

CURRICULUM VITAE
Silvia Bonettini

Birth: Modena, june 9th 1975
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Academic career:

01/01/2019-present	<u>Associate professor</u> (permanent position) in Numerical Analysis at the Department of Physics, Computer Science and Mathematics, University of Modena and Reggio Emilia
01/01/2017-31/10/2019	<u>Researcher</u> (permanent position) in Numerical Analysis at the Department of Physics, Computer Science and Mathematics, University of Modena and Reggio Emilia
01/11/2008 - 31/12/2016	<u>Researcher</u> (permanent position) in Numerical Analysis at the Department of Mathematics and Computer Science, University of Ferrara
01/08/2008-31/10/2008	<u>Fellowship</u> in Numerical Analysis at the Department of Pure and Applied Mathematics, University of Modena and Reggio Emilia (supervised by prof. Luca Zanni, research topic <i>Constrained optimization methods for image restoration</i>)
03/04/2006 - 02/04/2007	<u>Post-doc position</u> in Numerical Analysis at the Department of Mathematics, University of Ferrara (supervised by prof. Valeria Ruggiero, research topic <i>Newton Interior point methods for Large scale Nonlinear programming problems</i>)
01/03/2005 - 28/02/2006	<u>Post-doc position</u> in Numerical Analysis at the Department of Pure and Applied Mathematics, University of Modena and Reggio Emilia (supervised by prof. Emanuele Galligani, research topic <i>Parallel computing in large scale nonlinear optimization</i>)

Education:

PhD in Mathematics, thesis in Numerical Analysis *Newton interior-point methods for large scale nonlinear constrained optimization*, February 28th 2005, University of Modena and Reggio Emilia.
Master in Mathematics thesis in Numerical Analysis *Analisi teorica e sperimentale delle funzioni wavelet*, September 26th 2001, University of Modena and Reggio Emilia, mark 110/110.

Awards:

1. Italian National Scientific Qualification as Associate Professor in the field 01/A5 - Numerical Analysis, call 2021.
2. Selection of the paper S. Bonettini, I. Loris, F. Porta, M. Prato and S. Rebegoldi 2017, Inverse Problems 33, 055005, in the 'Inverse Problems Highlights Collection 2017';
3. Italian National Scientific Qualification as Associate Professor in the field 01/A5 - Numerical Analysis, call 2016.
4. Selection of the paper M. Prato, A. La Camera, S. Bonettini, M. Bertero, 2013, A convergent blind deconvolution method for post-adaptive-optics astronomical imaging, Inverse Problems, 29(6), 065017, in the "Inverse Problems Insights 2013 - summaries of the excellent interdisciplinary work published in Inverse Problems".
5. Selection of the paper S. Bonettini, M. Prato, Nonnegative image reconstruction from sparse Fourier data: a new deconvolution algorithm, Inverse Problems, 26(9), 095001, in the "Inverse Problems Highlights of 2010", due to the scientific quality and interest for the community.
6. Selection of the paper S. Bonettini, R. Zanella, L. Zanni, A scaled gradient projection method for constrained image deblurring, Inverse Problems, 25(1), 2009, 015002 in the

"Inverse Problems Highlights of 2009", due to the scientific quality and interest for the community.

Research grants as investigator:

1. PRIN2022, local investigator of the Modena and Reggio Emilia research unit, grant 2022ANC8HL, *Inverse Problems in the Imaging Sciences (IPIS)*;
2. University of Modena and Reggio Emilia FAR project 2019, *Numerical methods for computational and data science*, principal investigator;
3. FIRB "Futuro in Ricerca" 2012, local investigator of the Ferrara research unit, grant RBFR12M3AC, *Learning meets time: a new computational approach for learning in dynamical systems*(unit foundings: 273000 Euro).
4. GNCS 2009, Principal investigator, *Optimization methods for image reconstruction and inverse problems with sparsity constraints* (foundings: 2000 Euro).

Research grants as participant:

