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ANNA LETIZIA ALLEGRA MASCARO

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Education and training

[2017-now] Researcher (permanent position) of the Neuroscience Institute, National Research Council (IN-CNR)

[2015-2016] Researcher at National Institute of Optics, National Research Council; Prot. CNR-INO n.12425 of 17/12/2014.

[2012-2014] Post-doc on stem cell tracking in a model of ischemic stroke with *in vivo* two-photon microscopy.

[2011-2012] Post-doc on *In vivo* two-photon imaging of cerebellar climbing fibers after laser axotomy; Correlative two-photon and electron microscopy of lesioned axons.

[2008-2010] PhD in Atomic and Molecular Spectroscopy

Main subject covered: *In vivo* two-photon imaging of neuronal network of genetically modified animals.

[2005-2007] University of Florence, LENS, Master Degree in Chemistry of Biological Molecules

Date: 17/09/2007; Level in national classification: 110/110 cum laude

Main subject covered: Setting up of a TIRFM apparatus for detection of single molecules of biological interest, applied to the tweak of an ultra-sensitive biosensor.

[2001-2005] University of Florence, Organic Department, Bachelor Degree in Chemistry

Date: 22/09/2005; Level in national classification: 110/110 cum laude
Main subject covered: Organic synthesis of natural alcaloids working as selective inhibitors of glicosidases.

▪ BIBLIOMETRIC PARAMETERS

- 42 peer-reviewed papers (indexed in Web of Science/Scopus/GoogleScholar; 18 as 1st author, 8 as corresponding author)
- 3 book chapters
- 1 science communication papers
- 35 abstracts at national and international congresses
- total number of citations: 358 (Scopus), 654 (Google Scholar)
- h-index: 9 (ISI Web of Science), 11 (Scopus), 12 (Google Scholar)
- i10-index: 15 (Google Scholar)
- average citations per item: 8.5 (ISI)
- average citations per year: 32.5 (ISI)

Scientific publications
(* corresponding author)

1. Heys, J., Wu, Z., Allegra Mascaro, A.L., Dombeck, D.A. Inactivation of medial entorhinal cortex selectively disrupts learning of interval timing, Cell Reports 32, 108163 (2020)
2. Adam, I., Cecchini, G., Fanelli, D., Kreuz, T., Livi, R., di Volo, M., Allegra Mascaro, A.L., Conti, E., Scaglione, A., Silvestri, L., Pavone, F. S. Inferring network structure and local dynamics from neuronal patterns with quenched disorder. Chaos, Solitons and Fractals 140 110235 (2020)

