

Iacopo Mochi

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- EXPERIENCE**
- Beamline Scientist* April 2016 - Present
[Laboratory of Micro and Nanotechnology](#),
[Paul Scherrer Institut](#), Villigen, Switzerland
- Development of synchrotron-based instrumentation for EUV and soft X-ray metrology.
 - EUV Coherent Diffraction Imaging (CDI) microscopy.
 - EUV interference lithography.
- R&D Lithography Engineer* January 2015 - March 2016
[IMEC](#), Leuven, Belgium
- EUV aerial image and resist simulations with Hyperlith.
 - CD-SEM data analysis with ProDATA and Matlab.
- Home-based child care* October 2013 - December 2014
- I moved to Switzerland for family reasons and I stayed home to take care of my children.
- Project Scientist* January 2010 - September 2013
[Center for X-Ray Optics](#),
[Lawrence Berkeley National Laboratory](#), Berkeley, California
- Beamline scientist at the [Advanced Light Source \(ALS\)](#). Beamline 11.3.2 (EUV - Soft X rays).
 - Design and tolerancing of the illuminator optics for the [SEMATECH High-NA Actinic Reticle Review Project \(SHARP\)](#)
 - Design and optimization of the multilayer coating for the EUV reflective optics of SHARP.
 - Development and test of an ancillary visible light microscope for SHARP.
 - Design and tolerancing of optical systems for EUV and X-ray technical instrumentation.
- Physics Post-Doc* May 2008 - May 2010
[Center for X-Ray Optics](#),
[Lawrence Berkeley National Laboratory](#), Berkeley, California
- Upgrade and alignment of the [Actinic Inspection Tool \(AIT\)](#).
 - Aberration characterization for the AIT.
 - Image processing and phase retrieval algorithm development.
- Physics Post-Doc* February 2005 - April 2008
[Arcetri Infrared Group](#),
[Arcetri Astrophysical Observatory](#), Firenze, Italy.
- Tolerancing for the optics of [Giano](#), an infrared spectrometer for the TNG telescope.

- Optical assembly and alignment of Giano.
- Materials characterization at cryogenic temperature (CTE, index of refraction).

SKILLS

- Optical design and tolerancing using Optics Studio (Zemax).
- Optical design and tolerancing using SHADOW VUI.
- Optics assembling and testing.
- Interferometry in visible light, extreme ultra violet (EUV) and infrared.
- HV and UHV optical systems.
- Cryogenic optical systems.
- Zoneplate lenses. Off-axis optical systems.
- Fluorescence and Raman spectroscopy.
- LIDAR remote sensing.
- Image processing using Matlab.

EDUCATION

- *PhD*, Methods and Technologies for Environmental Monitoring. Università della Basilicata, Potenza, Italy. (2005).
Thesis: “Design of a fluorescence lidar for the monitoring of the aquatic environment (FLIDAR-SpOt).”
- *Master Degree*, Physics. (2001).
Università di Firenze, Firenze, Italy.

COURSES

- “Advanced Optical Design with Zemax” at Optima Research Ltd. (2003).
- “Innovative microscopy for biotechnologies” at Università degli studi di Firenze (2001).

BACKGROUND

I began my scientific career in 2001 shortly after receiving a degree in physics at the university of Florence. I took a fellowship of the Italian National Research Council for the development of laser remote sensing techniques, where I started acquiring experience in the field of optical spectroscopy, laser sources and light detectors. The next year I started working in the F-LIDAR (Fluorescence LIDAR) group at the [CNR-Applied Research Institute “Nello Carrara”](#). There I was a collaborator in the design and development of several LIDAR (Light Detection And Ranging) systems for the remote sensing of the sea and the atmosphere and I carried out several tests and measurement campaigns. In addition to the technical experience gained dealing with these systems, this activity allowed me to take part in every step of a scientific instrument’s development, from the discussion of scientific motivation, through the design and realization of the system to the final tests in the field. I also became familiar with data handling and reduction techniques such as multivariate and principal components analysis, digital filtering, and image processing using mainly MatLab and R.