1. GNCS2024: *Modelli con rango basso e algoritmi di ottimizzazione per l'analisi dati*, (PI Margherita Porcelli, Università di Bologna);
2. GNCS2023: *Metodi di ottimizzazione data-driven: nuove prospettive teoriche e pratiche*, (PI Giorgia Franchini, Università di Modena e Reggio Emilia);
3. GNCS2022: *Ottimizzazione adattiva per il machine learning*, (PI Simone Rebegoldi, Università di Modena e Reggio Emilia);
4. IEA-CNRS2020: International Emerging Action (IEA) CNRS project VaMOS - Variable-Metric and inexact sparse Optimisation for Super-resolution fluorescence microscopy, PI: prof. Luca Calatroni, Université Sophia Antipolis, Nice, France;
5. H2020/ECSEL-JU: *Intelligent motion control under Industry 4.E (IMOCO4.E)*, (Coordinatore locale Marko Bertogna, Università di Modena e Reggio Emilia);
6. GNCS2020: *Ottimizzazione Numerica in Image Restoration and Reconstruction*, (PI Damiana Lazzaro, Università di Bologna);
7. ISCRA B2020: Darknet per la segmentazione semantica, (PI Marko Bertogna, Università di Modena e Reggio Emilia);
8. POR FESR Regione Lombardia 2020: CEMP - Connected Electric Modular Powertrain, (PI Marko Bertogna, Università di Modena e Reggio Emilia);
9. GNCS2019: *Metodi avanzati di ottimizzazione non lineare per l'elaborazione di immagini*, (PI Germana Landi, Università di Bologna);
10. GNCS2018: *Metodi di ottimizzazione stocastica per problemi di apprendimento automatico a larga scala*, (PI Luca Zanni, Università di Modena e Reggio Emilia);
11. GNCS2017: *Metodi numerici per problemi di ottimizzazione vincolata di grandi dimensioni e applicazioni*, (PI Luca Bergamaschi, Università di Padova);
12. GNCS2016: *Nuove frontiere dell'ottimizzazione non differenziabile nei problemi inversi*, (PI Marco Prato, Università di Modena e Reggio Emilia);
13. GNCS2015: *Metodi numerici per l'ottimizzazione non convessa o non regolare e applicazioni*, (PI Valentina De Simone, Seconda Università di Napoli);
14. GNCS2014: *Metodi di ottimizzazione del prim'ordine per l'analisi e la ricostruzione di immagini*, (PI Daniela di Serafino Seconda Università di Napoli);
15. GNCS2013: *Metodi numerici e software per l'ottimizzazione su larga scala con applicazioni all'immagine processing*, (PI Daniela di Serafino, Seconda Università di Napoli);

16. Spinner 2013, progetto regionale di dottorato di ricerca: *Applicazioni in ambito biomedico e sociosanitario di problemi inversi di grande complessità*.
17. PRIN2008 *Optimization methods and software for inverse problems*, (PI Valeria Ruggiero, Università di Ferrara);
18. PRIN2006-2006018748: *Problemi inversi in Medicina e Astronomia*, (PI Mario Bertero, Università di Genova).
19. COFIN2004: *Metodi numerici e software matematico per le applicazioni*, (PI Luigi Brugnano Università di Firenze);
20. FIRB2001/RBAU01877P *Apprendimento statistico: teoria, algoritmi e applicazioni*, (PI Alessandro Verri, Università di Genova);
21. FIRB2001/RBAU01JYPN *Parallel Algorithms and Numerical Nonlinear Optimization*, (PI Valeria Ruggiero, Università di Ferrara).

Research groups:

- Gruppo SIMAI–OPTIMA, *Ottimizzazione, Tecnologia, Industria, Metodi & Applicazioni* (2026–);
- Gruppo UMI–MIVA, *Mathematics for Imaging, Vision and their Applications* (2020–);
- Gruppo Nazionale per il Calcolo Scientifico (GNCS) - Istituto Nazionale di Alta Matematica “Francesco Severi” (INdAM) (2004–);
- Optimization Algorithms and Software for Inverse Problems (OASIS) (www.oasis.unimore.it) (2008–);
- IFIP - Working Group 7.4 Inverse Problems and Imaging (www.ifip.org) (2014–).

Publications:

Journal articles

- [1.1] S. Bonettini, C. Parenti, M. Prato, 2026, PnP-IPA: A Provably Convergent Plug-and-Play Inexact Proximal Algorithm for Nonconvex Imaging Problems, submitted;
- [1.2] S. Bonettini, G. Franchini, F. Porta, M. Prato, 2026, Global Convergence of Inexact Proximal Gradient Methods for Bilevel Learning and Imaging Applications, submitted;
- [1.3] S. Bonettini, G. Franchini, D. Pezzi, M. Prato, 2025, Linesearch-enhanced forward-backward methods for inexact nonconvex scenarios, *SIAM Journal of Imaging Sciences*, **18**(2), 1314-1343;
- [1.4] S. Bonettini, L. Calatroni, D. Pezzi, M. Prato, 2025, Algorithmic unfolding for image reconstruction and localization problems in fluorescence microscopy, *IMA Journal of Applied Mathematics*, **90**(5), 465-487;
- [1.5] S. Aleotti, S. Bonettini, M. Donatelli, M. Prato, S. Rebegoldi, 2025, A nested primal-dual iterated Tikhonov method for regularized convex optimization, *Computational Optimization and Applications*, 2025, **91**(2), 357-395, 113192;
- [1.6] S. Bonettini, M. Prato, S. Rebegoldi, 2024, A new proximal heavy ball inexact line-search algorithm, *Computational Optimization and Applications*, **88**, 525-565;
- [1.7] S. Bonettini, P. Ochs, M. Prato, S. Rebegoldi, 2023, An abstract convergence framework with application to inertial inexact forward-backward methods, *Computational Optimization and Applications*, **84**(2), 319-362;
- [1.8] S. Bonettini, G. Franchini, D. Pezzi, M. Prato, 2023, Explainable bilevel optimization: An application to the Helsinki deblur challenge, *Inverse Problems and Imaging*, **17**(5), 925-950;
- [1.9] S. Bonettini, D. Pezzi, M. Prato, S. Rebegoldi, 2023, On an iteratively reweighted linesearch based algorithm for nonconvex composite optimization, *Inverse Problems*, **39**(6), pp. 1-42;

