanding Neural Networks : From Dynamics to Function, Paris, December (2018)
17. V. Emiliani, *Temperature rise under two-photon optogenetic stimulation*, *Genetic Manipulation of Neuronal Activity V*, Janelia Farm Research Campus, Ashburn, USA, October (2018)
18. V. Emiliani, *Toward circuits Optogenetics*, *SPP 1926 Next Generation*, Research Center Caesar Bonn, Germany, September (2018)
19. 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)
20. 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)
21. V. Emiliani , **New Approaches for Optical Brain Manipulation**, Gordon research conference: Image Science Stonehill College in Easton MA United States, June (2018)
22. 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)
23. 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)
24. V. Emiliani, *Two-photon optogenetics with millisecond temporal precision and single cell resolution*, *Optogen 2017, Lecce Italy, Decembre 2017*
25. V. Emiliani, *In vivo millisecond two-photon Optogenetics*, Multiphoton Excitation Microscopy to Optical Nanoscopy, Biophotonics, Marseille - Nov 2017
26. V. Emiliani, *In vivo two-photon Optogenetics*, International conference: Frontiers in neurophotonics Bordeaux Octobre 2017
27. 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
28. V. Emiliani, *Two-Photon Optogenetics*, International workshop: Symposium Sculpting light in the brain, Berkeley Juin 2017

29. V. Emiliani, Three-dimensional simultaneous photoconversion of neuronal ensembles with single-cell resolution, Photonics West, BIOS/Photonics West, January (2017) - invited talk
30. V. Emiliani, Remote axial displacement of spatiotemporal focused patterns through neural systems, Photonics West, BIOS/Photonics West, January (2017) - invited talk
31. V. Emiliani, Three Dimensional Computer-Generated Holography for Neural Circuit Reverse Engineering; Global efforts in Neurotechnology", BRAIN Initiative Investigators meeting December (2016)
32. V. Emiliani, Optical control of brain activity by wave front shaping; Symposium: "Quantifying the behaving brain" Max Plank Insititut Bonn, November (2016)
33. 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
34. 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
35. 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)
36. V. Emiliani, Two photon optogenetics, International Symposium The Brain in focus: New approaches to imaging neurons and neural circuits, North Copenhagen- Denmark, April 2016
37. V. Emiliani, Two photon optogenetics Lorentz Workshop: Optogenetics: From molecules to applications, Leiden, Netherlands, March 2016
38. V. Emiliani, Spatiotemporal wavefront shaping for 3D volume illumination Trends in microscopy, Dresden Germany, February 2016
39. 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)
40. 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
41. V. Emiliani, Three-dimensional spatiotemporal focusing of holographic patterns, Cell Symposia: Engineering the Brain: Technologies for Neurobiological Applications, Chicago-USA, October 2015
42. 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)
43. V. Emiliani, Wave front shaping and optogenetics, Special symposium: Advanced Optical Microscopy for Brain Imaging, CLEO, in San Jose, CA May (2015)
44. V. Emiliani, Optogenetics and wave front shaping, Keystone Symposia: Optogenetics, Denver, Colorado, USA Mars (2015)
45. V. Emiliani, Holographic photostimulation in freely behaving mice, 7th International IEEE EMBS Conference on Neural Engineering (NER), Montpellier April (2015)
46. V. Emiliani, Wave front shaping and optogenetics, 2nd INT neuroscience conference Marseille, May (2014)
47. V. Emiliani, Optogenetics and wave front shaping, Neurotech 2014, MIT center for Neurobiological engineering, Cambridge, MA, USA (2014)

