ALESSANDRO ZUNINO

CONTACT INFO

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ABOUT ME

I am a physicist with a deep interest in optics – both classical and quantum – and its applications to light shaping and imaging. I am currently acting as PostDoc within the laboratory of Dr. Giuseppe Vicidomini. My research efforts are currently dedicated to the development of a microscope exploiting non-classical properties of light and to the development of innovative image processing techniques.

RESEARCH

POST DOCTORAL FELLOW

February 2022 - Now

Istituto Italiano di Tecnologia (IIT) | *Genoa, Italy*

- Developed new image processing techniques for super-resolution microscopy.

Ph.D. FELLOW

November 2018 - January 2022

Istituto Italiano di Tecnologia (IIT) | *Genoa, Italy*

- Developed a new optical beam shaping tool for advanced material processing.
- Developed a new microscopy technique, built the instrument, and coded the control system.
- Performed mathematical modeling and quantitative analysis of data and images.

VISITING RESEARCHER

June 2016 - August 2016

Durham University | *Durham, UK*

- Performed experimental activities to investigate the mechanical properties of artificial tissues.

TEACHING

SUPERVISOR

March 2022 - Now

Istituto Italiano di Tecnologia (IIT) | *Genoa, Italy*

- Mentored and supervised an MSc student, now a Ph.D. student.

LECTURER

March 2023 - April 2023

University of Genoa - DIBRIS department | *Genoa, Italy*

- Lecturer of the Ph.D. course entitled *Optics for Microscopy and Spectroscopy*.

WINTER SCHOOL INSTRUCTOR

November 2021 - November 2022

Istituto Italiano di Tecnologia (IIT) | *Genoa, Italy*

- Instructor at the 6th and 7th edition of the *NIC@IIT Advanced Microscopy practical workshop*. Held theoretical lectures and practical demonstrations.

TEACHER ASSISTANT

April 2019 - July 2020

University of Genoa - Physics department | *Genoa, Italy*

- Taught classes and prepared exercises for first-year students as part of the course General Physics 1.

EDUCATION

MASTER OF SCIENCE IN PHYSICS

January 2016 - April 2018

University of Milan | *Milan, Italy*

- Grade: 110/110 with honors

BACHELOR OF SCIENCE IN PHYSICS

November 2012 - December 2015

University of Milan | *Milan, Italy*

- Grade: 110/110 with honors

PUBLICATIONS

Articles : The symbol † indicates equal contribution.

Colin J. R. Sheppard, Marco Castello, Giorgio Tortarolo, **Alessandro Zunino**, Eli Slenders, Paolo Bianchini, Giuseppe Vicidomini, and Alberto Diaspro. "Signal strength and integrated intensity in confocal and image scanning microscopy". In: *Journal of the Optical Society of America A* 40 (1 2023), p. 138. DOI: 10.1364/JOSAA.477240.

Alessandro Zunino, Marco Castello, and Giuseppe Vicidomini. "Reconstructing the Image Scanning Microscopy Dataset: an Inverse Problem". In: *arXiv* (2022). DOI: 10.48550/arXiv.2211.12510.

Giorgio Tortarolo†, **Alessandro Zunino**†, Francesco Fersini, Marco Castello, Simonluca Piazza, Colin J.R. Sheppard, Paolo Bianchini, Alberto Diaspro, Sami Koho, and Giuseppe Vicidomini. "Focus image scanning microscopy for sharp and gentle super-resolved microscopy". In: *Nature Communications* 13 (1 2022). DOI: 10.1038/s41467-022-35333-y.

Purnima N. Manghnani, Valentina Di Francesco, Carlo Panella La Capria, Michele Schlich, Marco Elvino Miali, Thomas Lee Moore, **Alessandro Zunino**, Martí Duocastella, and Paolo Decuzzi. "Preparation of anisotropic multiscale microhydrogels via two-photon continuous flow lithography". In: *Journal of Colloid and Interface Science* 608 (2022), pp. 622–633. DOI: 10.1016/j.jcis.2021.09.094.

Alessandro Zunino, Francesco Garzella, Alberta Trianni, Peter Saggau, Paolo Bianchini, Alberto Diaspro, and Martí Duocastella. "Multiplane Encoded Light-Sheet Microscopy for Enhanced 3D Imaging". In: *ACS Photonics* 8.11 (2021), pp. 3385–3393. DOI: 10.1021/acsphotonics.1c01401.

Martí Duocastella, Salvatore Surdo, **Alessandro Zunino**, Alberto Diaspro, and Peter Saggau. "Acousto-optic systems for advanced microscopy". In: *Journal of Physics: Photonics* 3.1 (2021), p. 012004. DOI: 10.1088/2515-7647/abc23c.

Salvatore Surdo, **Alessandro Zunino**, Alberto Diaspro, and Martí Duocastella. "Acoustically-shaped laser: a machining tool for Industry 4.0". In: *ACTA IMEKO* 9.4 (2020), p. 60. DOI: 10.21014/acta_imeko.v9i4.740.