- [1.10] S. Bonettini, M. Prato, S. Rebegoldi, 2022, A nested primal-dual FISTA-like scheme for composite convex optimization problems, *Computational Optimization and Applications*, **84**(1), 85-123;
- [1.11] S. Bonettini, F. Porta, V. Ruggiero, L. Zanni, 2021, Variable metric techniques for forward-backward methods in imaging, *Journal of Computational and Applied Mathematics*, **385**, 113192;
- [1.12] S. Bonettini, M. Prato, S. Rebegoldi, 2021, New convergence results for the inexact variable metric forward-backward method, *Applied Mathematics and Computation*, **392**, 125719;
- [1.13] S. Bonettini, M. Prato, S. Rebegoldi, 2020, Convergence of inexact forward-backward algorithms using the forward-backward envelope, *SIAM Journal on Optimization*, **30**(4), 3069-3097;
- [1.14] S. Bonettini, S. Rebegoldi, V. Ruggiero, 2018, Inertial variable metric techniques for the inexact forward-backward algorithm, *SIAM Journal on Scientific Computing*, **40**(5), A3180-A3210;
- [1.15] S. Bonettini, M. Prato, S. Rebegoldi, 2018, A block coordinate variable metric linesearch based proximal gradient method, *Computational Optimization and Applications*, **71**(1), 5-52;
- [1.16] T.A. Bubba, F. Porta, G. Zanghirati, S. Bonettini, 2018, A nonsmooth regularization approach based on shearlets for Poisson noise removal in ROI tomography, *Applied Mathematics and Computation*, **318**, 131-152;
- [1.17] T.A. Bubba, D. Labate, G. Zanghirati, S. Bonettini, 2018, Shearlet-based regularized reconstruction in region-of-interest computed tomography, *Mathematical Modelling of Natural Phenomena*, **13**(4), 34;
- [1.18] S. Bonettini, I. Loris, F. Porta, M. Prato, S. Rebegoldi, 2017, On the convergence of a linesearch based proximal-gradient method for nonconvex optimization, *Inverse Problems*, **33**(5), 055005;
- [1.19] S. Bonettini, A. Benfenati, V. Ruggiero, 2016, Scaling techniques for epsilon-subgradient methods, *SIAM Journal on Optimization*, **26**(3), 1741-1772;
- [1.20] S. Bonettini, F. Porta, V. Ruggiero, 2016, A variable metric forward-backward method with extrapolation, *SIAM Journal on Scientific Computing*, **38**(4), A2558-A2584;
- [1.21] S. Bonettini, I. Loris, F. Porta, M. Prato, 2016, Variable metric inexact line-search based methods for nonsmooth optimization, *SIAM Journal on Optimization*, **26**, 891-921;
- [1.22] S. Bonettini, M. Prato, S. Rebegoldi, 2016, A cyclic block coordinate descent method with generalized gradient projections, *Applied Mathematics and Computation*, **286**, 288-300;
- [1.23] S. Bonettini, A. Chiuso, M. Prato, 2015, A scaled gradient projection method for Bayesian learning in dynamical systems, *SIAM Journal on Scientific Computing*, **37**(3), A1297-A1318;
- [1.24] S. Bonettini, M. Prato, 2015, New convergence results for the scaled gradient projection method, *Inverse Problems*, **31**(9), 095008;
- [1.25] M. Prato, A. La Camera, S. Bonettini, S. Rebegoldi, M. Bertero, P. Boccacci, 2015, A blind deconvolution method for ground based telescopes and Fizeau interferometers, *New Astronomy*, **40**, 1-13;
- [1.26] S. Bonettini, V. Ruggiero, 2014, An alternating extragradient method with non Euclidean projections for saddle point problems, *Computational Optimization and Applications*, **59**(3), 511-540;
- [1.27] S. Bonettini, M. Prato, 2014, Accelerated gradient methods for the X-ray imaging of solar flares, *Inverse Problems*, **30**(5), 055004;