3. Allegra Mascaro, A.L.*, Falotico, E., Petkoski, S., Pasquini, M., Vannucci, L., Tort-Colet, N., Conti, E., Resta, F., Spalletti, C., Ramalingasetty, S.T., von Arnim, A., Formento, E., Angelidis, E., Blixhavn, C.H., Leergaard, T.B., Caleo, M., Destexhe, A., Ijspeert, A., Micera, S., Laschi, C., Jirsa, V., Gewaltig, M.O., Pavone. F.S. Experimental and computational study on motor control and recovery after stroke: towards a constructive loop between experimental and virtual embodied neuroscience. Front. Syst. Neurosci. (2020| doi: 10.3389/fnsys.2020.00031
4. Celotto, M. De Luca, C., Muratore, P., Resta, F., Allegra Mascaro, A.L., Pavone, F.S., De Bonis, G., Paolucci, P.S. Analysis and Model of Cortical Slow Waves Acquired with Optical Techniques. Methods and Protocols 3(1), 14 (2020)
5. *Allegra Mascaro , A.L., Conti, E., Lai, S., Di Giovanna, A., Spalletti, C., Alia, C., Panarese, A., Scaglione, A., Sacconi, L., Micera, S., Caleo, M., Pavone, F.S. Combined Rehabilitation Promotes the Recovery of Structural and Functional Features of Healthy Neuronal Networks after Stroke. Cell Reports, 8;13:P3474-3485.E6 (2019)
6. San Cataldo, G., Silvestri, L., Allegra Mascaro, A.L., Sacconi, L., Pavone, F.S. Advanced fluorescence microscopy for in vivo imaging of neuronal activity. Optica 6 (6), 758-765 (2019)
7. Howe, M., Ridouh, M., Allegra Mascaro, A.L., Larios, A., Sedano, M.A., Dombeck, D. Coordination of rapid cholinergic and dopaminergic signaling in striatum during spontaneous movement. eLife 8:e44903 (2019)
8. Montagni, E., Resta, F., Allegra Mascaro, A.L., Pavone, F.S. Optogenetics in Brain Research: From a Strategy to Investigate Physiological Function to a Therapeutic Tool. Photonics, 6, 92 (2019)
9. Conti, E., Allegra Mascaro, A.L., Pavone, F.S. Large Scale Double-Path Illumination System with Split Field of View for the All-Optical Study of Inter-and Intra-Hemispheric Functional Connectivity on Mice. Methods Protoc. 2(1), 11 (2019)
10. Montagni, E., Resta, F., Conti, E., Scaglione, A., Pasquini, M., Micera, S., *Allegra Mascaro, A.L., Pavone, F.S. Wide-field imaging of cortical neuronal activity with red-shifted functional indicators during motor task execution. Journal of Physics D: Applied Physics 52 074001 (2019).
11. Kubotera, H, Ikeshima-Kataoka, H., Hatashita, Y., Allegra Mascaro, A.L., Pavone, F.S., Inoue, T. Astrocytic endfeet re-cover blood vessels after removal by laser ablation. Scientific Reports, 4;9(1):1263 (2019).
12. Di Giovanna, A. P., Tibo, A., Silvestri, L., Müllenbroich, M. C., Costantini, I., Allegra Mascaro A.L., Sacconi, L., Frasconi, P. & Pavone, F.S. Whole-brain vasculature reconstruction at the single capillary level. Scientific reports, 8(1), 12573 (2018).
13. *Allegra Mascaro, A.L., Sacconi, L., Silvestri, L., Knott, G., Pavone, F.S. Multi-Modal Optical Imaging of the Cerebellum in Animals. Cerebellum, 1(15):18-20 (2016)
14. *Allegra Mascaro, A.L., Costantini, I., Margoni, E., Iannello, G., Bria, A., Sacconi, L., Pavone, F.S. Label-free near-infrared reflectance microscopy as a complimentary tool for two-photon fluorescence brain imaging. Biom. Optics Express, 6(11):4483-4492 (2015)
15. Costantini, I., Ghobril, J.P., Di Giovanna, A.P., Allegra Mascaro, A.L., Silvestri, L., Müllenbroich, M.C., Onofri, L., Conti, V., Vanzi, F., Sacconi, L., Guerrini, R., Markram, H., Iannello, G., Pavone F.S. A versatile clearing agent for multi-modal brain imaging. Sci Rep. 7(5):9808 (2015)
16. *Allegra Mascaro, A.L.; Silvestri, L.; Sacconi, L.; Pavone, F.S. Towards a comprehensive understanding of brain machinery by correlative microscopy. J Biomed Opt. Jun;20(6):61105 (2015)
17. *Allegra Mascaro, A.L.; Sacconi, L.; Pavone, F.S. Laser nanosurgery of cerebellar axons in vivo. J. Vis Exp, 28; (89):e51371 (2014)
18. Silvestri, L.; Allegra Mascaro, A.L.; Costantini, I.; Sacconi, L.; Pavone, F.S. Correlative two-photon and light sheet microscopy, Methods 66 (2), 268-272 (2014)
19. *Allegra Mascaro, A.L.; Cesare, P.; Sacconi, L.; Grasselli, G.; Mandolesi, G.; Maco, B.; Knott, G.W.; Huang, L.; De Paola, V.; Strata, P.; Pavone F.S. *In vivo* single branch axotomy induces GAP-43 dependent sprouting and synaptic remodeling in cerebellar cortex. Proc Natl Acad Sci USA 25;110(26):10824-9 (2013)
20. *Allegra Mascaro, A.L.; Silvestri, L.; Sacconi, L.; Pavone F.S. Breakthroughs in Photonics

