Giovanni Saraceno

Research Interests: Robust Statistics, Machine Learning, Neural Networks, Statistical distances, Statistics for Neuroscience, k-sample Hypothesis tests.
orcid.org/0000-0002-1753-2367
https://github.com/giovsaraceno
Personal webpage: https://giovsaraceno.github.io/

Work Experience

Since 09/2026 **Tenure Track Researcher (RTT)**, Department of Economics and Management, University of Parma, Italy

10/2024-08/2026 **Fixed-term Assistant Professor (RTDA)**, Department of Statistical Sciences, University of Padua, Italy

11/2022 - 08/2024 **Postdoctoral Research Associate**, *Mentor: Dr. Marianthi Markatou*, Department of Biostatistics, School of Public Health and Health Professions, University at Buffalo, NY, USA

05–07/2022 **Researcher**, *Epidemiological and economic evaluation of influenza vaccines*, Collaboration with Prof. Andrea Pugliese, Department of Mathematics, University of Trento, Trento, Italy

07/2018 **Organizer**, *At the edge of Chaos – Journey to discovery of Complexity*, Castellammare del Golfo (TP), Italy, With the collaboration of the "Festival della Complessità" and A.I.F. Alcamo - Associazione per l'Insegnamento della Fisica (Association for the teaching of Physics).
https://www.festivalcomplessita.it/materiali/archivio/edizione-2018/castellammare-del-golfo-2018/

03/2018–05/2018 **Teacher of Mathematics**, *Istituto d'Istruzione Superiore Statale "Rosina Salvo"*, Trapani, Italy

11/2016 **Project Manager**, *International Scientific Festival "Festival della Scienza 2016"*, Genova (Italy), Project title: "Between perception and reality: how the brain interprets the signs of the World"

Education

2018–2022 **Ph.D. in Mathematics**, *cum laude*, University of Trento, Trento, Italy
Thesis: *Robust estimators in the presence of cell-wise and case-wise contamination*
Supervisors:
Prof. Claudio Agostinelli
Prof. Anand N. Vidyashankar (George Mason University, Fairfax, VA, USA)

2015–2017 **Master degree in Mathematics**, *University of Trento*, Trento, Italy, Grade:109/110

- *Curriculum: Mathematics for Life Sciences - Modelling, Statistics and Analysis of Biosystems.*
- Thesis: *Deep Learning and Memorizing of Spectro-Temporal Data (Music) in the Spatio-Temporal Brain.*
  Supervisor: Prof. Claudio Agostinelli
  Co-supervisors: Prof. Nikola Kasabov (KEDRI - Auckland University of Technology), Cesare Furnarello (FBK - Fondazione Bruno Kessler)
  Note: The content of this thesis was cited and included in the book: *Kasabov, N.K. (2019). Time-Space, Spiking Neural Networks and Brain-Inspired Artificial Intelligence. Springer Series on Bio- and Neurosystems.* https://doi.org/10.1007/978-3-662-57715-8

2011–2015 **Bachelor's degree in Mathematics**, *University of Palermo*, Palermo, Italy, Grade:107/110
Thesis: *Study of a Competitive Lotka-Volterra System with Allee effect.*
Supervisor: Prof. Vincenzo Sciacca

Research Experience

30/03/2019–31/05/2019 **Doctoral research**, *Indian Statistical Institute*, Kolkata,India, Collaboration with Prof. Ayanendranath Basu and Prof. Abhik Ghosh
Topic: Development of robust estimators using Minimum Distance methods.

03/2017–06/2017 **International Credit Mobility (Erasmus+ program)**, *KEDRI - Knowledge Engineering and Discovery Research Institute, AUT - Auckland University of Technology*, Auckland, New Zealand, Supervisor: Prof. Nikola Kasabov
Topic: Study of Spiking Neural Networks, analysis of Neuro-Informatics data and brain-like computational models.