- [1.28] S. Bonettini, A. Cornelio, M. Prato, 2013, A new semi-blind deconvolution approach for Fourier-based image restoration: an application in astronomy, *SIAM Journal on Imaging Science*, **6**(3), 1736-1757;
- [1.29] M. Prato, A. La Camera, S. Bonettini, M. Bertero, 2013, A convergent blind deconvolution method for post-adaptive-optics astronomical imaging, *Inverse Problems*, **29**(6), 065017;
- [1.30] S. Bonettini, G. Landi, E. Loli Piccolomini, L. Zanni, 2013, Scaling techniques for gradient projection-type methods in astronomical image deblurring, *International Journal of Computer Mathematics*, **90**(1), pp. 9-29;
- [1.31] S. Bonettini, V. Ruggiero, 2012, Analysis of Interior Point methods for edge preserving removal of Poisson noise, *Quaderni di Matematica*, **27**, pp. 67-91;
- [1.32] S. Bonettini, V. Ruggiero, 2012, On the convergence of primal-dual hybrid gradient algorithms for total variation image restoration, *Journal of Mathematical Imaging and Vision*, **44**(3), 236-253;
- [1.33] S. Bonettini, 2011, Inexact block coordinate descent methods with application to the non-negative matrix factorization, *IMA Journal of Numerical Analysis*, **31**(4), 1431-1452;
- [1.34] S. Bonettini, V. Ruggiero, 2011, An alternating extragradient method for total variation based image restoration from Poisson data, *Inverse Problems*, **27**(9), 095001;
- [1.35] S. Bonettini, M. Prato, 2010, Nonnegative image reconstruction from sparse Fourier data: a new deconvolution algorithm, *Inverse Problems*, **26**(9), 095001;
- [1.36] S. Bonettini, T. Serafini, 2009, Nonnegatively constrained image deblurring with an inexact interior point method, *Journal of Computational and Applied Mathematics*, **231**(1), 236-248;
- [1.37] S. Bonettini, R. Zanella, L. Zanni, 2009, A scaled gradient projection method for constrained image deblurring, *Inverse Problems*, **25**(1), 015002;
- [1.38] S. Bonettini, V. Ruggiero, F. Tinti, 2007, On the solution of indefinite systems arising in nonlinear optimization, *Numerical Linear Algebra with Applications*, **14**(10), 807-831;
- [1.39] S. Bonettini, F. Tinti, 2007, A nonmonotone semismooth inexact Newton method, *Optimization Methods and Software*, **22**(4), pp. 637-657;
- [1.40] S. Bonettini, E. Galligani, V. Ruggiero, 2007, Inner solvers for interior point methods for large scale nonlinear programming, *Computational Optimization and Applications*, **37**(1), 1-34;
- [1.41] S. Bonettini, V. Ruggiero, 2007, Some iterative methods for the solution of a symmetric indefinite KKT system, *Computational Optimization and Applications*, **38**, 3-25;
- [1.42] S. Bonettini, 2006, Metodi di tipo Newton interior point in ottimizzazione vincolata non-lineare di grandi dimensioni, *Bollettino della Unione Matematica Italiana*, **9**(2), 207-210;
- [1.43] S. Bonettini, 2005, A nonmonotone inexact Newton method, *Optimization Methods and Software*, **20**(4-5), 475-491;
- [1.44] S. Bonettini, E. Galligani, V. Ruggiero, 2005, An inexact Newton method combined with Hestenes multiplier's scheme for the solution of Karush-Kuhn-Tucker systems, *Applied Mathematics and Computation*, **168**(1), 651-676;
- [1.45] S. Bonettini, E. Galligani, V. Ruggiero, 2004, Hestenes method for symmetric indefinite systems in interior-point method, *Rendiconti di Matematica, Serie VII*, **24**, 185-199.

Book chapter

- [2.1] S. Bonettini, F. Porta, M. Prato, S. Rebegoldi, L. Zanni, V. Ruggiero, 2019, Recent advances in variable metric first-order methods, Springer INdAM Series, **36**, 1-31.