In 2003 I attended the course “Advanced Optical design with Zemax” at Optima Research Ltd. And since then I have been using Zemax to design, model and align optical systems. I also had the opportunity to get some experience in the use of CodeV, another widely used optical modeling software.

In February 2005 I obtained a PhD in Methods and Technologies for Environmental Monitoring with a thesis on the design and development of the optical system of a LIDAR sensor for aquatic environment. This gave me the opportunity to gain experience with telescope systems, photonic devices and spectroscopy. In addition

I was able to interact with a cross-disciplinary team addressing topics ranging from chemistry and biology to optical engineering and physics.

Pushed by sheer curiosity I delved into the study of super-luminal effects and I collaborated to a couple of studies on Bessel beams and X-waves propagation.

In 2005 I joined the [Arcetri Astrophysical Observatory](#). I was in charge of the development, assembly and testing of the optics and opto-mechanics of [Giano](#), a near infrared spectrograph for the Italian National Telescope Galileo. In this job the challenge of dealing with a complex optical system was made more interesting by the fact that the instrument had to work in a cryogenic environment. I performed the tolerance analysis to assess the theoretical constraints on the positioning of the optical elements. I have been involved in several tasks ranging from mechanical tests, cryogenic characterization of materials and devices, optical alignment and optical design development and evaluation. This activity allowed me to exploit my previous knowledge of optics and spectroscopy and to gain new experience in the field of infra-red astronomical instrumentation.

In the meantime I collaborated with the metrology centre of the [National Institute of Applied Optics](#) for the characterization of special glass refraction index in cryogenic environment. I developed the cryogenic set-up of the measurements and I designed a special cryostat to host the samples.

In 2008 I joined the [Center for X-Ray Optics \(CXRO\)](#) at [Lawrence Berkeley National Laboratory \(LBNL\)](#) as a Physicist Post-Doc Fellow. I have been involved in the [Sematech Berkeley Actinic Inspection Tool \(AIT\)](#) project. I was responsible for shared operation of the AIT, an EUV mask inspection microscope. This included interacting with research sponsors and customer industries to define strategy and details about specific experiments and long-term projects, recommend, develop, and conduct original experiments to expand knowledge base. My main focus has been the analysis of EUV aerial images and the development of aberration control algorithms and alignment procedures.

In 2010 I was hired as a project scientist at CXRO. I worked as a beamline scientist at BL11.3.2 at the [Advanced Light Source](#) and I began my work on the [SHARP](#) project. SHARP is an EUV microscope dedicated to photolithographic mask inspection funded by [SEMATECH](#), a consortium of firms working on integrated devices. I realized the optical design of the microscope and its ancillary optical systems. I have been in charge of the alignment and testing of the optical components and assemblies and, after the commissioning of SHARP, I interacted with the users to develop customized experimental procedures and to perform image data analysis and interpretation.

In 2015, I joined [imec](#) as a R&D lithography engineer in the Advanced Patterning group and I worked on sub-resolution assist features for Node 5 and Node 7 structures on EUV photomasks. My job included simulations and experimental validation of test structures.

In 2016 I moved to Switzerland and joined the [Paul Scherrer Institut](#) as a beamline scientist at the Swiss Light Source (SLS). Here I am working on the development of synchrotron-based instrumentation and techniques for EUV interference lithography and soft X-Ray metrology based on coherent diffraction imaging.

COMPUTER SKILLS

Languages & Software: Matlab, Zemax, Python, C++, Sage, Javascript, POV-Ray.
Operating Systems: OSX, Windows, Unix.

LANGUAGES Italian (native).
English (fluent).

PUBLICATIONS A complete list of my publications can be accessed on my [website](#).

If you are interested in learning more about me, please visit my [website](#) and feel free to contact me by email.