

## PERSONAL INFORMATION

**Bruno Giovanni Galuzzi** <https://github.com/brunoG89> <https://it.linkedin.com/in/bruno-galuzzi-825a64196> [ORCID 0000-0002-8518-5352](https://orcid.org/0000-0002-8518-5352)

Date of birth 18 May 1989 | Nationality Italian

## WORK EXPERIENCE

January 2023 – Present

**Research Fellow in Computer Science (SSD INF/01)**Department of Biotechnology and Biosciences, University of Milano-Bicocca  
Supervisor: Prof. Chiara Damiani

The research activity concerns the design and implementation of computational strategies that combine computational models and machine learning techniques, to analyze and integrate - omic data of different nature, such as transcriptomics, proteomics and metabolomics data.

January 2021 – December 2022

**Research Fellow in Computer Science (SSD INF/01)**Department of Biotechnology and Biosciences, University of Milano-Bicocca  
Supervisor: Prof. Chiara Damiani

The research activity concerns the design and implementation of algorithms to analyze and integrate omics data, in particular of metabolomics and transcriptomics, to allow a new understanding of metabolic alterations in cancer and other complex diseases.

March 2020 – December 2020

**Research Fellow in Operational Research (SSD MAT/09)**Department of Computer Sciences, University of Milano-Bicocca  
Supervisor: Prof. Enza Messina

The research activity concerned the context "Analytics models for the analysis of behavioral data in Healthcare", with particular attention to: construction of a database from log data relating to an applied narrative video game, identification of behavior changes for the maintenance and monitoring of the condition of a patient in rehabilitation or during the treatment of a chronic disease, the study and development of analytics techniques for the identification of common patterns; visualization techniques, clustering, and anomaly detection.

March 2018 – February 2020

**Research Fellow in Operational Research (SSD MAT/09)**Department of Computer Sciences, University of Milano-Bicocca  
Supervision: Prof. Francesco Archetti

The research activity concerned the "Learning and Optimization" context, with particular attention to: Machine Learning methods for the analysis of data on water consumption; mathematical programming models for water networks; Bayesian methods of global optimization in simulation-optimization problems.

November 2017 – February 2018

**Research collaborator**Department of Earth Sciences, University of Milano  
Supervisor: Prof. Eusebio Stucchi

The activity concerned the estimation of underground velocity models through the inversion of active seismic data, using gradient optimization techniques

## EDUCATION AND TRAINING

November 2014– October 2017

**PhD in Earth Sciences (SSD GEO/11)**

Department of Earth Sciences, University of Milano, Italy

Thesis title: "Modelling and optimization techniques for acoustic Full Waveform Inversion in seismic exploration"

Supervisor: Prof. Eusebio Stucchi

My research activity focused on:

- Processing on seismic data
- Development of algorithm for seismic modelling, using Finite Difference Methods.
- Development of global optimization algorithms for Full Waveform Inversion.
- Development of local optimization algorithms for Full Waveform Inversion.

January 2012 – September 2014

### Master's degree in Mathematics

Department of Mathematics, University of Milano, Italy

Thesis title: "A Global Optimization Algorithm for Seismic Inversion"

110/110 summa cum laude

Supervisors: Prof. Eusebio Stucchi, Prof. Elena Zampieri

October 2008 – December 2011

### Bachelor's degree in Mathematics

Department of Mathematics, University of Milano, Italy

Thesis title: "Mathematical Models and Numerical Approximation of seismic waves"