Referred proceedings

- [3.1] S. Bonettini, G. Franchini, D. Pezzi, M. Prato 2022, Learning the Image Prior by Unrolling an Optimization Method, *EUSIPCO 2022*, Belgrado 29/08-2/09, 952–956;
- [3.2] S. Rebegoldi, S. Bonettini, M. Prato 2020, Efficient block coordinate methods for blind Cauchy denoising, *Lecture Notes in Computer Science*, **11973** LNCS, 198-211;
- [3.3] S. Rebegoldi, S. Bonettini, M. Prato 2018, A Bregman inexact linesearch-based forward-backward algorithm for nonsmooth nonconvex optimization, *Journal of Physics: Conference Series*, **1131**(1), 012013M;
- [3.4] T.A. Bubba, F. Porta, G. Zanghirati, S. Bonettini 2016, The ROI CT problem: a shearlet based regularization approach, *Journal of Physics: Conference Series*, **756**(1), 012009;
- [3.5] M. Prato, S. Bonettini, I. Loris, F. Porta, S. Rebegoldi 2016, On the constrained minimization of smooth Kurdyka-Lojasiewicz functions with the scaled gradient projection method, *Journal of Physics: Conference Series*, **756**(1), 012001;
- [3.6] S. Rebegoldi, S. Bonettini, M. Prato 2015, Application of cyclic block generalized gradient projection methods to Poisson blind deconvolution, *23rd European Signal Processing Conference, EUSIPCO 2015*, 7362378, 225-229;
- [3.7] T.A. Bubba, D. Labate, G. Zanghirati, S. Bonettini, B. Goossens 2015, Shearlet-based regularized ROI reconstruction in fan beam computed tomography, *Proceedings of SPIE - The International Society for Optical Engineering*;
- [3.8] M. Prato, A. La Camera, S. Bonettini, M. Bertero 2015, The scaled gradient projection method: an application to nonconvex optimization, *Proceedings of PIERS 2015*, 2332-2336;
- [3.9] S. Bonettini, A. Benfenati, V. Ruggiero 2014, Primal-dual first order methods for total variation image restoration in presence of Poisson noise, *Proceedings of the IEEE International Conference on Image Processing 2014*, October 27-30 2014, Paris, France, 4156-4160;
- [3.10] M. Prato, S. Bonettini, A. La Camera, S. Rebegoldi 2014, Alternating minimization for Poisson blind deconvolution in astronomy, *Proceedings of the Inverse Problems from Theory to Applications Conference (IPTA 2014)*, 148-152, ISBN 9780750311069;
- [3.11] M. Prato, A. La Camera, S. Bonettini 2014, An alternating minimization method for blind deconvolution from Poisson data, *Journal of Physics: Conference Series*, **542**, 012006;
- [3.12] A. Cornelio, S. Bonettini, M. Prato 2013, An image reconstruction method from Fourier data with uncertainties on the spatial frequencies, *Journal of Physics: Conference Series*, **464**, 012008;
- [3.13] S. Bonettini, M. Prato 2010, A novel gradient projection approach for Fourier-based image restoration, *AIP conference proceedings*, **1281**, ICNAAM 2010: International Conference on Numerical Analysis and Applied Mathematics 2010, Rhodes, Greece, 19-25 September 2010, pp. 527-530;
- [3.14] S. Bonettini, V. Ruggiero 2010 On the Uniqueness of the Solution of Image Reconstruction Problems with Poisson Data, *AIP conference proceedings*, **1281**, ICNAAM 2010: International Conference on Numerical Analysis and Applied Mathematics 2010, Rhodes, Greece, 19-25 September 2010, pp. 1803-1806;
- [3.15] L. Sambo, J. B. Stephen, S. Bonettini, G. Zanghirati, and F. Frontera 2009, Improving the angular resolution of coded aperture instruments using a modified Lucy-Richardson algorithm for deconvolution, *SISSA (Trieste), proceedings of the conference The Extreme sky: Sampling the Universe above 10 keV*, Otranto, 13-19 Ottobre 2009;
- [3.16] S. Bonettini, F. Benvenuto, R. Zanella, L. Zanni, M. Bertero 2009, Gradient approaches for optimization problems in image deblurring and denoising, *EUSIPCO 2009, proceedings of the 17th European Signal Processing Conference*, 2009, pp.1384-1388;
- [3.17] S. Bonettini, R. Zanella, L. Zanni, M. Bertero 2008, Accelerated gradient methods for constrained image deblurring, *Journal of Physics, Conference Series*, **135**, 012022;

- [3.18] S. Bonettini 2007, Some preconditioned conjugate gradient algorithms for the solution of equality constrained quadratic programming problems, *Communications to SIMAI Congress*, **2**;
- [3.19] S. Bonettini, V. Ruggiero, F. Tinti 2006, On the solution of indefinite systems arising in nonlinear optimization, *Communications to SIMAI Congress*, ISSN 1827-9015, DOI: 10.1685/CSC06025.

Software:

1. iPila, inertial Proximal inexact linesearch algorithm: a Matlab software implementing a forward-backward method with heavy-ball extrapolation
<http://www.oasis.unimore.it/site/home/software.html>;
2. SFBEM, Scaled Forward-Backward Method with Extrapolation: a Matlab software for Poisson images deconvolution
<http://www.oasis.unimore.it/site/home/software.html>;
3. CSGP, Cyclic Scaled Gradient Projection Method: a Matlab and IDL software for blind image deconvolution
<http://iopscience.iop.org/0266-5611/29/6/065017/media>;
4. VMILA, Variable Metric Inexact Line-search Algorithm: a Matlab software implementing an inexact forward-backward method
<http://www.oasis.unimore.it/site/home/software.html>;
5. AEM, Alternating Extragradient Method: a Matlab software for Poisson image restoration with Total Variation Regularization
<http://www.unife.it/prin/software>;
6. *A collection of optimal control problems*: an optimal control test problems package coded in Fortran90 and AMPL, http://dm.unife.it/~bonettini/ip_pcg/controllo.htm;
7. BLKFCLT: a FORTRAN90 software for the factorization of quasidefinite matrices, <http://dm.unife.it/blkfelt>;
8. IP-PCG: a C++ software with AMPL interface, including a library for sparse matrices, for the solution of constrained nonlinear programming problems, http://dm.unife.it/~bonettini/ip_pcg.htm. This software is registered at the Italian Society of Authors and Editors (SIAE).

Bibliometric indexes

Scopus: 59 documents, h-index 16, 1136 citations.

ISI WoS: 52 documents, h-index 16, 1010 citations.

Invited talks:

1. *Linesearch-enhanced Forward-Backward methods for inexact nonconvex scenarios*, Mathematics and Image Analysis 2025, Paris, 13-15/01/2025;
2. *Unrolling techniques for learning image prior: a non deep approach*, XXII convegno UMI, Pisa, 4-9/08/2023;
3. *Forward-backward methods for convex and nonconvex optimization in imaging*, Workshop Calcolo Scientifico e Modelli Matematici: alla ricerca delle cose nascoste attraverso le cose manifeste, Roma, 6-8/04/2022;
4. *Optimization methods for inverse problems in imaging: new results and challenges*, Workshop Advanced optimisation methods for inverse problems and applications to image microscopy, Firenze 22-23/11/2021;
5. *New convergence results for forward-backward for nonconvex optimization*, SIMAI2020-21, 31/08-03/09/2021;
6. *Forward-backward methods: new results and perspectives*, SIAM-OP2021, 19-23/07/2021;