2012: Non-linear laser imaging for neuroscience , Photonics Journal. PP: 99, 1 (2013)

21. Silvestri, L.; Allegra Mascaro, A.L.; Lotti, J.; Sacconi, L.; Pavone, F.S. Advanced optical techniques to explore brain structure and function. J. Innov. Opt. Health Sci. 06, 1230002 (2013)
22. Laperchia, C.; Allegra Mascaro, A.L.; Sacconi, L.; Andrioli, A.; Mattè, A. et al. Two-Photon Microscopy Imaging of thy1GFP-M Transgenic Mice: A Novel Animal Model to Investigate Brain Dendritic Cell Subsets in Vivo. PLoS ONE 8(2): e56144 (2013)
23. Allegra Mascaro, A.L.; Sacconi, L.; Pavone F.S. Multi-photon nanosurgery in live brain. Front Neuroenergetics. **2**,21 (2010)

Book chapters

1. Allegra Mascaro A.L., Pavone F.S. "Multi-Photon Nanosurgery" in *Handbook of Neurophotonics* (2020).
2. Allegra Mascaro, A.L., Silvestri, L., Sacconi, L., Pavone, F.S. "Multiscale correlative imaging of the brain", book chapter of "Multiphoton Microscopy and Fluorescence Lifetime Imaging. Applications in Biology and Medicine" De Gruyter Ed. (2018)
3. Allegra Mascaro, A.L., Silvestri, L., Sacconi, L., Calamai, M., Pavone, F.S., "Neurophotonics", in *The Optics Encyclopedia*, Wiley-VCH Verlag GmbH & Co. KGaA, (2015).

Grants

- (2021-2022) PI, grant Bando Ricerca Scientifica e Tecnologica CRF 2020, "Validazione della connettività funzionale come biomarker per la diagnosi dell'autismo", Budget 15,000 €
- (2020-2023) PI of partner unit, grant "Bando Salute" of Regione Toscana, "Integrating novel NeuroImaging Measurements and circulating Biomarkers for the prediction of secondary injury foLlowing strokE: from bench to bedside" Budget 250,000 €
- (2020-2021) PI of partner UNIT, grant Bando Ricerca Scientifica e Tecnologica CRF 2018, "Ictus ischemico acuto: dal laboratorio al letto del malato. Studio di biomarcatori ematici e di neuroimaging e dell'azione di farmaci neuroprotettivi come predittori di edema cerebrale, estensione della lesione ischemica e dell'outcome funzionale."Budget 40,000 €
- (2018-2020) Task Leader (T1.3.4, co-PI of T1.4.5) of the EC FET flagship Human Brain Project (SGA2), n. 785907; T1.3.4. High resolution in Vivo Meso-scale cortical activity mapping; T1.4.5 Structural and functional connectomics of brain sub-circuits using multiscale recording techniques with cellular resolution. Budget 45,000 €
- (2017-2018) Scientific coordinator of the Neurorobotic Platform (SP10) of the EC FET flagship Human Brain Project
- (2016-2021) Collaborator of the EC-H2020 Excellent Science, European Research Council grant 692943 BrainBIT (Pavone) "All-optical brain-to-brain behaviour and information transfer"

Other scientific commitments

- Organizer and Chair of the minisymposium: "Shining light on neuronal plasticity after stroke" at the Neuroscience 2020, the 50th meeting for the Society for Neuroscience [2020]
- Organizer and Chair of the symposium "Shining light on neuronal plasticity after stroke" at the 11th International Symposium on Neuroprotection and Neurorepair (ISN&N), [2020]
- Organizer and Chair of the symposium "In vivo optical approaches to investigate brain functionality" XVII Conference of the Italian Society for Neuroscience SINS [2017]
- Referee for international journals: Neurophotonics, Brain Research, Neuroscience Bulletin, Journal of Biophotonics, Frontiers in Neuroengeneering, Biomedical Optics Express, Journal of Neuroscience Methods, Journal of Visualized Experiments, Laser Physics Letters, BioMolecular Concepts
- Guest Editor for the Research Topic on Frontiers in System Neuroscience "Optical Imaging and Neurorehabilitation Strategies after Stroke"
- Review Editor for Frontiers in Cellular Neuroscience