110/110 summa cum laude

Supervisor: Prof. Elena Zampieri

## RESEARCH ACTIVITIES

### Talks and Posters

- Talk "Machine Learning for Efficient Prediction of Protein Redox Potential: The Flavoproteins Case" at the BtBs day 2022 (Milano, December 2022)
- Talk "Best practises in flux sampling of constrained-based models" at the 8th International Online/Onsite Conference on Machine Learning, Optimization, and Data Science (Siena, Italy, September 2022)
- Talk "An efficient implementation of Flux Variability Analysis for metabolic networks" at the XVI International Workshop in Artificial Life and Evolutionary Computation WIVACE (Gaeta, Italy, September 2022)
- Talk "knowledge-based multi-omics data integration to unveil the many facets of metabolic variation and regulation" at the Workshop Complex Systems: from Physics to Biomedicine (Rome, Italy, May 2022)
- Talk "Combining denoising and flux balance analysis for single-cell cluster analysis" at the Annual Conference of Bioinformatics Italian Society (CIBB 2021)(Online, November, 2021).
- Talk "Differential reaction expression analysis for single-cell metabolic networks" at the MCHBS Conference (Online, September 2021).
- Talk "Single-Cell reaction expression analysis as a bridge between transcriptomics and flux-omics" at the Annual Conference of Bioinformatics Italian Society (BITS 2021)(Online, July, 2021).
- Talk "Insight on seismic hazard: a cutting-edge framework for seismic coupling coefficient computation" at the 39th GNGTS Conference (Online, June 2021).
- Poster "On the Usage of Deterministic Global Optimization Methods for Addressing Full Waveform Inversion Problems" at the SIAM Conference on Mathematical and Computational Issues in the Geosciences (Online, June 2021).
- Talk "Can differential reaction expression analysis be used to characterize single-cell behaviour?" at the School on Cancer Development and Complexity (Online, May 2021).
- Talk "Active Scenario-Generation for Stochastic Programming" at the International Conference on Optimization and Decision Science (ODS Congress) (Genoa, Italy, September 2019).
- Talk "A Tool for Anomaly Detection in ECG Signals to support health medical Decisions" at the International Conference on Computational Intelligence Methods for Bioinformatics and Biostatistics (CIBB 2019) (Bergamo, Italy, September 2019).
- Talk "The fullwave2D software" at the 21th UMI Congress (Pavia, Italy, September 2019).
- Talk "Modelling human preferences by Bayesian Optimization" at the Second international conference on data science and social research (DSSR 2019) (Milan, Italy, February 2019)
- Talk "Estimation of an acoustic velocity model for the CROP M12A seismic line using a gradient-based Full Waveform Inversion" at the 37th GNGTS Congress (Bologna, Italy, November 2018).
- Talk "Efficiency and resilience assessment under cascading failures in transit networks" at the WIT Urban Transport 2018 (Sevilla, Spain, September 2018).
- Talk "Evaluation of cascade effects for transit networks" at the ODS Congress 2018 (Taormina, Italy, September 2018).
- Poster "A Global-Local Experience of 2D Acoustic FWI on a Real Data Set" at the 80th EAGE Conference and Exhibition (Copenhagen, Denmark, June 2018)
- Talk "Efficient gradient computation of a misfit function for FWI using the adjoint method" at the 36th GNGTS Conference (Trieste, Italy, November 2017).
- Talk "Global Optimization Procedure to Estimate a Starting Velocity Model for Local Full Waveform Inversion" at the ODS Congress 2017 (Sorrento, Italy, September 2017)
- Invited talk "Numerical approximation of the wave equation in seismic inverse problems (Mediolanum 2017: Concilium iuvenum mathematicorum)", at the Department of Mathematics of the University of Milan (May, 2017)
- Talk "Experience of FWI on Marine Seismic Data Using a Robust Optimization Procedure" at the 35th GNGTS Conference (Lecce, Italy, November 2016).
- Talk "A Local Adaptive Method for the Numerical Approximation of Seismic Inversion Problems" at the 13th SIMAI Congress (Milan, Italy, September 2016).
- Talk "Stochastic FWI on Wide-angle Land Data with Different Order of Approximation of the 2D Acoustic Wave Equation" at the 78th EAGE Conference and Exhibition 2016 (Vienna, Austria, May, 2016).
- Talk "Optimal parameters for finite difference modeling of 2D seismic wave equation" at the 34th GNGTS Conference (Trieste, Italy, November 2015).
- Talk "A Parallel Software for seismic modelling" at the 20th UMI Congress (Siena, Italy, September 2015)

