

Marta Lazzaretti

Curriculum Vitæ

Research Interests

- Inverse Problems in Imaging
- Optimization Algorithms
- Microscopy Imaging Problems

Current Position

20/11/2023– Present **Ingénieur d'études**, *I3S Lab-CNRS, Sophia Antipolis*, Project: Gridless methods for inverse problems, Supervisor: Luca Calatroni

Education

11/2020–10/2023 **PhD student - Joint PhD in Applied Mathematics between Università di Genova and Université Côte d'Azur**, *DIMA - Università di Genova, I3S Lab (Sophia Antipolis) - Université Côte d'Azur*, Supervisors: Luca Calatroni (UCA) and Claudio Estatico (UniGe), Project: Optimisation algorithms in non-standard Banach spaces for inverse problems in imaging

- May/June 2022 - **Visiting PhD student at University of Cambridge**. NoMADS Secondment, Cambridge Image Analysis group, DAMTP. Project: 3D Single Molecule Localisation Microscopy with on-the-grid and off-the-grid approaches. Supervisors: Leila Muresan, Jerome Boulanger, Yury Korolev
- November 2022/August 2023 - **PhD research visit at I3S Lab. - Université Côte d'Azur** in the framework of the Joint PhD program to pursue the double degree

2018–2020 **Master degree in Applied Mathematics**, *Università di Genova*, 110/110 cum Laude

- Master thesis: Continuous relaxation of sparse ℓ_0 optimisation problems in fluorescence microscopy with Poisson data. Supervisors: Luca Calatroni (UCA) and Claudio Estatico (UniGe)
- March/July 2020 - **Master 2 Internship Project at I3S Lab. - Université Côte d'Azur** in Sophia Antipolis. Supervisor: Luca Calatroni (UCA).

2015–2018 **Bachelor degree in Mathematics**, *Università di Genova*, 110/110 cum Laude

- Bachelor thesis: RSA cryptosystem. Supervisor: Prof. Maria Evelina Rossi
- September/December 2017 - **Erasmus exchange semester at University College Cork**. Bachelor degree in Mathematics: 6 modules of 5 ECTS each, passed with First Class Honours

Teaching experience

02-06/2023 **Tutor (50h)**, *DIMA, Università di Genova*, Genova
Tutoring for the course *Statistica Descrittiva* of Bachelor degrees in *Matematica* and *Statistica Matematica e Trattamento Informatico dei Dati*.

01/2023 **Exercise classes (6h)**, *Università di Bologna*, Bologna
Exercise classes and Python labs for the Advanced Methods for Mathematical Image Analysis PhD winter school (Course: Smooth and non-smooth optimisation for imaging applications)

- 10-12/2022 **Teaching assistant (30h)**, *DIME, Università di Genova*, Genova
Teaching assistant (*supporto alla didattica*) for the course Calculus 1 of Bachelor degree in *Ingegneria gestionale*.
- 01/2022 **Exercise classes (8h)**, *Université Côte d'Azur, Sophia Antipolis*
Exercise classes (TD) for the Master 2 course *Inverse problems in image processing*. Preparation of Python notebooks and corrections of students' reports.
- 11/2020–
04/2021 **Teaching assistant (40h)**, *DIMA, Università di Genova*, Genova
Teaching assistant (*supporto alla didattica*) for the courses Calculus 1, Algebra 1, Linear algebra and analytic geometry of Bachelor degrees in *Matematica, Fisica* and *Statistica Matematica e Trattamento Informatico dei Dati*.

Publications

Conferences' Proceedings

Stochastic Gradient Descent for Linear Inverse Problems in Variable Exponent Lebesgue Spaces, *Lazzaretti, M., Kereta, Z., Estatico, C., Calatroni, L.*, Scale Space and Variational Methods in Computer Vision. SSVM 2023. Lecture Notes in Computer Science, vol 14009. Springer, Cham.

A continuous, non-convex and sparse super-resolution approach for fluorescence microscopy data with Poisson noise, *Lazzaretti M., Calatroni L., Estatico C.*, ICCSA 2021. IEEE CPS

A Scaled and Adaptive FISTA Algorithm for Signal-Dependent Sparse Image Super-Resolution Problems, *Lazzaretti M., Rebegoldi S., Calatroni L., Estatico C.*, Scale Space and Variational Methods in Computer Vision. SSVM 2021. Lecture Notes in Computer Science, vol 12679. Springer, Cham.