Awards

- FENS, IBRO-PERC and The Brain Prize stipend for participation to the Brain Conference on Brain Stroke: Why, how, and hope. [2020] Denmark
- Best 3' Presentation "Rehabilitation promotes the recovery of functional and structural features of healthy neuronal networks after stroke" [2018] BIS 18, Rome
- Travel grant for the FENS-IBRO Imaging Training Center, [2010] Lausanne-Geneva

Invited seminars

- "In vivo fluorescence imaging of cortical plasticity after stroke" [2020] Invited seminar at Physics Department, University of Trento
- "Multi-modal in vivo imaging of cortical plasticity after stroke" [2019] FisMat conference, Catania
- "In vivo imaging of functional and structural plasticity after stroke" [2018] 69th National Congress of the Italian Physiological Society (SIF), Florence
- "In vivo imaging of rehabilitation-induced cortical plasticity after stroke" [2017] NEST, Pisa
- "In vivo imaging of rehabilitation-induced cortical plasticity after stroke" [2017] Neuroscience Institute, National Research Council, Milan
- "Multi-modal imaging of rehabilitation-induced cortical plasticity" [2017] INO Annual Symposium, Trento
- "Multi-scale investigation of rehabilitation-induced cortical plasticity" [2017] Invited seminar at V. Jirsa laboratory, Institut de Neurosciences des Systèmes-CNRS, Marseiile.
- "Multi-modal optical imaging of the cerebellum in animals" [2015] The 7th International Symposium of SRC, Bruxelles
- "Single branch axotomy induces GAP-43 dependent regrowth and synaptic remodelling of cerebellar climbing fibers in vivo" [2015] IBRO congress, Rio de Janeiro; selected for the "Alumni mini-symposium: Neurodegeneration and Neural repair"
- "Multiphoton microscopy in brain imaging" [2015] Photonics West, BIOS, San Francisco
- "Optical microscopy for brain imaging" [2015] 3D Lab Exchange Symposium, Singapore
- "Optical Brain Imaging" [2015] Biophotonics 2015, Florence
- "Structural and functional imaging of cortical plasicity" [2015] Invited seminar at Prof. P. Carloni laboratory, Julich Forschungszentrum, Germany
- "In vivo imaging of neural reactive plasticity after laser axotomy in cerebellar cortex " [2014] Photonics West, BIOS, San Francisco
- "In vivo reactive neural plasticity investigation by means of correlative two photon: electron microscopy" [2013] Photonics West, BIOS, San Francisco
- "In vivo imaging of cerebellar cortex and more" [2013] Invited seminar at M. Hausser laboratory, UCL, London
- "Neural nonlinear microscopy imaging" [2012] Meeting of the SAUUL project, 11th Jan., Murcia
- "In vivo imaging of climbing fibers after laser axotomy" [2012] Invited seminar at Prof. V. De Paola laboratory, Imperial College, London
- "In vivo imaging of climbing fibers after laser axotomy" [2012] Invited seminar at Prof. F. Rossi laboratory, Istituto Cavalieri Ottolenghi, Torino

Selected seminars

- "Rehabilitation promotes the recovery of functional and structural features of healthy neuronal networks after stroke" [2018] BIS 18, Rome
- "Multi-level imaging of brain plasticity after stroke" [2016] Optics and the Brain, Miami
- "Multi-level maps of mouse brain through an integrated view of functionality and anatomy" [2016] Microcircuit workshop of Human Brain Project, Madrid
- "Label-free NIR reflectance microscopy as a complimentary tool for two-photon fluorescence microscopy" [2016] Photonics West, BIOS, San Francisco
- "In vivo imaging of climbing fibers reactive plasticity after laser axotomy" [2012] Owls, Genova
- "Reactive plasticity of climbing fibers explored through correlative two-photon and electron microscopy" [2013] European Conference on Biomedical Optics, Munich

