NICOLA MAGHELLI

Senior Manager
Light Imaging Facility
Human Technopole

WORKING EXPERIENCE

2022-present:	**Senior Manager** (Light Imaging Facility) at the Human Technopole (HT), Milan
2017-2022:	**Facility Leader** (Advanced Imaging Facility) at the Max Planck Institute of Molecular Cell Biology and Genetics (MPI-CBG), Dresden
2012-2017:	**Project Leader** (staff scientist) in Eugene W. Myers group, at the Center for System Biology Dresden (CSBD), Dresden
2006-2012:	**Postdoctoral Researcher** in Iva Tolić-Nørrelykke, Ph. D. group, MPI-CBG, Dresden
2001-2006:	**PhD student** in the group of Prof. Othmar Marti, Ulm University

FACILITY MANAGEMENT EXPERIENCE

Since 2022 I am managing the Light Imaging Facility (LIF) at the HT. I was the first manager of the facility and under my supervision LIF started its operations, reaching now 180 registered users. LIF is supporting the whole light imaging at HT by offering the most advanced **commercially available microscopy technologies**. LIF also offers training to its users and organizes microscopy courses.
In 2017 I established the Advanced Imaging Facility (AIF) at MPI-CBG. The facility offered **cutting-edge non-commercial microscopes** to the users of the MPI-CBG and the Dresden Campus. The facility operated in a multi-user environment and offered a **lattice lightsheet** microscope and a **single objective lightsheet** microscope. The AIF also supported experimental groups developing their **custom** microscopes, both for what concerns the optics, the mechanics and the software. The AIF was tightly integrated in the research infrastructure of MPI-CBG, collaborating both with internal facilities and with other facilities in the Dresden campus. Moreover, AIF was chosen as the go-to place by **Leica** for developing a microscope prototype, which is now being commercialized.

RESEARCH EXPERIENCE

Since 2012 I worked as a project leader at CSBD, where I developed two custom selective plane illumination microscopes (**SPIM**). I have designed the mechanics and the optics,

including a long working distance, water immersion microscope objective and several custom doublets used in the relay optics. I have upgraded one of the microscopes with **adaptive optics** to compensate for sample-induced aberrations.
During my experience as a postdoc, I designed and built a **two-photon** microscope capable of **laser ablation** and equipped with **optical tweezers**. I designed the hardware, the optics, and the software controlling the system. The setup was used to study cytoskeletal forces in *Zebrafish* and yeast, eventually leading to the development of a model for the self-organization of dynein in *S. pombe.* In addition, the setup allowed for dissecting the role of centrosome in hippocampal rat neurons.

TECHNICAL EXPERTISE

Microscopes developed

- Single objective lightsheet (in collaboration with a commercial partner)
- Software for controlling the FLUCS prototype (in collaboration with a research group at MPI-CBG)
- Lattice lightsheet (part of the Advanced Imaging Facility at MPI-CBG)
- Lightsheet for organoids imaging (part of the Advanced Imaging Facility at MPI-CBG)
- Multiview scanning lightsheet (Developed for the Myers lab at CSBD)
- Single and two-photon Bessel beam scanning lightsheet (Developed for the Myers lab at CSBD)
- Two-photon microscope with integrated laser ablation and optical tweezers (Developed as a postdoctoral researcher in the Tolić group, MPI-CBG)
- Optical tweezers (Developed as a PhD student in the Marti group, University of Ulm)
- Differential atomic force microscope (Developed as a PhD student in the Marti group, University of Ulm)

Furthermore, I have been using and troubleshooting custom **scanning probe** microscopes (atomic force microscopes, scanning near-field microscopes) and I am familiar with virtually any kind of **fluorescence microscopy** technique (confocal, spinning disc confocal, TIRF, STORM, STED, etc.).

Optical and mechanical design
I have designed and built a **multi-immersion, long working distance objective** (20× 0.2 NA). The objective has been successfully used in two of the microscopes I have built. I have designed and built both the optics and the mechanics, as well as the equipment needed to align and test the objective (**autocollimator**).
I am familiar with **optical design** and optimization programs (OSLO, Zemax, etc.) and with **CAD programs** (Autodesk Inventor).

Programming skills
I have written the controlling software for one of the microscopes I have built (two-photon microscope with laser ablation and optical tweezers). The software, developed in **Labview**, allowed for a tight integration of image acquisition, laser ablation, and optical trapping.
I have written several device adapters for Micromanager using **C++**, as well as **Python** and **C** simulations for several optic problems (Bessel beam characterization, adaptive optics, etc.). I

have written simple ImageJ plugins in **Java** and ASCOM drivers for optomechanical devices in **Visual Basic** together with their **Arduino**-based firmware.

PUBLICATION LIST

1. Vinopal S, Dupraz S, Alfadil E, Pietralla T, Bendre S, Stiess M, Falk S, Camargo Ortega G, Maghelli N, Tolić IM, Smejkal J, Götz M, Bradke F. Centrosomal microtubule nucleation regulates radial migration of projection neurons independently of polarization in the developing brain **Neuron** 2023 111(8) doi: 10.1016/j.neuron.2023.01.020

2. Rapp G, Van Ingen C, Erben E, Maghelli N, Kreysing M, Huhn F. Focused light induced cytoplasmatic streaming (FLUCS): non-invasive microscopic flow fields and their applications **Biophysical Journal** 2022 121 (3), 426a

3. Stoev ID, Seelbinder B, Erben E, Maghelli N, Kreysing M. Highly sensitive force measurements in an optically generated, harmonic hydrodynamic trap **eLight** 2021 1 (1), 1-9

4. Erben E, Seelbinder B, Stoev I, Klykov S, Maghelli N, Kreysing M. Feedback-based positioning and diffusion suppression of particles via optical control of thermoviscous flows **Opt. Expr.** 2021 doi: OE.432935

5. Samajova O, Ticha M, Richter H, Ovecka M, Maghelli N, Hrbackova M, Dvořák P, Samaj J. Advanced microscopy reveals complex developmental and subcellular localization patterns of ANNEXIN 1 in Arabidopsis.
Front. Plant Sci. 2020 doi: 10.3389/fpls.2020.01153

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11. Coelho M, Maghelli N, Tolić-Nørrelykke IM. Single-molecule imaging in vivo: the dancing building blocks of the cell.
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PubMed PMID: 23525260

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PATENTS

1. Dynamic and high precision positioning of colloidal particles using thermoviscous flows (PCT/EP2021/071437)

2. Femtonewton-range force measurements in aqueous media via optically generated flows (PCT/EP2021/071392)