Publications

Saraceno, G., Calcagnì, A. (2026), *Towards a Geometric Characterization of Multiverse Analysis*
https://doi.org/10.48550/arXiv.2607.11345

Saraceno, G., Markatou, M., Mukhopadhyay, R., Golzy, M. (2026), *The QuadratiK Package: Kernel-Based Quadratic Distance Methods for Multivariate Data Analysis*, ACM Transactions on Mathematical Software, 52, 3, Article 17
https://doi.org/10.1145/3820488

Talal, A.H., Mukhopadhyay, R., Veronesi, V., Dharia, A., Saraceno, G., Fierer, D.S. (2026), *Improvements in substance use and social determinants of health associated with hepatitis C treatment initiation and sustained virologic response in opioid treatment programs*, Addictive Behaviors Reports, 100683

Saraceno, G., Vidyashankar, A.N., Agostinelli, C. (2025), *Hellinger loss function for Generative Adversarial Networks.*
https://doi.org/10.48550/arXiv.2512.12267

Saraceno, G. (2025), *Kernel-Based Quadratic Distance Testing: Sensitivity and Robustness. In: di Bella, E., Gioia, V., Lagazio, C., Zaccarin, S. (eds) Statistics for Innovation IV. SIS 2025. Italian Statistical Society Series on Advances in Statistics*, Springer, Cham.
https://doi.org/10.1007/978-3-031-96033-8_51

Saraceno G., Mukhopadhyay R., Markatou M. (2025), *QuadratiK: A Python and R package for Clustering on the Sphere and Goodness-of-Fit tests*, SoftwareX, vol. 31, 102155, ISSN: 2352-7110
https://doi.org/10.1016/j.softx.2025.102155

Ding Y., Markatou M., Saraceno G. (2025), *Poisson Kernel-Based Tests for Uniformity on the d-Dimensional Sphere*, Statistica Sinica, vol.35, p. 1-23, ISSN:1017-0405
https://doi:10.5705/ss.202022.0347

Markatou M., Saraceno G. (2024), *A unified framework for multivariate two-sample and k-sample Kernel-based Quadratic Distance Goodness-of-fit tests*
https://doi.org/10.48550/arXiv.2407.16374

Saraceno G., Markatou M., Mukhopadhyay R., Golzy M. (2024), *Goodness-of-Fit and Clustering of Spherical Data: the* `Quadratik` *package in R and Python.*
https://doi.org/10.48550/arXiv.2402.02290

Agostinelli C., Greco L. and Saraceno G. (2024), *Weighted Likelihood Methods for Robust Fitting of Wrapped Models for p-torus Data*, AStA - Advances in Statistical Analysis, vol. 108, p. 853-888, ISSN: 1863-8171
https://doi.org/10.1007/s10182-024-00494-2

Saraceno G., Ghosh A., Basu A., Agostinelli C. (2024), *Robust Estimation of fixed effect parameters and variances of linear mixed models: the minimum density power divergence approach*, AStA - Advances in Statistical Analysis, vol. 2024, 108, p. 127-157, ISSN: 1863-8171
https://doi.org/10.1007/s10182-023-00473-z

Calabro' G.E., et al. (2022), *Health Technology Assessment: a value-based tool for the evaluation of healthcare technologies. Reassessment of the cell-cultured-derived quadrivalent influenza vaccine: Flucelvax Tetra 2.0*, Journal of Predictive Medicine and Hygiene, vol. 63, p. 1-140, ISSN: 2421-4248
https://doi.org/10.15167/2421-4248/jpmh2022.63.4s1

Saraceno G. and Agostinelli C. (2022), *Case-Wise and Cell-Wise Outliers Detection Based on Statistical Depth Filters. In: García-Escudero, L.A., et al. Building Bridges between Soft and Statistical Methodologies for Data Science. SMPS 2022. Advances in Intelligent Systems and Computing*, Springer, vol. 1433, p. 343-349, Springer International Publishing AG, ISBN: 9783031155086, ISSN: 2194-5357, Valladolid, Spain, 14-16 September 2022
https://doi.org/10.1007/978-3-031-15509-3_45

Saraceno G. and Agostinelli C. (2021), *Robust Multivariate Estimation Based On Statistical Depth Filters*, TEST, vol. 30, p. 935-959, ISSN: 1133-0686
https://doi.org/10.1007/s11749-021-00757-z

Saraceno G., Agostinelli C. and Greco L. (2021), *Robust estimation for multivariate wrapped models*, METRON, vol. 79, p. 225-240, ISSN: 0026-1424 https://doi.org/10.1007/s40300-021-00214-9

Greco L., Saraceno G. and Agostinelli C. (2021), *Robust Fitting of a Wrapped Normal model to Multivariate Circular Data and Outlier Detection*, Stat, vol. 4, p. 454-471, ISSN: 2571-905X
https://doi.org/10.3390/stats4020028

