

Curriculum vitae et studiorum

Personal information

Name, surname: Lapo, Turrini
Place and date of birth: Fiesole (Florence), Italy, June 28th 1987.
Citizenship: Italian
e-mail: turrini@lens.unifi.it lapoturrini@gmail.com
Phone: +39 0554572025
Skype: live:turrini_8
Work address: National Institute of Optics, National Research Council
Via G. Sansone 1, 50019 – Sesto Fiorentino (FI), Italy

Current position

2022-present Postdoctoral research fellow, National Institute of Optics, National Research Council
Sesto Fiorentino (FI), Italy.

Previous positions

2019-2022 Postdoctoral research fellow, Dept. of Physics and Astronomy, University of Florence
Sesto Fiorentino (FI), Italy.
2015-2018 Graduate student, European Laboratory for Non-linear Spectroscopy (LENS)
Sesto Fiorentino (FI), Italy.

Education

2021 FELASA certificate, Universitat Autònoma de Barcelona (UAB)
Barcelona, Spain.
“Training course in laboratory animal science for scientists responsible for the design or conduct of animal experiments”, FELASA ID F002/03.
Functions: A, B, C, D (as required by EU Directive 2010/63).
Species: rodents and fish.

2015-2018 PhD in Biophysics, European Laboratory for Non-linear Spectroscopy (LENS)
Sesto Fiorentino (FI), Italy.
PhD thesis: “*Development of optical methods for real-time whole-brain functional imaging of zebrafish neuronal activity*”, supervisor Prof. Francesco Vanzi.
Final grade: excellent.

2012-2015 Master’s degree in Biology, University of Florence
Florence, Italy.
Master thesis: “*Three-dimensional imaging of zebrafish neuronal activity by light-sheet microscopy*”, supervisor Prof. Francesco Vanzi.
Final grade: 110/110, *magna cum laude*.

2007-2012 Bachelor’s degree in Biological Sciences, University of Florence
Florence, Italy.
Bachelor thesis: “*Development of a murine model for the study of human pancreatic adenocarcinoma*”, supervisor Prof. Olivia Crociani.
Final grade: 107/110.

Research activity

2012 **University of Florence (Italy), Dept. of Experimental Pathology and Oncology**
During my bachelor thesis I learnt and mastered fundamental techniques applied in cellular and molecular biology (e.g., cell culture, protein/nucleic acids extraction and electrophoresis, PCR and rtPCR, Western and Southern blot, ELISA, etc.). I have

performed bioluminescence imaging on mice xenografted with human pancreatic adenocarcinoma cells transfected with luciferase gene.

2014-2015 **University of Florence (Italy), Biophotonics group at LENS.** During my master thesis I contributed to the establishment of the zebrafish research line at UNIFI, and I daily managed an aquarium system for zebrafish breeding and rearing. I applied genetic engineering techniques for the handling of plasmidic vectors. I have generated the Tg(elavl3:GCaMP6s) zebrafish line, pan-neuronally expressing the calcium indicator GCaMP6s (<https://zfin.org/action/feature/view/ZDB-ALT-180314-9>). I performed light sheet microscopy imaging of zebrafish larvae neuronal activity.

2015-2018 **European Laboratory for Non-linear Spectroscopy (Italy), Biophotonics group.** During my PhD thesis I have generated the Tg(elavl3:H2B-GCaMP6s) zebrafish line expressing the calcium reporter GCaMP6s in all neuronal nuclei (<https://zfin.org/action/feature/view/ZDB-ALT-190827-2>). I have contributed to the development of several fluorescence optical systems (wide-field, Bessel-beam light-sheet, etc.) and I have devised a novel high-throughput drug screening assay combining the simultaneous recording of both neuronal activity (GCaMP fluorescence) and behavior (locomotor activity). I have written Matlab and Python scripts for the analysis of functional imaging data. I employed fluorescence microscopy to study the functional alterations occurring in the zebrafish brain during pharmacologically induced seizures. I also employed Bessel beams in light-sheet microscopy to dramatically reduce typical striping artefacts affecting this technique when using conventional Gaussian-distributed beam.