7. *Inexact variable metric forward-backward methods for convex and nonconvex optimization*, AIP, Grenoble, 8-12/07/2019;
8. *Inexact variable metric proximal gradient methods with line-search for convex and non-convex optimization*, Workshop Computational Methods for Inverse Problems in Imaging, 16-18/07/2018;
9. *Inexact variable metric forward-backward methods for convex and nonconvex optimization*, SIAM Conference on Imaging Science, Bologna, 05-08/06/2018;
10. *Inexact forward-backward methods for inverse imaging problems*, NCMIP 2017, Cachan (France), 12/05/2017;
11. *From gradient projection to forward-backward methods for variational inverse problems*, nell'ambito del Colloquium presso Institut für Numerische und Angewandte Mathematik - Universität Göttingen (Germany), 11/04/2017;
12. *Variable metric forward-backward methods for convex and nonconvex optimization*, Workshop Shape, images, optimization, Muenster (Germania), 28/02 - 03/03/2017;
13. *Practical approaches for the variable metric selection in forward-backward methods*, OIP Workshop, Modena, 19-21/09/2016;
14. *Primal-dual first order methods for Total Variation image restoration in presence of Poisson noise*, IEEE International Conference on Image Processing, Parigi, 27-30/10/2014, (Special Session *Advances in Optimization for Inverse-Imaging Problems*);
15. *Variable metric first order methods for smooth and nonsmooth optimization*, Workshop Optimization and dynamical processes in statistical learning and inverse problems, Fondazione Mediaterraneo, Sestri Levante (GE), 8-12/09/2014;
16. *On the convergence of primal-dual hybrid gradient algorithms for convex optimization*, First Workshop on Optimization for Image and Signal Processing, Ecole Polytechnique, Paris-Palaiseau, 18-20/11/2013;
17. *Optimization methods for image reconstruction problems*, Università di Firenze, Seminario permanente di Ottimizzazione, 10/12/2010;
18. *Numerical optimization methods for image restoration problems*, Università di Ferrara, 3/11/2009;
19. *Interior-point methods as inexact Newton methods*, Arizona State University, (USA), 22/04/2004;
20. *Il metodo di Hestenes nella classe dei metodi di Newton del punto interno inesatti*, Università di Catania, 30/09/2002;
21. *Programmazione matematica: i metodi interior-point*, Università di Messina, 01/10/2002.

Contributed talks:

1. *Primal-dual hybrid gradient algorithms for image restoration*, SIMAI 2012, Torino, 25-28/06/2012;
2. *An alternating extragradient method for total variation based image restoration from Poisson data*, 15th Austrian-French-German conference on Optimization, Toulouse, 19-23/09/2011;
3. *Un metodo extragradiente per la ricostruzione di immagini mediante regolarizzazione con la funzione di Variazione Totale*, Convegno UMI 2011, Bologna, 12-17/09/2011;
4. *Gradient projection approaches for Nonnegative Matrix Factorization*, Inverse Problems and Application, Workshop in honour of prof. Mario Bertero, Università di Genova, 02/02/2011.
5. *On the Uniqueness of the Solution of Image Reconstruction Problems with Poisson Data*, ICNAAM 2010: International Conference on Numerical Analysis and Applied Mathematics 2010, Rhodes, Greece, 19-25/09/2010;

6. *Gradient projection approaches for optimization methods in image deblurring and denoising*, 17th European Signal Processing Conference, Glasgow, 24-28/08/2009.
7. *Image Deblurring and Denoising: Gradient Projection Approaches*, convegno nazionale GNCS, Montecatini Terme, 3-5 Febbraio 2009.
8. *Accelerated gradient methods for constrained image deblurring*, convegno ICIPE (International Conference on Inverse Problems in Engineering: Theory and Practice), Dourdan, France, 15-19/06/2008.
9. *Scaled Gradient Projection Approaches to Image Deblurring*, workshop Optimization Techniques for Inverse Problems, Modena, 28-29/04/2008.
10. *On the solution of indefinite systems arising in nonlinear optimization*, SIMAI 2006, Baia Samuele, 22-26/05/2006.
11. *Some iterative methods for the solution of a symmetric indefinite KKT system*, convegno High Performance Software for Nonlinear Optimization Status of Perspective, Ischia 18-20/06/2004;
12. *Metodo di Newton inesatto per sistemi KKT*, convegno nazionale GNCS, Montecatini Terme, 9-11/02/2004;
13. *A nonmonotone inexact Newton method*, convegno Numerical Methods for local and global optimization: sequential and parallel algorithms, Cortona, 13-19/07/2003;

Posters:

1. A. Benfenati, S. Bonettini, V. Ruggiero, *A scaled ϵ -subgradient method*, Optimization Techniques for Inverse Problems III, Modena, 19-21/09/2016 (co-author);
2. T. A. Bubba, F. Porta, G. Zanghirati, S. Bonettini, *The ROI CT problem: a shearlet-based regularization approach*, 6th International Workshop on New Computational Methods for Inverse Problems, Cachan, 20/05/2016 (co-author);
3. S. Rebegoldi, S. Bonettini, A. La Camera, M. Prato, *An alternating minimization method for blind deconvolution in astronomy*, Computational Harmonic Analysis, Marseille (France), 20-24/10/2014 (co-author);
4. A. Cornelio, S. Bonettini, M. Prato, *An image reconstruction method from Fourier data with uncertainties on the spatial frequencies*, 3rd International Workshop on New Computational Methods for Inverse Problems, Cachan (Francia), 22/05/2013 (co-author);
5. S. Bonettini, *A cyclic block coordinate gradient projection algorithm*, Optimization Techniques for Inverse Problems 2, Modena, 20-21/09/2012 (author);
6. A. Cornelio, S. Bonettini, M. Prato, *Semi-blind deconvolution for Fourier-based image restoration*, Optimization Techniques for Inverse Problems 2, Modena, 20-21/09/2012 (co-author);
7. M. Prato, S. Bonettini, *Image reconstruction from nonuniform Fourier data*, 15th Austrian-French-German Conference on Optimization, Toulouse, 19-23/09/2011 (co-author);
8. S. Bonettini, M. Prato, V. Ruggiero, R. Zanella, G. Zanghirati, L. Zanni, *Image reconstruction in astronomy, medicine and microscopy*, Secondo Meeting Borsa della Ricerca, Bologna, 18-20/05/2011 (author);
9. S. Bonettini, M. Prato, V. Ruggiero, R. Zanella, G. Zanghirati, L. Zanni, *Learning from examples: methodologies and software*, Secondo Meeting Borsa della Ricerca, Bologna, 18-20/05/2011 (co-author).

Courses and summer schools:

1. *Mathematics and Image Analysis*, Institut Henri Poincaré, Paris, 16-18/01/2012;

2. *Yet another journey through computation*, Genova, 20/06/2011;
3. *Matematica, forme, immagini*, Genova, 18-19/03/2010;
4. *Short course: A vademecum of pattern recognition techniques with applications to image and video analysis*, Ferrara, 19-20/01/2009;
5. *The second international School in Computational Cell Biology: Computational Methods in Multiscale Processes for Protein Interactions*, Modena, 4-6/09/2006;
6. *38th Workshop of the International School of Mathematics "G. Stampacchia": Variational Analysis and Applications*, Erice, 21/06-01/07/2003.
7. *Ecole des ondes: direct and inverse scattering problems*, 27-31/01/2003, INRIA, Rocquencourt (France);
8. *Wavelets and applications*, 10-17/09/2002, prof. Christine de Mol, Università di Genova;
9. *11 Scuola estiva di Calcolo Parallelo*, 8-19/07/2002, CINECA, Casalecchio di Reno, BO;
10. *Giornate studio su Splines, Refinability, Subdivision*, Messina, 13-14/03/2002.

Conference organization

1. *Optimization Techniques for Inverse Problems, OIP2024*, Modena, 4-6/09/2024 (comitato organizzatore);
2. *Optimization Techniques for Inverse Problems, OIP2020/21*, Modena, 6-7/09/2021 (comitato organizzatore);
3. *New Computational Methods for Inverse Problems (NCMIP) 2019*, Cachan (France), 24 Maggio 2019 (comitato scientifico);
4. *New Computational Methods for Inverse Problems (NCMIP) 2018*, Cachan (France), 25 Maggio 2018 (comitato scientifico);
5. *Optimization Techniques for Inverse Problems, OIP2016*, Modena, 19-21/09/2016 (comitato organizzatore);
6. *Optimization Techniques for Inverse Problems, OIP2012*, Modena, 20-21/09/2012 (comitato organizzatore);
7. *Optimization Techniques for Inverse Problems, OIP2008*, Modena, 28-29/04/2008 (comitato organizzatore).

Peer reviewer for the following journals:

SIAM Journal on Optimization, SIAM Journal on Imaging Science, Inverse Problems, Journal of Optimization Theory and Applications, Journal of Scientific Computing, Journal of Mathematical Imaging and Vision, Optimization Methods and Software, Computational Optimization and Applications, IEEE Journal of Selected Topics in Signal Processing, IEEE Transactions on Signal Processing, European Journal of Operational Research, Journal of Computational and Applied Mathematics, Data mining and Knowledge Discovery, Applied Mathematics and Computation, Calcolo, Applied and Numerical Mathematics, Mediterranean Journal of Mathematics.

Periods abroad:

Arizona State University di Tempe, AZ, USA, professor Hans D. Mittelmann, april - may 2004.