- Editorial Activities**
- Program Committee member for the 8<sup>th</sup> International Conference on machine Learning, Optimization & Data science – LOD 2022.
  - Program Committee member for 16<sup>th</sup> Learning and Intelligent Optimization Conference (LION 2022).
  - Reviewer for: Computational and Management Science - Springer, Transportation Research Part b: Metodological - Elsevier, Physica A: Statistical Mechanics and its Applications - Elsevier, Expert Systems with Applications - Elsevier, Geofluids - Hindawi, Informatics - MDPI, Processes - MDPI, Soft Computing - Elsevier, Scientific Reports - Nature, Bioinformatics - BMC.
  - Reviewer for the 7<sup>th</sup> International Online and Onsite Conference on Machine Learning, Optimization, and Data Science (LOD 2021).
  - Reviewer for the 17<sup>th</sup> edition of the CIBB international conference on Computational Intelligence Methods for Bioinformatics and Biostatistics (CIBB 2021).

**Teaching experiences** **University of Milano-Bicocca**

- Teacher for the course of “Omics Data Integration” for the Master in “qOmics: quantitative methods for Omics Data”. Overall hours: 8. Period: Oct. 2020.
- Teaching Assistant for the course of “Operational Research and Resource Planning” for the bachelor degree in Computer Science. Overall hours: 40. Periods: Oct. 2019 - Feb. 2020; Oct. 2020 - Feb. 2021; Oct. 2021 - Febr. 2022. SSD MAT/09
- Tutor for the course of “Informatics” for the bachelor degree in Biotechnology. Overall hours: 30. Period: Oct. 2021 - Jan. 2022. SSD INF/01.
- Tutor for the course of “Operational Research and Resource Planning” for the bachelor degree in Computer Science Overall hours: 32. Period: Mar. 2019 - Sep. 2020. SSD MAT/09.
- Tutor for the course of “Streaming Data Management and Time Series Analysis” for the master degree in Data Science. Overall hours: 10. Period: Oct. 2018 - Sep. 2019.
- Co-Supervisor of 7 bachelor’s degree theses and 5 master’s degree theses.

**University of Insubria**

- Teacher for the course of “Biostatistics and Data Science” for the master degree in Biotechnology for the bio-based and health industry. Overall hours: 24. Period: Oct. 2022 -Present Language: English. SSD INF/01.

**University of Milan**

- Teaching Assistant for the course of “Elements of Basic Mathematics” for the bachelor degree in Mathematics. Overall hours: 20. Period: Sep 2019.

**University of Pisa**

- Co-Supervisor of 1 master’s degree thesis in Seismic Exploration.

**Industrial Research Collaboration** **University of Milano-Bicocca**

- Collaboration with OAKS SRL for the developing of an automatic reporting system (Feb 2019-Mar 2019).

- Awards and Scholarships**
- PhD Scholarship funded by the Italian Ministry of Research and Education.

**PERSONAL SKILLS**

**Mother tongue** Italian

**Other languages**

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1	B2	B2	C1

Certificate PET (Preliminary English Test) obtained in November 2005.

Levels: A1 and A2: Basic user – B1 and B2: Independent user – C1 and C2: Proficient user  
Common European Framework of Reference for Languages

- Member in organizations**
- InfoLife Laboratory – CINI (Consorzio Interuniversitario Nazionale per l’Informatica)
  - SYSBIO – Centre of Systems Biology

**Computer skills**

- Advanced knowledge of Python, Matlab, C.
- Good knowledge of R, Java.
- Moderate knowledge of Javascript.
- Good knowledge of the database querying language SQL and the database management system MySQL.
- Excellent use of the most widely used Operating Systems (Linux, Windows, Macintosh).
- Proficiency with several Python tools: Pandas, Numpy, scikit-learn, Keras, Plotly, Dash, Corbrapy, Scanpy.
- Experience with tools for analyzing single-cell gene expression data (Scanpy, Seurat).
- Experience with several bioinformatics databases: Protein Data Bank, NCBI, UCSC Genome Browser.
- Experience with distributed version control systems (git)
- Good knowledge of Office, Adobe.
- Moderate knowledge of PyMol, GIMP, Inkscape