48. V. Emiliani, Optogenetics in good shape, Opening Symposium Max Plank Institut for Brain research, Frankfurt, September (2014)
49. 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)
50. V. Emiliani, Two-photon Optogenetics by Wave Front Shaping of Ultra Fast Pulses, Neurotechnology Symposium, Leuven, Belgium, May (2014)
51. V. Emiliani, Wave front shaping and optogenetics Journées d'Imagerie Optique Non Conventiionnelle, ESPCI, Paris Mars (2014)
52. V. Emiliani, Two-photon Optogenetics by Wave Front Shaping of UltraFast Pulses, 11th Annual Advanced Imaging Methods (AIM) Workshop UC Berkeley USA, January (2014)
53. V. Emiliani, Optogenetics in a good shape, Shaping the Waves: Engineering Optical Wavefront for Biomedical Imaging, Janelia Farm Research Campus, Ashburn, USA, November (2013)
54. V. Emiliani, Two-photon optogenetics by wave front shaping of ultrafast pulses, Frontiers in Neurophotonics, Bordeaux, October (2013)
55. V. Emiliani, Two-photon Optogenetics by Wave Front Shaping of Ultra Fast Pulses, ELMI conference European Light Microscopy Initiative, Arcachon, France, May (2013)
56. 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)
57. V. Emiliani, Two photon optogenetics, Conference Jacques Monod: Imaging neuronal functions: from molecules to circuits, Roscoff (Brittany), France, June (2012)
58. V. Emiliani, Wave front shaping for two photon optogenetics, 8th FENS forum for Neuroscience, Barcellona, Spain, June (2012)
59. V. Emiliani, Spatiotemporal control of neuronal activity by wave front shaping, International Molecular Nano- and Biophotonics Conference Giens Peninsula, France (2012)
60. V. Emiliani, Advanced optical methods for two photon optogenetics, Neuroscience French Society Annual meeting, Marseille, France (2011)
61. V. Emiliani, Two-photon optogenetics Multiphoton imaging: the next 6x10²³ femtoseconds, Janelia Farm Research Campus, Ashburn, USA, April (2011)
62. V. Emiliani, Advanced optical methods for two photon optogenetics, Neuroscience French Society Annual meeting, Marseille, France (2011)
63. V. Emiliani, Two-photon optogenetics, Multiphoton imaging: the next 6x10²³ femtoseconds, Janelia Farm Research Campus, Ashburn, USA, April (2011)
64. V. Emiliani, Shining light into the Brain, Conference Neurosciences Sorbonne Paris Cité, Paris, France, November (2010)
65. V. Emiliani, Spatiotemporal control of brain activity by spatiotemporal shaping of ultra-short pulses, Franco Japonais Frontiers of Engineering (FOE), Grenoble, France, September (2010)
66. V. Emiliani, Patterned illumination to control brain activity, Frontiers in Neurophotonics, Quebec City, Canada, September (2010)
67. 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)

68. V. Emiliani, Shining light into the brain, Journee GDR Ondes «Ondes et imagerie en milieux complexes et biologiques », Institut Fresnel Marseille, May (2010)
69. V. Emiliani, Patterned illumination to control brain activity, Trends in Optical Micromanipulation, Obergurgl, Tirol, Austria (2010)
70. 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)
71. V. Emiliani, Spatiotemporal control of neuronal activity by holographic patterns, ENI network meeting: Cell-type specific manipulation of neuronal network, Geneva, Swiss -September (2009)
72. 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)
73. V. Emiliani, Wave-front engineered microscopy to reproduce complex environments of living cells 19th Ion Channel Meeting, September, Presqu'île de Giens, France (2008)
74. V. Emiliani, Holographic photolysis of cage neurotransmitters, Workshop on Bioimaging and Applications, Thales Research and technology, Orsay, France (2008)
75. V. Emiliani, Holographic photolysis of cage neurotransmitters, Conference Jacques Monod: Investigating brain function using light, Roscoff (Brittany), France (2008)
76. V. Emiliani, Holographic photolysis of cage neurotransmitters, Symposium Optical microscopy in a good shape, Paris, France (2008)
77. V. Emiliani, Wave-front engineered microscopy for the mechanical and chemical control of cell environment, USGEB (Biology Meets Engineering) Lausanne, Swiss (2008)
78. V. Emiliani, Wave-front engineered microscopy to investigate signal transmission in neurons and glial cells, Société de Neurosciences: 8 colloque, Montpellier, France (2007); (plenary talk)
79. V. Emiliani, Wave-front engineered microscopy results and prospective for live sciences, COLOQ'10 , Grenoble, France (2007)
80. V. Emiliani, 2D and 3D optical tweezers to investigate cell mechano transduction, Workshop on Nanobiophysics, Szeged (Hungary) (2006)
81. V. Emiliani, Wave-front engineering microscopy for living cells, Workshop: optical manipulation of nanoparticles, Thales Research and technology, Orsay, France (2006)
82. 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)