

Federica Porta

Curriculum vitae

Born in Reggio Emilia on 21/12/1987

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Positions

- From 01/11/2024 **Associate Professor**, *Department of Physics, Computer Science and Mathematics*, University of Modena and Reggio Emilia, Italy.
- 01/10/2018 – 31/10/2024 **Research assistant**, *Department of Physics, Computer Science and Mathematics*, University of Modena and Reggio Emilia, Italy.
- 01/03/2015 – 16/09/2016 **Research fellow on “Optimization methods for dynamical systems”**, *Department of Mathematics and Computer Science*, University of Ferrara, Italy.

Education

- February 2015 **PhD in Applied Mathematics**, *Multiscale, Modelling, Computational Simulations and Characterization in Material and Life Sciences School of Graduate Studies*, University of Modena and Reggio Emilia.
Thesis: Novel steplength approaches for differentiable and nondifferentiable optimization.
Supervisors: Prof. Luca Zanni, Dr. Marco Prato.
- September 2011 **Master Degree in Mathematics**, University of Modena and Reggio Emilia.
Thesis: Approcci duali alla ricostruzione di immagini attraverso variazione totale.
Supervisors: Prof. Luca Zanni, Dr. Marco Prato.
- October 2009 **Laurea in Matematica**, University of Modena and Reggio Emilia.
Thesis: Approssimazione di un problema differenziale legato al calcolo di onde gravitazionali.
Supervisor: Prof. Daniele Funaro.
- July 2006 **High School graduation**, *Liceo Classico L. Ariosto*, Reggio Emilia, Italy.

Conferences

- September 4 - 6, 2024 **Optimization Techniques for Inverse Problems**, *OIP2024*, Modena, Italia.
Invited talk “Line search based stochastic gradient methods for learning applications”.

- June 30 - July 3, 2024 **33rd European Conference on Operational Research, EURO2024**, Copenhagen, Denmark.
Invited talk "On stochastic first order optimization methods for deep learning applications".
- June 14 - 20, 2023 **4th International Conference on Numerical Computations: Theory and Algorithms, NUMTA 2023**, Pizzo Calabro, Italy.
Invited talk "Variable metric proximal stochastic gradient algorithms for deep learning optimization".
- May 3 - 5, 2023 **International Conference on Optimization and Learning**, Malaga, Spain.
Contributed talk "Diagonal Barzilai-Borwein rules in stochastic gradient-like methods".
- September 1 - 2, 2022 **International Conference on Optimization and Decision Science, ODS 2022**, Firenze, Italy.
Contributed talk "Proximal stochastic gradient methods with variable learning rate and dynamical variance reduction".
- July 20 - 23, 2021 **SIAM Conference on Optimization, SIOP 2021**.
Invited talk "Stochastic variance reduced gradient methods with variable learning rate and dynamical variance reduction".
- July 15 - 19, 2019 **International Congress on Industrial and Applied Mathematics, ICIAM 2019**, Valencia, Spain.
Contributed talk "Analysis of steplength rules in gradient projection methods for constrained optimization".
- September 13 - 16, 2016 **SIMAI 2016**, Milano, Italy.
Contributed talk "A variable metric proximal-gradient method with extrapolation".
- June 19 - 25, 2016 **Numerical Computations: Theory and Algorithms 2016, NUMTA 2016**, Pizzo Calabro, Italy.
Contributed talk "Region-of-interest tomography: a nonsmooth regularization approach based on shearlets".
- February 2 - 4, 2016 **Convegno Gruppo Nazionale per il Calcolo Scientifico, GNCS 2016**, Montecatini, Italy.
Invited talk "Lipschitz independent first-order methods for nondifferentiable optimization".
- June 17 - 20, 2015 **New Trends in Numerical Analysis, NETNA 2015**, Falerna, Italy.
Contributed talk "A variable metric inertial method for convex optimization".
- May 25 - 29, 2015 **Applied Inverse Problems, AIP 2015**, Helsinki, Finland.
Contributed talk "A convergent alternating-block iterative scheme for least-squares regularized blind deconvolution".
- December 15 - 17, 2014 **IFIP TC7.4 Workshop on Inverse Problems and Imaging**, Mülheim a.d. Ruhr, Germany.
Contributed talk "Lipschitz independent steplength techniques for proximal algorithms".
- August 26 - 28, 2014 **Inverse Problems from Theory to Application, IPTA 2014**, Bristol, UK.
Poster presentation "Novel steplength possibilities for proximal-type algorithms".

- May 12 - 15, 2014 **International Conference on Inverse Problems in Engineering, ICIPE 2014**, Cracow, Poland.
Contributed talk "Accelerated gradient projection algorithm for sparse channel estimation: an application in underwater communications".
- June 26 - 28, 2013 **Europt Workshop on Advances in Continuous Optimization, EUROPT 2013**, Università di Firenze, Firenze, Italia.
Contributed talk "Filtering effect of first-order methods for linear least squares".
- May 22, 2013 **New Computational Methods for Inverse Problems, NCMIP 2013**, Ecole Normale Supérieure de Cachan, Cachan, France.
Contributed talk "Filter factor analysis of scaled gradient methods for linear least squares".