Publications:

- peer-reviewed articles: [1] and [2].
- conference proceeding: [1] and [2].

2018-2022 **University of Florence (Italy), Dept. of Physics and Astronomy.** I worked in the framework of two EU-funded projects (ERC and ERC PoC). In this period, I have generated the Tg(elavl3:ReaChR-TagRFP) zebrafish line, expressing the red-shifted light-gated cation channel ReaChR on the membranes of all differentiated neurons. I contributed to the development of optical systems employing non-linear excitation (i.e., two-photon light-sheet microscope and two-photon AOD-based light-targeting system for optogenetic applications). I performed whole-brain two-photon light-sheet imaging of neuronal dynamics in a model of acute seizure in zebrafish, describing for the first time a peculiar wave propagation activity pattern. I also characterized the neuronal response following optogenetic stimulation of the Tg(elavl3:ReaChR-TagRFP) line.

Publications:

- peer-reviewed articles: [3] to [10].
- books: [1].
- conference proceedings: [3] to [5].

2022-present **National Institute of Optics, National Research Council (Italy).** I have devised an optical system for high-speed behavioral tracking of the swimming kinematic of zebrafish larvae exposed to visual stimuli. I have also implemented the two-photon light-sheet microscope with an optical system for visual stimulation and behavioral imaging (e.g., tail and eye movements, heartbeat, etc.) to investigate neural circuits controlling visually mediated escape response in zebrafish in a closed-loop experiment (virtual reality). I am currently performing whole-brain calcium imaging and simultaneous targeted 3D optogenetic stimulation to map large-scale functional connectivity of specific cerebral nuclei and combining it with whole-mount immunohistochemistry molecular profiling of neuronal populations.

Publications:

- peer-reviewed article: [11].

Teaching activity

Tutoring

2015-2018 Internship tutor of 8 bachelor's degree students in Biological Sciences at the University of Florence.

Co-supervisor

2018-2020 Co-supervisor and member of the Biological Sciences bachelor's degree board at the University of Florence.

Thesis co-supervised:

- "*Characterization of a double transgenic zebrafish line for the simultaneous optical readout and control of neuronal activity*", Lorenzo Roschi, a.y. 2018/2019.
- "*Kinematic characterization of the virtual reality evoked escape response in zebrafish larvae*", Alessandro Scorzoso, a.y. 2018/2019.

Subject expert

2022-present Appointed by the Biology degree course board of the University of Florence as subject expert of "the biological and physiological correlates of behavior and perceptive, cognitive and emotional functions, in humans and animals" (SSD M-PSI/02 "Psychobiology and physiological psychology").

Seminars

2022

"Zebrafish (Danio rerio) as an animal model"

Course of "Psychobiology and animal models", part of the Master's degree course in Behavioral Biology (a.y. 2021/2022), University of Florence (Italy), May 2022.

"Zebrafish (Danio rerio): applications in neuroscience"

Course of "Psychobiology and animal models", part of the Master's degree course in Behavioral Biology (a.y. 2021/2022), University of Florence (Italy), May 2022.

"Functional imaging of zebrafish larvae neuronal activity: an overview"

Dept. of Health Science, University of Florence (Italy), October 2022.

Awards

2020

"Premio Tesi Dottorato 2019", Firenze University Press (FUP)

Best doctoral thesis in the scientific area, 2019

Publications

Since 2016 I have authored 17 scientific publications, distributed as follows: 11 articles in peer-reviewed journals (3 as first author), 1 book (monograph), and 5 conference proceeding (2 as first author).