Weighted-CEL0 sparse regularisation for molecule localisation in super-resolution microscopy with Poisson data, *M. Lazzaretti, L. Calatroni, C. Estatico*, IEEE ISBI 2021

Journal papers

Modular-proximal gradient algorithms in variable exponent Lebesgue spaces, *Lazzaretti M., Calatroni L., Estatico C.*, SIAM Journal on Scientific Computing, Vol.44, Iss.6 (2022)

Dual descent regularization algorithms in variable exponent Lebesgue spaces for imaging, *Bonino B., Estatico C., Lazzaretti M.*, Springer Numerical Algorithms, Vol. 92 (2023)

Conferences & workshops & seminars

2023

- Nov. 21-22 **Off-the-grid and continuous methods for optimization and inverse problems in imaging workshop**, *Invited speaker*, Paris, France
- Nov. 16 **PRIMO Talks**, *Seminar*, virtual
- Sep. 4-8 **11th Applied Inverse Problems Conference**, *Invited speaker at the Modelling and optimisation in non-Euclidean settings for inverse problems minisyposium*, Gottingen, Germany
- July 5-7 **3rd Alps-Adriatic Inverse Problems Workshop 2023 (AAIP 2023)**, *talk*, Klagenfurt, Austria
- June 28 **Image Processing seminars at University of Graz**, *Seminar*, Graz, Austria, (virtual)
- June 5-9 **CANA 23: Challenges and Advances in Numerical Analysis**, *talk*, Cagliari, Italy

- May 21-25 **SSVM 2023: 9th Scale Space and Variational Methods in Computer Vision**, *poster presentation*, Sardinia, Italy
- Feb.6 **MIVA PhD winter school: advanced methods for mathematical image analysis**, *Invited seminar*, Bologna, Italy, (virtual)
- Feb.1-3 **Mathematics and Image Analysis conference**, *poster presentation*, Berlin, Germany
[2022](#)
- Sep.26-30 **SIAM MDS22: SIAM Conference on Mathematics of Data Science**, *Invited speaker at the Algorithmic Advances in Imaging Inverse Problems minisymposium*, San Diego, USA
- Sep.12-14 **MIA-MIVA workshop**, *talk*, Sophia-Antipolis, France
- Aug.30-Sep.2 **ODS 2022: International Conference on Optimisation and Decision Science**, *Invited speaker at the Numerical Optimization for Data Analysis and Imaging minisymposium*, Firenze, Italy
- June 16 **MathWorks**, *Seminar*, Cambridge, UK
- June 15 **MRC Laboratory of Molecular Biology**, *Seminar*, Cambridge, UK
- June 8 **Cambridge Analysis Imaging Center**, *Seminar*, Cambridge, UK
- April 8 **Cambridge Image Analysis group meeting**, *Seminar*, Cambridge, UK, (virtual)
[2021](#)
- Nov.29-Dec.3 **Micro-blind startup meeting**, *talk*, CIRM, Luminy, France
- Oct. 11-13 **PRIMO Workshop 2021**, *talk*, Bologna, Italy, (hybrid)
- Sep. 13-17 **YAMC 2021: First Young Applied Mathematicians Conference**, *talk*, Leuca, Italy
- Aug.30-Sep.3 **SIMAI 2020+2021: congress of the Italian Society of Industrial and Applied Mathematics**, *Invited speaker at the Mathematics of Machine Learning minisymposium*, Parma, Italy, (hybrid)
- May 17-19 **SSVM 2021: Eight Scale Space and Variational Methods in Computer Vision**, *poster presentation*, Cabourg, France, (virtual)
- April 13-16 **IEEE ISBI 2021: International Symposium on Biomedical Imaging**, *poster presentation*, Nice, France, (virtual)
[Conference organisation](#)
- 2022 Co-organiser of the **Young Applied Mathematicians Conference**, Arenzano (Genova, Italy), 18th-22nd September 2022

Grants & Scientific Projects

- 2023 **National Project INdAM – GNCS 2023**. Research project: Tecniche numeriche per lo studio dei problemi inversi e l'analisi delle reti complesse. Responsible: Caterina Fenu. Role: Participant.
- 2022 **National Project INdAM – GNCS 2022**. Research project: Metodi e modelli di regolarizzazione per problemi mal posti di grandi dimensioni. Responsible: Alessandro Buccini. Role: Participant.
- 09/2022 **SIAM Student Travel Award**, SIAM Conference on Mathematics of Data Science 2022 (MDS22), San Diego
- 08/2022 **Verizon Connect Italy grant for young female researcher**, International Conference on Optimization and Decision Science 2022, Firenze

02/2022 **Travel financial support for early career researchers**, to attend **LMS Invited Lectures on the Mathematics of Deep Learning**, Isaac Newton Institute, Cambridge

Memberships

GNCS Gruppo Nazionale per il Calcolo Scientifico, Istituto Nazionale Di Alta Matematica
PRIMO Post graduate Researchers in Inverse problems, Machine learning and Optimization

Computational skills

Basic R, SAS, C++
Good MATLAB, Python, L^AT_EX

Languages

Italian Mother tongue
English Fluent
French Intermediate

C1 level (First FCE certificate passed with grade A in June 2014)

B1 level course completed

Autorizzo il trattamento dei dati personali contenuti nel mio curriculum vitae in base all'art. 13 del D. Lgs. 196/2003 e all'art. 13 GDPR 679/16.

November 22, 2023, Genova
Marta Lazzaretti