- "Imaging of neural reactive plasticity through correlative two photon and electron microscopy" [2013] Focus On Microscopy, Maastricht
- "Connecting in vivo synaptic plasticity with ex vivo whole brain imaging: correlative two photon and light sheet microscopy" [2013] Frontiers in Neurophotonics, Bordeaux
- "Climbing fibers reactive plasticity after laser axotomy" [2012] SfN Congress, New Orleans
- "Laser axotomy on cerebellar climbing fibers" [2011] Biophotonics, Parma
- "Two photon imaging of axonal plasticity" [2010] "Fotonica 2010" Congress, Pisa
- "In vivo imaging of climbing fibers after laser nanosurgery" [2010] "The Cerebellum: from neurons to higher control and cognition" Congress, Pavia

Teaching

- "Multi-scale investigation of brain machinery with correlative microscopy" [2017] 1st HBP Student Conference, Vienna
- "Micron-scale neuroanatomy of the whole mouse brain by confocal light sheet microscopy", *Zeiss on Your Campus 2014*, Sesto Fiorentino (FI), (2014)
- "Brain imaging and functionality explored by non-linear microscopy" Lecture for the "Physiology and biophysics school", 10-13th May, organized by the Italian Society of Physiology, University of Florence *Scuola di Fisiologia e Biofisica della Società Italiana di Fisiologia*, Firenze (2010).
- Lectures for the University course "Biomedical optics" and "Lasers and applications", master degree in Physics, University of Florence [2009-2018]

Selected posters (first author contributions only)

- "Robotic rehabilitation promotes stabilization of peri-infarct cortical circuits and inter-hemispheric connectivity: in vivo study of structural and functional plasticity" [2016] Dynamic poster at SfN Congress, San Diego
- "Label-free NIR reflectance imaging as a complimentary tool for two-photon fluorescence brain imaging" [2015] SfN Congress, Chicago
- "In vivo reactive plasticity after single neuron axotomy in cerebellar cortex relies on the growth-associated protein GAP-43" [2013] Frontiers in Neurophotonics, Bordeaux
- "Correlative two-photon and light sheet microscopy" [2013] SfN Congress, San Diego
- "In vivo imaging of climbing fibers plasticity after laser axotomy" [2011] IBRO congress, 18th July, Florence
- "Thy1GFP-M mice as novel tool to investigate brain dendritic cells" [2011] IBRO congress, Florence
- "In vivo imaging of climbing fibers after laser nanosurgery " [2010] SfN Congress, San Diego
- "Plasticity of climbing fibers after laser-axotomy" [2010] FENS Congress, Amsterdam
- "Plasticity of Climbing Fibers after laser axotomy" [2010] BIOS Congress, San Francisco
- "Plasticity of Climbing Fibers after laser axotomy" [2009] SfN Congress, Chicago

Supervision of students

- Lorenzo Baldi "Ottimizzazione di un microscopio wide field per stimolazione optogenetica e rivelazione dell'attività neuronale in vivo", Bachelor Degree in Physics, University of Florence
- Emilia Conti "Plasticità strutturale e funzionale in vivo in modello murino di ischemia cerebrale" Master Degree in Biology, University of Florence and PhD program under my supervision
- Matteo Parretti "Optimization of AAV-mediated chr2 transfection for light manipulation of cortical neuronal activity" Master Degree in Biology, University of Florence
- Elena Montagni "Imaging dell'attività neuronale corticale con indicatori funzionali red-shifted durante esecuzione di task motorio" Master Degree in Biology, University of Pavia;

now PhD student at LENS under my supervision

- Jessica Lucchesi “Optical imaging of a cortical activity during learning of a motor task.” Bachelor Degree and Master Degree in Biology, University of Florence; now PhD student at LENS under my supervision
- Alessio Coppola ”Application of the Multivariate Ornstein-Uhlenbeck model on in vivo Wide-Field Calcium Imaging to study the effect of stroke on Effective Connectivity”, Bachelor Degree in Physics, University of Florence
- Virginia Boretti “Implementazione dell’imaging del segnale di riflettanza e del software per la correzione del contributo emodinamico al segnale di fluorescenza del GCaMP.” Bachelor Degree in Physics, University of Florence