Total citations: 163 Avg. citations per year: 27.2 Avg. citations per article: 14.8 h-index: 6
(source: Scopus, February 2023)

Peer-reviewed articles

[11] **Turrini, L.***, Sorelli, M., de Vito, G., Credi, C., Tiso, N., Vanzi, F., Pavone, F.S.*, "*Multimodal characterization of seizures in zebrafish larvae*", 2022, *Biomedicines*, 10(5): 951, doi: [10.3390/biomedicines10050951](https://doi.org/10.3390/biomedicines10050951).

* Corresponding author.

[10] Ricci, P., Marchetti, M., Sorelli, M., **Turrini, L.**, Resta, F., Gavryusev, V., de Vito, G., Sancataldo, G., Vanzi, F., Silvestri, L., Pavone, F.S., "*Power-effective scanning with AODs for 3D optogenetic applications*", 2022, *Journal of Biophotonics*, 15(4): e202100256, doi: [10.1016/j.pbiomolbio.2021.07.003](https://doi.org/10.1016/j.pbiomolbio.2021.07.003).

[9] de Vito, G.[†], **Turrini, L.[†]**, Müllenbroich, M.C., Ricci, P., Sancataldo, G., Mazzamuto, G., Tiso, N., Sacconi, L., Fanelli, D., Silvestri, L., Vanzi, F., Pavone, F.S., "*Fast whole-brain imaging of*

seizures in zebrafish by two-photon light-sheet microscopy, 2022, Biomedical Optics Express, 13 (3): 1516-1536, doi: [10.1364/BOE.434146](https://doi.org/10.1364/BOE.434146).

† First author with equal contribution.

- [8] Ricci, P., Gavryusev, V., Müllenbroich, M.C., **Turrini, L.**, de Vito, G., Silvestri, L., Sancataldo, G., Pavone, F.S., “*Removing striping artifacts in light-sheet microscopy: a review*”, 2022, Progress in Biophysics and Molecular Biology, 168:52-65, doi: [10.1016/j.pbiomolbio.2021.07.003](https://doi.org/10.1016/j.pbiomolbio.2021.07.003).
- [7] Chicchi, L., Cecchini, G., Adam, I., de Vito, G., Livi, R., Pavone, F.S., Silvestri, L., **Turrini, L.**, Vanzi, F., Fanelli, D., “*Reconstruction scheme for excitatory and inhibitory dynamics with quenched disorder: application to zebrafish imaging*”, 2021, Journal of Computational Neuroscience, 49(2): 159-174, doi: [10.1007/s10827-020-00774-1](https://doi.org/10.1007/s10827-020-00774-1).
- [6] Meneghetti, N., Dedola, F., Gavryusev, V., Sancataldo, G., **Turrini, L.**, de Vito, G., Vanzi, F., Carpaneto, J., Cutrone, A., Pavone, F.S., Mazzoni, A., Micera, S., “*Direct activation of zebrafish neurons by ultrasonic stimulation revealed by whole CNS calcium imaging*”, 2020, Journal of Neural Engineering, 17(5):056033, doi: [10.1088/1741-2552/abae8b](https://doi.org/10.1088/1741-2552/abae8b).
- [5] de Vito, G., Ricci, P., **Turrini, L.**, Gavryusev, V., Tiso, N., Vanzi, F., Silvestri, L., Pavone, F.S., “*Effects of excitation light polarization on fluorescence emission in two-photon light-sheet microscopy*”, 2020, Biomedical Optics Express 11, 4651-4665, doi: [10.1364/BOE.396388](https://doi.org/10.1364/BOE.396388).
- [4] Gavryusev, V., Sancataldo, G., Ricci, P., Montalbano, A., Fornetto, C., **Turrini, L.**, Laurino, A., Pesce, L., de Vito, G., Tiso, N., Vanzi, F., Silvestri, L., Pavone, F.S., “*Dual-beam confocal light-sheet microscopy via flexible acousto-optic deflector*”, 2019, Journal of Biomedical Optics, 24:10, doi: [10.1117/1.JBO.24.10.106504](https://doi.org/10.1117/1.JBO.24.10.106504).
- [3] Sancataldo, G., Gavryusev, V., de Vito, G., **Turrini, L.**, Locatelli, M., Fornetto, C., Tiso, N., Vanzi, F., Silvestri, L., Pavone, F.S., “*Flexible multi-beam light-sheet fluorescence microscope for live imaging without striping artefacts*”, 2019, Frontiers in Neuroanatomy, 13:7, doi: [10.3389/fnana.2019.00007](https://doi.org/10.3389/fnana.2019.00007).
- [2] Müllenbroich, M.C., **Turrini, L.**, Silvestri, L., Alterini, T., Gheisari, A., Tiso, N., Vanzi, F., Sacconi, L., Pavone, F.S., “*Bessel beam illumination reduces random and systematic errors in quantitative functional studies using light-sheet microscopy*”, 2018, Frontiers in Cellular Neuroscience, 12:315, doi: [10.3389/fncel.2018.00315](https://doi.org/10.3389/fncel.2018.00315).
- [1] **Turrini, L.**, Fornetto, C., Marchetto, G., Müllenbroich, M.C., Tiso, N., Vettori, A., Resta F., Masi A., Mannaioni G., Pavone, F.S., Vanzi, F., “*Optical mapping of neuronal activity during seizures in zebrafish*”, 2017, Scientific Reports, 7:3025, doi: [10.1038/s41598-017-03087-z](https://doi.org/10.1038/s41598-017-03087-z).