**Other skills** Trekking. Tennis. Chess.

**Driving licence** B

## PUBLICATIONS

- [1] **B.G. Galuzzi** and C. Damiani. “An efficient implementation of Flux Variability Analysis for metabolic networks”. In: *XVI International Workshop in Artificial Life and Evolutionary Computation (WIVACE 2022) (Accepted)* (2022).
- [2] **B.G. Galuzzi**, L. Milazzo, and C. Damiani. “Best practices in flux sampling of constrained-based models”. In: *8th International Online/Onsite Conference on Machine Learning, Optimization, and Data Science(In press)* (2022).
- [3] **B.G. Galuzzi**, M. Vanoni, and C. Damiani. “Combining denoising of RNA-seq data and flux balance analysis for cluster analysis of single cells”. In: *BMC bioinformatics* 23.6 (2022), pp. 1–21.
- [4] **B.G. Galuzzi**, A. Mirarchi, E.L. Viganò, L. De Gioia, C. Damiani, and F. Arrigoni. “Machine learning for efficient prediction of protein redox potential: the flavoproteins case”. In: *Journal of Chemical Information and Modelling* (2022).
- [5] F. Sparacino, **B.G. Galuzzi**, M. Palano, M. Segou, and C. Chiarabba. “Seismic coupling for the Aegean - Anatolian region”. In: *Earth-Science Reviews* (2022), p. 103993.
- [6] M. Di Filippo, D. Pescini, **B.G. Galuzzi**, M. Bonanomi, D. Gaglio, E. Mangano, C. Consolandi, L. Alberghina, M. Vanoni, and C. Damiani. “INTEGRATE: Model-based multi-omics data integration to characterize multi-level metabolic regulation”. In: *PLOS Computational Biology* 18.2 (2022), e1009337.
- [7] M. M. Baldi, P. A. Mavrodiev, **B.G. Galuzzi**, F. Mantovani, O. Realdon, and E. Messina. “A Decision Support System in the Context of an Applied Game for Telerehabilitation”. In: *2021 IEEE International Conference on Digital Health (ICDH)*. IEEE. 2021, pp. 203–208.
- [8] S. Terragni, E. Fersini, **B.G. Galuzzi**, P. Tropeano, and A. Candelieri. “OCTIS: Comparing and optimizing topic models is simple!” In: 2021, pp. 263–270.
- [9] F. Archetti, A. Candelieri, **B.G. Galuzzi**, and R. Perego. “Learning Enabled Constrained Black-Box Optimization”. In: *Springer Optimization and Its Applications* 170 (2021), pp. 1–33.
- [10] **B.G. Galuzzi**, I. Giordani, A. Candelieri, R. Perego, and F. Archetti. “Hyperparameter optimization for recommender systems through Bayesian optimization”. In: *Computational Management Science* 17.4 (2020), pp. 495–515.
- [11] **B.G. Galuzzi**, E. Messina, A. Candelieri, and F. Archetti. “Optimal Scenario-Tree Selection for Multistage Stochastic Programming”. In: *International Conference on Machine Learning, Optimization, and Data Science*. Springer. 2020, pp. 335–346.