Alessandro Zunino, Salvatore Surdo, and Martí Duocastella. "Dynamic Multifocus Laser Writing with Acousto-Optofluidics". In: *Advanced Materials Technologies* 4.12 (2019), pp. 1–7. DOI: 10.1002/admt.201900623.

Proceedings

Alessandro Zunino, Salvatore Surdo, and Martí Duocastella. "Design, implementation, and characterization of a fast acousto-optofluidic multi-focal laser system". In: *Fourteenth School on Acousto-Optics and Applications*. Ed. by Ireneusz Grulkowski, Bogumił B. J. Linde, and Martí Duocastella. SPIE, 2019, p. 23. DOI: 10.1117/12.2540976.

CONFERENCES

Invited contributions

Alessandro Zunino, Giorgio Tortarolo, Francesco Fersini, Giacomo Garrè, and Giuseppe Vicidomini. "Extending the Three-Dimensional Resolution with Focus-ISM". In: *Optica Biophotonics Congress: Optics in the Life Sciences*. 2023.

Oral contributions

Alessandro Zunino, Giorgio Tortarolo, Francesco Fersini, Colin J.R. Sheppard, Paolo Bianchini, Alberto Diaspro, and Giuseppe Vicidomini. "Focus-ISM: a universal tool to enhance optical sectioning in super-resolution microscopy". In: *Congresso Nazionale – Società Italiana di Fisica*. 2022.

Alessandro Zunino, Francesco Garzella, Alberta Trianni, Peter Saggau, Paolo Bianchini, Alberto Diaspro, and Martí Duocastella. "Parallelized Light-sheet Microscopy with Flexible and Encoded Illumination". In: *2021 Conference on Lasers and Electro-Optics Europe & European Quantum Electronics Conference (CLEO/Europe-EQEC)*. IEEE, 2021, pp. 1–1. DOI: 10.1109/CLEO/Europe-EQEC52157.2021.9541789.

Martí Duocastella, **Alessandro Zunino**, and Salvatore Surdo. "On-The-Fly Laser Beam Shaping With Acousto-Optofluidics". In: *2021 Conference on Lasers and Electro-Optics Europe & European Quantum Electronics Conference (CLEO/Europe-EQEC)*. IEEE, 2021, pp. 1–1. DOI: 10.1109/CLEO/Europe-EQEC52157.2021.9542393.

Alessandro Zunino, Francesco Garzella, Alberta Trianni, Peter Saggau, Paolo Bianchini, Alberto Diaspro, and Martí Duocastella. "Multi-plane encoded light-sheet microscopy with acousto-optics". In: *Photonics West – High-Speed Biomedical Imaging and Spectroscopy VI*. Ed. by Keisuke Goda and Kevin K. Tsia. SPIE, 2021, p. 29. DOI: 10.1117/12.2577559.

Alessandro Zunino, Francesco Garzella, Alberta Trianni, Peter Saggau, Paolo Bianchini, Alberto Diaspro, and Martí Duocastella. "Multi-plane Encoded Light-sheet Microscopy for Fast Volumetric Imaging". In: *Conference on Lasers and Electro-Optics*. OSA, 2021, AM3C.3. DOI: 10.1364/CLEO_AT.2021.AM3C.3.

Salvatore Surdo, **Alessandro Zunino**, Alberto Diaspro, and Martí Duocastella. "Rapid parallelization of tailored laser beams with acousto-optofluidics". In: *2020 International Conference Laser Optics (ICLO)*. IEEE, 2020, pp. 1–1. DOI: 10.1109/ICLO48556.2020.9285579.

Alessandro Zunino, Salvatore Surdo, and Martí Duocastella. "Parallelized Laser Writing with Acousto-Optofluidics". In: *International Congress on Applications of Lasers and Electro-Optics (ICALEO)*. LIA, 2019.

Alessandro Zunino, Salvatore Surdo, and Martí Duocastella. "Acousto-Optofluidic Multi-spot Generation for High-throughput Laser Material Processing". In: *Fourteenth School on Acousto-Optics and Applications*. SPIE, 2019.

Salvatore Surdo, **Alessandro Zunino**, Alberto Diaspro, and Martí Duocastella. "Acoustically shaped laser light as an enabling technology for Industry 4.0". In: *2019 II Workshop on Metrology for Industry 4.0 and IoT (MetroInd4.0&IoT)*. IEEE, 2019, pp. 360–364. DOI: 10.1109/METROI4.2019.8792853.

Posters

Giorgio Tortarolo, Simonluca Piazza, **Alessandro Zunino**, Andrea Bucci, Sabrina Zappone, Paolo Bianchini, Colin J.R. Sheppard, Alberto Diaspro, Eli Slenders, Marco Castello, and Giuseppe Vicidomini. "STED-ISM enables gentler and higher-contrast super-resolution imaging". In: *Focus on microscopy*. 2022.

ACHIEVEMENTS

Awards

- SPIE Photonics West conference - 2021:
  Best presentation award

Scholarships

- Durham University - 2016:
  Winner of a student research bursary