# Dorotea Nardini

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## Summary

I am a PhD student at the European Laboratory for Non-Linear Spectroscopy (LENS), working on a project within the HyperProbe consortium, which aims to develop an intraoperative hyperspectral imaging system for glioma identification during brain surgery. My research involves setup characterization and data acquisition, alongside 3D volumetric reconstruction of the biochemical microenvironment in brain cancer samples using light-sheet fluorescence microscopy. These two imaging approaches are then compared to correlate hyperspectral signatures with 3D structural and biochemical information.
During my Master's thesis, I focused on developing an optical system that combines two-photon light-sheet microscopy and high-transmission microscopy to analyze the correlation between brain activity and heart rate variability in zebrafish larvae.
I am a passionate and driven student who enjoys working in the lab and improving experimental setups. While I am enthusiastic about expanding my knowledge across various branches of physics, my primary academic interests lie in optics and photonics, and their biomedical applications.

## Education

**LENS - European Laboratory for Non-Linear Spectroscopy** — Florence, Italy
*International Doctorate in Atomic and Molecular Photonics* — *Nov 2024 - present*

**Università degli Studi di Firenze** — Florence, Italy
*Master's degree in Physical and Astrophysical Sciences* — *Sept 2021 - June 2024*

- Final grade: 110/110 cum laude (GPA 29.85/30)
- Curriculum: Physics of the Matter
- Thesis' topic: Two-photon light-sheet and high transmission microscopy for uncovering heart-brain correlation in zebrafish larvae

**École normale supérieure Paris-Saclay** — Orsay, France
*Erasmus+ programme* — *Aug 2022 - Apr 2023*

- First of the class in all attended courses (GPA 17.7/20)
- Curriculum: M2 Molecular Nano Bio PHOTonics (MoNaBiPHOT)
- Laboratories: Mathematical and statistical methods: from big data to relevant information, Python programming for biological data analysis, Fluorescence in Biology

**Università degli Studi di Firenze** — Florence, Italy
*Bachelor's degree in Physics and Astrophysics* — *Sept 2018 - Oct 2021*

- Final grade: 110/110 cum laude (GPA 29.125/30)
- Thesis' topic: Study and characterization of an optical potential for ultracold atoms
- Elective courses: Laser applications, Techniques of detectors for ionizing radiation

## Experience

**Teaching Assistant** — Dec 2025 – present
*Physics tutoring for BSc courses* — *Florence, Italy*

**Member of the Organizing Committee, Lights of Tuscany 2025** — Sep 2024 – May 2025
*Organization and coordination of a Spring School in Photonics for undergraduate, graduate, and PhD students in Physics* — *Pisa & Florence, Italy*

**Internship at LuMIn laboratory (@ENS Paris-Saclay)** — Feb 2023 –Apr 2023
*Realisation of gold nanoparticles structures by holographically assisted polymeric templates* — *Gif sur Yvette, France*

**Private tutoring to university and high school students** — Oct 2018 – present
*Private lessons of Physics and Mathemathics*

**Internship at Museo Galileo** — June 2017 – July 2017
*Realisation of Physics-based games for children visitors of the museum* — *Florence, Italy*

## Technical Skills

During my Bachelor's I learned how to use LaTex, how to program in C, MatLab, and Mathematica (Bachelor's thesis). In my Master's program I improved my laboratory skills, working with spectroscopy techniques (Raman, Vis-IR), femtosecond, supercontinuum and semiconductor (VCSEL) lasers, fluorescence microscopy, and interferometry. I built an optical setup to create photonic cristals by olographically illuminating a negative photoresist (internship at LuMIn laboratory) and I improved a light-sheet microscope increasing the resolution and combining it with a high transmission microscopy setup (Master's thesis internship). I am also experienced with Python, Origin and Fiji (ImageJ).

## Languages

**Italian**: native speaker (C2) **English**: fluent (C1) **French**: conversational (B1/B2)

## Publications and Conference Papers

Versatile and comprehensive hyperspectral imaging tool for molecular neuronavigation: a case study on cerebral gliomas. *Journal of Biomedical Optics* (2025). doi:10.1117/1.JBO.30.12.126007

A Label-Free Hyperspectral Imaging Device for Ex Vivo Characterization and Grading of Meningioma Tissues. *Journal of Biophotonics* (2025). doi:10.1002/jbio.202500374

Hyperspectral Imaging System for Meningioma Grade Discrimination. *European Conferences on Biomedical Optics (ECBO)* (2025). doi:10.1364/ECBO.2025.Th2A.1

Advancing Neuroscience Diagnostics: A Hyperspectral Imaging System for Real-Time Biochemical Insights into Brain Tissue. *European Conferences on Biomedical Optics (ECBO)* (2025). doi:10.1364/ECBO.2025.Tu2A.25