- [12] A. Candelieri, **B.G. Galuzzi**, I. Giordani, and F. Archetti. "Learning Optimal Control of Water Distribution Networks Through Sequential Model-Based Optimization". In: *International Conference on Learning and Intelligent Optimization*. Springer. 2020, pp. 303–315.
- [13] A. Candelieri, **B.G. Galuzzi**, I. Giordani, R. Perego, and F. Archetti. "Optimizing partially defined black-box functions under unknown constraints via Sequential Model Based Optimization: an application to Pump Scheduling Optimization in Water Distribution Networks". In: *International Conference on Learning and Intelligent Optimization*. Springer. 2019, pp. 77–93.
- [14] **B.G. Galuzzi**, I. Giordani, A. Candelieri, R. Perego, and F. Archetti. "Bayesian optimization for recommender system". In: *World Congress on Global Optimization*. Springer. 2019, pp. 751–760.
- [15] A. Candelieri, **B.G. Galuzzi**, I. Giordani, and F. Archetti. "Vulnerability of public transportation networks against directed attacks and cascading failures". In: *Public Transport* 11.1 (2019), pp. 27–49.
- [16] A. Candelieri, I. Giordani, **B.G. Galuzzi**, and F. Archetti. "Efficiency and Resilience Assessment Under Cascading Failures in Transit Networks". In: *WIT Transactions on The Built Environment* 182 (2019), pp. 177–186.
- [17] A. Candelieri, **B.G. Galuzzi**, I. Giordani, R. Perego, and F. Archetti. "Business Information Systems for the Cost/Energy Management of Water Distribution Networks: A Critical Appraisal of Alternative Optimization Strategies". In: *International Conference on Business Information Systems*. Springer. 2018, pp. 3–13.
- [18] A. Candelieri, I. Giordani, **B.G. Galuzzi**, and F. Archetti. "Evaluation of cascade effects for transit networks". In: *New Trends in Emerging Complex Real Life Problems*. Springer, 2018, pp. 103–110.
- [19] **B.G. Galuzzi**, A. Tognarelli, and E.M. Stucchi. "A global-local experience of 2D acoustic FWI on a real data set". In: *80th EAGE Conference and Exhibition 2018*. Vol. 2018. 1. European Association of Geoscientists & Engineers. 2018, pp. 1–5.
- [20] **B.G. Galuzzi**, R. Perego, A. Candelieri, and F. Archetti. "Bayesian optimization for full waveform inversion". In: *New trends in emerging complex real life problems*. Springer, 2018, pp. 257–264.
- [21] **B.G. Galuzzi**, E. Zampieri, and E.M. Stucchi. "A local adaptive method for the numerical approximation in seismic wave modelling". In: *Communications in Applied and Industrial Mathematics* 8.1 (2017), pp. 265–281.
- [22] **B.G. Galuzzi**, E. Zampieri, and E. Stucchi. "Global optimization procedure to estimate a starting velocity model for local Full Waveform Inversion". In: *International Conference on Optimization and Decision Science*. Springer. 2017, pp. 171–179.
- [23] A. Sajeve, M. Aleardi, **B. G. Galuzzi**, E. Stucchi, E. Spadavecchia, and A. Mazzotti. "Comparing the performances of four stochastic optimisation methods using analytic objective functions, 1D elastic full-waveform inversion, and residual static computation". In: *Geophysical Prospecting* 65.Special Issue 1 (2017), pp. 322–346.
- [24] **B. G. Galuzzi**, A. Tognarelli, E. Stucchi, and A. Mazzotti. "Stochastic FWI on wide-angle land data with different order of approximation of the 2D acoustic wave equation". In: *78th EAGE Conference and Exhibition 2016*. Vol. 2016. 1. European Association of Geoscientists & Engineers. 2016, pp. 1–5.
- [25] M. Aleardi, E. Stucchi, A. Sajeve, and **B. G. Galuzzi**. "Surface-consistent Residual Statics Estimation with Genetic Algorithms-An Application to a Near-surface Seismic Survey". In: *Near Surface Geoscience 2016-22nd European Meeting of Environmental and Engineering Geophysics*. Vol. 2016. 1. European Association of Geoscientists & Engineers. 2016, pp. 495.
- [26] A. Sajeve, M. Aleardi, A. Mazzotti, E. Stucchi, and **B.G. Galuzzi**. "Comparison of stochastic optimization methods on two analytic objective functions and on a 1D elastic FWI". In: *76th EAGE Conference and Exhibition 2014*. Vol. 2014. 1. European Association of Geoscientists & Engineers. 2014, pp. 1–5.