Teaching activity

Università di Modena e Reggio Emilia:

1. Introduction to Scientific Python, s.s.d. MAT/08, Laurea Magistrale in Matematica, 25/26;

2. Convex Analysis and Optimization, s.s.d. MAT/05, Laurea Magistrale in Matematica, 20/21, 21/22, 22/23, 23/24, 24/25, 25/26;
3. Ottimizzazione Numerica, s.s.d. MAT/08, Laurea Triennale in Matematica, 19/20, 20/21, 21/22, 22/23, 23/24;
4. Elaborazione Numerica di Segnali e Immagini, s.s.d. MAT/08, Laurea Magistrale in Matematica, 17/18, 18-19, 19/20, 20/21, 21/22, 22/23, 23/24, 24/25, 25/26;
5. Calcolo Numerico, s.s.d. MAT/08, Laurea Triennale in Matematica, 19/20, 22/23, 23/24;
6. Calcolo Numerico, s.s.d. MAT/08, Laurea Triennale in Fisica, 20/21, 21/22;
7. Calcolo Numerico, s.s.d. MAT/08, Laurea Triennale in Informatica, 18/19, 19/20, 24/25, 25/26;

Università di Ferrara:

1. Analisi Numerica I, s.s.d. MAT/08, Laurea Triennale in Matematica, 09/10, 11/12, 13/14, 14/15, 16/17;
2. Laboratorio di Calcolo Numerico, s.s.d. MAT/08, Laurea Triennale in Matematica, 08/09;
3. Analisi Numerica, s.s.d. MAT/08, Laurea Magistrale In Ingegneria Civile, 10/11, 11/12;
4. Calcolo Numerico, s.s.d. MAT/08, Laurea Magistrale in Ingegneria Meccanica, 10/11, 11/12.
5. Calcolo Numerico, s.s.d. MAT/08, Laurea Specialistica/Magistrale in Ingegneria Informatica e dell'Automazione e Ingegneria Elettronica e delle Telecomunicazioni, 05/06, 06/07, 07/08, 08/09, 09/10, 10/11;
6. Informatica di Base, s.s.d. INF/01, Facoltà di Economia, 05/06, 06/07, 07/08;
7. Sistemi di Elaborazione delle Informazioni, s.s.d. INGINF/05, Facoltà di Economia, 05/06, 06/07, 07/08;

Thesis advisor

During my career, I have been the supervisor for over 30 bachelor's and 25 master's theses in mathematics.

PhD thesis supervision

- *Mathematical models of cognition: from active inference to clinical applications*, Riccardo Maramotti, Dottorato in Matematica, Università di Parma, Modena e Reggio Emilia, Ferrara, XXXVIII ciclo, 20 february 2026.
- *Learning Variational Models via Bilevel Optimization and Unfolded Algorithms*, Danilo Pezzi, Dottorato in Matematica Università di Parma, Modena e Reggio Emilia, Ferrara, XXXVI ciclo, 10 april 2024;
- *Variable metric line-search based methods for nonconvex optimization*, Simone Rebegoldi, Dottorato in Matematica Università di Parma, Modena e Reggio Emilia, Ferrara, XXIX ciclo, 4 april 2017.

PhD thesis reviewer:

- *Variational methods for data decomposition*, 2026, Laura Girometti, Dottorato in Matematica, XXXVIII ciclo, Università di Bologna. Reviewer;
- *Some Strategies Addressing Non-Convex Variational Problems in Image Processing*, 2024, Gabriele Scrivanti, Ecole doctorale 580 Sciences et Technologies de l'Information et de la Communication (STIC), Université Paris-Saclay, Paris; Spécialité de doctorat: Sciences du traitement du signal et des images. Reviewer and member of the examination committee.
- *Tensor-Train decomposition for image classification problems*, 2022, Domitilla Brandoni, Dottorato in Matematica, Università di Bologna, XXXIV ciclo. Member of the examination committee.

- *Wavelet-based denoising for Poisson noise corrupted images*, 2012, Chiara Olivieri, Dottorato in Informatica, Università di Genova, XXIV ciclo. Reviewer and member of the examination committee.

Post-Doc fellowships supervision

- *Metodi di ottimizzazione bilivello per la ricostruzione di immagini*, Danilo Pezzi, Università di Modena e Reggio Emilia, 1/12/2023-31/08/2024;
- *Metodi di ottimizzazione per l'apprendimento automatico di sistemi dinamici*, Federica Porta, Dipartimento di Matematica ed Informatica, Università di Ferrara, 01/03/2015-15/09/2016.
- *Metodi numerici di ottimizzazione per problemi non differenziabili e non convessi*, Simone Rebegoldi, Dipartimento di Matematica ed Informatica, Università di Ferrara, 01/02/2017-31/01/2018.

Supervision of tenure-track researcher positions:

- *Apprendere nel tempo: un nuovo approccio computazionale per l'apprendimento automatico di sistemi dinamici*, Riccardo Zanella, Dipartimento di Matematica ed Informatica, Università di Ferrara, 01/01/2014-31/12/2016.

Institutional and administrative appointments:

- Since 2024: member of the Department Board.
- Since 2024: Department Quality Assurance (QA) Coordinator.
- Since 2022: member of the QA Steering Committee for the Master's Degree in Mathematics.
- Since 2022: member of the QA Steering Committee for the Bachelor's Degree in Mathematics.
- Since 2018: member of the Department QA Committee.
- Since 2013: member of the Faculty Board of the PhD Program in Mathematics (joint program with the Universities of Parma and Ferrara).
- 2018-2024: coordinator for corporate internships for the Master's Degree in Mathematics.

Modena, July 22, 2026