Periods abroad

- 01/01/2014 - 31/03/2014 **Visiting student**, *Université Libre de Bruxelles (ULB)*, Département de Mathématique, Bruxelles, Belgium.
Collaboration with Prof. Ignace Loris on the research project "Optimization methods for inverse problems in imaging applications".
- 21/09/2015 - 25/09/2015 **Visiting postdoc**, *Université Libre de Bruxelles (ULB)*, Département de Mathématique, Bruxelles, Belgium.

Awards

- Selection of the publication "A. Cornelio, F. Porta, M. Prato and L. Zanni 2013, Inverse Problems 29, 125013" for the Inverse Problems Highlights Collection 2013
- Selection of the publication " S. Bonettini, I. Loris, F. Porta, M. Prato and S. Rebegoldi 2017, Inverse Problems 33, 055005" for the Inverse Problems Highlights Collection 2017.
- Assignment of the Italian National Scientific Qualification as Associate Professor in the field 01/A5 - Numerical Analysis (Call for Candidates 2018).
- Assignment of the Italian National Scientific Qualification as Full Professor in the field 01/A5 - Numerical Analysis (Call for Candidates 2023).

Research grants (principal investigator)

- 2013 GNCS call for young researchers: Accelerated first-order methods for constrained optimization.
- 2014 GNCS call for young researchers: Lipschitz-independent descent methods for non-differentiable optimization.
- 2020 INDAM - GNCS Research project: "Optimization for machine learning and machine learning for optimization".
- 2022 PRIN PNRR: Advanced optimization METHods for automated central vein Sign detection in multiple sclerosis from magneTic resonAnce imaging (AMETISTA).

Research projects supports

- PhD Projects SPINNER 2013: High-complexity inverse problems in biomedical applications and social systems (IPBioSS).
- 2014 UNIMORE Mobility Actions: Numerical solution for Ill-posed Inverse Problems arising in Image Processing Applications.
- 2012 FIRB Future in Research: Learning meets time: a new computational approach for learning in dynamic systems.

Teaching activity

Courses at the University of Modena and Reggio Emilia

- A.Y. 2024 - 2025 **Analisi Numerica**, *Corso di Laurea in Matematica*.
2023 - 2024
2022 - 2023
- A.Y. 2024 - 2025 **Analisi Numerica e Statistica**, *Corso di Laurea in Ingegneria Informatica (Mantova)*.
2023 - 2024
2022 - 2023
2020 - 2021
- A.Y. 2023 - 2024 **Inexact and stochastic optimization methods for big data applications**, *Ph.D. in Mathematics*.
- A.Y. 2022 - 2023 **Optimization methods for machine learning**, *Ph.D. in Mathematics*.
- A.Y. 2020 - 2021 **Variational methods for imaging**, *Ph.D. in Mathematics*.
- A.Y. 2019 - 2020 **Variational methods for imaging and machine learning**, *Ph.D. in Mathematics*.
- A.Y. 2018 - 2019 **Fondamenti di Analisi**, *Corso di Laurea in Ingegneria Informatica (Mantova)*.
- A.Y. 2016 - 2017 **Matematica Applicata**, *Corso di Laurea in Ingegneria Gestionale*.
- A.Y. 2015 - 2016 **Matematica**, *Corso di Laurea in Marketing e Organizzazione di Impresa*.
2016 - 2017
- A.Y. 2013 - 2014 **Matematica Applicata (tutor)**, *Corso di Laurea in Ingegneria Gestionale*.
2014 - 2015
2015 - 2016
- A.Y. 2013 - 2014 **Meccanica Razionale (tutor)**, *Corso di Laurea in Ingegneria Meccatronica*.
2014 - 2015
2015 - 2016

Degree thesis advisor

- A.A. 2023 - 2024 **Il metodo del gradiente stocastico con una applicazione ad un problema di classificazione binaria**, *Bachelor's Degree in Mathematics*, University of Modena and Reggio Emilia, Università di Modena e Reggio Emilia.
- A.A. 2023 - 2024 **Metodi per l'approssimazione di autovalori e relative applicazioni**, *Bachelor's Degree in Mathematics*, University of Modena and Reggio Emilia, Università di Modena e Reggio Emilia.
- A.Y. 2022 - 2023 **Interpolazione tramite funzioni B-splines con un'applicazione all'approssimazione di orbite**, *Bachelor's Degree in Mathematics*, University of Modena and Reggio Emilia.
- A.Y. 2022 - 2023 **Metodo del gradiente stocastico e applicazione ad un problema di classificazione**, *Bachelor's Degree in Mathematics*, University of Modena and Reggio Emilia.
- A.Y. 2022 - 2023 **Approcci di tipo Runge-Kutta per scalare la direzione di ricerca nei metodi del gradiente**, *Bachelor's Degree in Mathematics*, University of Modena and Reggio Emilia.

Degree thesis co-advisor

- A.Y. 2019 - 2020 **Strategie di Line Search e di selezione del passo nei metodi del gradiente per l'ottimizzazione non vincolata**, *Bachelor's Degree in Mathematics*, University of Modena and Reggio Emilia.
- A.Y. 2012 - 2013 **Metodi del primo ordine a memoria limitata per l'ottimizzazione con vincoli**, *Bachelor's Degree in Mathematics*, University of Modena and Reggio Emilia.
- A.Y. 2012 - 2013 **Metodi del gradiente accelerati per problemi di ottimizzazione non vincolata**, *Bachelor's Degree in Mathematics*, ,, University of Modena and Reggio Emilia.

Reggio Emilia, 11/12/2024