Books

- [1] **Turrini, L.**, “*Development of optical methods for real-time whole-brain functional imaging of zebrafish neuronal activity*”, 2020, Premio Tesi di Dottorato, Firenze University Press, ISSN 2612-8039, ISBN 978-88-5518-069-6, doi: [10.36253/978-88-5518-070-2](https://doi.org/10.36253/978-88-5518-070-2).

Conference proceedings

- [5] de Vito, G.[†], **Turrini, L.**[†], Fornetto, C.[†], Ricci, P., Müllenbroich, M.C., Sancataldo, G., Trabalzini, E., Mazzamuto, G., Tiso, N., Fanelli, D., Silvestri, L., Vanzi, F., Pavone, F.S., “*Two-photon light-sheet microscopy for high-speed whole-brain functional imaging of zebrafish neuronal physiology and pathology*”, 2020, Proc. SPIE, Neurophotonics; doi: [10.1117/12.2560341](https://doi.org/10.1117/12.2560341).

† First author with equal contribution.

- [4] de Vito, G., Fornetto, C., Ricci, P., Müllenbroich, M.C., Sancataldo, G., **Turrini, L.**, Mazzamuto, G., Tiso, N., Sacconi, L., Fanelli, D., Silvestri, L., Vanzi, F., Pavone, F.S., “*Two-photon high-speed light-sheet volumetric imaging of brain activity during sleep in zebrafish larvae*”, 2020, Proc. SPIE 11226, Neural Imaging and Sensing, 1122604, doi: [10.1117/12.2542285](https://doi.org/10.1117/12.2542285).
- [3] Müllenbroich, M.C., Silvestri, L., **Turrini, L.**, Di Giovanna, A. P., Costantini, I., Mazzamuto G., Ricci, P., Vanzi, F., Sacconi, L., Nelson, C. J., Taylor, J., Pavone F. S., “*Techniques for*

methodical, optical and computational automation in light-sheet microscopy”, 2019, Imaging and Applied Optics 2019 (COSI), OSA Publishing Group, paper CW4A.1, doi: [10.1364/COSI.2019.CW4A.1](https://doi.org/10.1364/COSI.2019.CW4A.1).

- [2] Müllenbroich, M. C., Silvestri, L., **Turrini, L.**, Di Giovanna, A. P., Alterini, T., Gheisari, A., Ricci, P., Sacconi, L., Vanzi, F., Pavone F. S., “*High-fidelity imaging with Bessel-beam light-sheet microscopy for whole-brain structural and functional studies*”, 2017, Optics in the Life Sciences Congress, OSA Publishing Group, paper BrW4B.2, doi: [10.1364/BRAIN.2017.BrW4B.2](https://doi.org/10.1364/BRAIN.2017.BrW4B.2).
- [1] **Turrini, L.**, Alterini, T., Müllenbroich, C., Gheisari, A., Sacconi, L., Silvestri, L., Vanzi, F., Pavone F.S. “*Functional imaging of zebrafish neuronal activity by Bessel beam light-sheet microscopy*”, 2016, 18th Italian National Conference on Photonic Technologies (Fotonica 2016), IET Conference Publications, pp. 1-3, doi: [10.1049/cp.2016.0926](https://doi.org/10.1049/cp.2016.0926).

Conferences

Talks

- [5] “*Whole-brain neuronal dynamics during seizures in zebrafish*”, ZFIM 2019, 2nd Italian Zebrafish Meeting, Pisa (Italy), 2019.
- [4] “*Fluorescence measurements of neuronal activity during PTZ-induced seizures in zebrafish*”, Fotonica 2017, 19th Italian National Conference on Photonic Technologies, Padua (Italy), 2017.
- [3] “*Functional imaging of zebrafish neuronal activity by Bessel illumination-based SPIM*”, Fotonica 2017, 19th Italian National Conference on Photonic Technologies, Padua (Italy), 2017.
- [2] “*Functional imaging of zebrafish neuronal activity by Bessel illumination-based SPIM*”, ZFIM 2017, 1st Italian Zebrafish Meeting, Padua (Italy), 2017.
- [1] “*Functional imaging of zebrafish neuronal activity by Bessel illumination-based light-sheet microscopy*”, Fotonica 2016, 18th Italian National Conference on Photonic Technologies, Rome (Italy), 2016.

Posters

- [6] “*Optical mapping of neuronal activity during PTZ-induced seizures in zebrafish*”, ICOBSI, International Conference on Bio Sensing and Imaging, Florence (Italy), 2018.
- [5] “*Optical mapping of neuronal activity during PTZ-induced seizures in zebrafish*”, 11th FENS – Forum of Neuroscience, Berlin (Germany), 2018.
- [4] “*Optical mapping of neuronal activity in a zebrafish model of epilepsy*”, Neuroscience 2017, Society for Neuroscience’s 47th annual meeting, Washington (DC, USA), 2017
- [3] “*Imaging zebrafish neuronal activity with Bessel beam light-sheet microscopy*”, 10th European Zebrafish Meeting, Budapest (Hungary), 2017.
- [2] “*Optical method for neuronal activity mapping during seizures in zebrafish*”, 10th European Zebrafish Meeting, Budapest (Hungary), 2017.
- [1] “*Optical mapping of neuronal activity during seizures in zebrafish*”, ZFIM 2017, 1st Italian Zebrafish Meeting, Padua (Italy), 2017.

Service

Reviewer

I served as reviewer for the following Journals:

- Frontiers in Neuroscience
- Biomedicines (MDPI)
- Healthcare (MDPI)
- Biology (MDPI)
- Int. J. of Molecular Sciences (MDPI)
- Applied Sciences (MDPI)
- Cells (MDPI)

Memberships

2017-present Society for Neuroscience (SfN)

Third mission activity

- 2019 *“The rainbow in a glass: fluorescence from tonic water to neurons”*, ScienzEstate 2019, European Laboratory for Non-linear Spectroscopy, Sesto Fiorentino (Italy). Lab experiences, for families and kids, focused on fluorescence and its applications in neuroscience.
- 2015-2018 *“Fluorescence in biology”*, ScienzEstate, OpenLab, Sesto Fiorentino (Italy). Lab experience focused on fluorescence in living organisms, for families and kids.
- 2015 *“Fluorescence microscopy”*, F-Light – Firenze Light Festival, Palagio di Parte Guelfa, Florence (Italy). Lab experiences focused on fluorescence and its applications in microscopy, for high school students and families.

02/02/2023