Agostinelli C., Saraceno G. and Greco L. (2021), *Robust Issues in Estimating Models for Multivariate Torus Data. In: (a cura di): Giovanni Camillo Porzio Carla Rampichini Chiara Bocci*, CLADAG 2021 BOOK OF ABSTRACTS AND SHORT PAPERS, p. 21-24, ISBN: 978-88-5518-340-6, Firenze, Italy, September 9-11, 2021
https://doi.org/10.36253/978-88-5518-340-6

Saraceno G., Alqallaf F., Agostinelli C. (2021), *A Robust Seemingly Unrelated Regressions For Row-Wise And Cell-Wise Contamination*
https://doi.org/10.48550/arXiv.2107.00975

Submitted Papers

Markatou M., Saraceno G. (2024), *A unified framework for multivariate two-sample and k-sample Kernel-based Quadratic Distance Goodness-of-fit tests*

Saraceno G., Markatou M., Mukhopadhyay R., Golzy M. (2024), *Goodness-of-Fit and Clustering of Spherical Data: the* `Quadratik` *package in R and Python.*, Accepted 21 April 2026

In progress

Veronesi V., Saraceno, G., *Climate Type Classification via Spherical Clustering.*

Saraceno, G., Greco A., *Robust Artifact Detection for EEG data.*

Cruciata, L., Saraceno, G., *Adaptive Poisson-kernel mixtures on learned spherical embeddings for unsupervised medical image segmentation*

Statistical Software

QuadratiK, *Collection of Methods Constructed using Kernel-Based Quadratic Distances*, R package, Role: Maintainer,
https://cran.r-project.org/web/packages/QuadratiK/index.html,
Python package, Role: Author, https://pypi.org/project/QuadratiK/

robustsur, *Robust Estimation for Seemingly Unrelated Regression Models*, R package, available on CRAN, Role: Author.
https://cran.r-project.org/web/packages/robustsur/index.html

Research Grants

CLassificazione di zone climatiche con clustering su Ipersfera e analisi delle Dinamiche temporali – CLID, *Veronesi, V. (PI), Saraceno, G. (co-PI)*, Associazione di Statistica Applicata (ASA), EUR 2,500.

Invited Presentations

Saraceno, G. Cruciata L., *Adaptive Poisson-kernel mixtures on learned spherical embeddings for unsupervised medical image segmentation*, 14-16/07/2026, Milan, Italy
Invited presentation at IFCS 2026 - 19th conference of the International Federation of Classification Societies

Saraceno, G. Vidyashankar, A.N., Agostinelli, C., *Hellinger-Type Losses for Generative Adversarial Networks*, 29/06-01/07/2026, Trento, Italy
Invited presentation at Data Science, Statistics & Visualisation (DSSV) 2026

Saraceno, G. Veronesi V., *Exploring Climate Patterns via Poisson Kernel-Based Clustering*, 15-17/09/2025, Roma, Italy
Invited presentation at GRASPA 2025 (Gruppo di Ricerca per le Applicazioni della Statistica ai Problemi Ambientali)

Saraceno, G. Vidyashankar, A.N., Agostinelli, C., *Generative Adversarial Network Methods with Hellinger Loss*, 19-23/05/2025, Stresa, Italy
Invited presentation at ICORS 2025 (International Conference on Robust Statistics)

Saraceno, G., *The robustness of the two- and k-sample kernel-based quadratic distance tests*, (joint work with Marianthi Markatou), 29/07-02/08/2024, Fairfax, VA, USA
Invited presentation at ICORS (International Conference on Robust Statistics) and DSSV (Conference on Data Science, Statistics and Visualization)

Saraceno, G., Vidyashankar, A.N., Agostinelli, C., *Generative Adversarial Network Methods with Hellinger Loss*, 17-21/07/2023, Pittsburgh (USA)
Poster presented at the Working Group on Model-based Clustering (Participation is by invitation only)

Agostinelli, C., Saraceno, G., Greco, L., *Robust Issues in Estimating Models for Multivariate Torus Data*, 09-11/09/2021, Firenze (Italy)
Invited session at CLADAG 2021, 13-th Scientific Meeting, Classification and Data Analysis Group

Contributed Presentations

Saraceno, G., *Robust hypothesis testing via Quadratic Distances.*, 16-18/06/2025, Genova, Italy
Contributed talk at SIS2025, Italian Statistical Society Conference on Statistics for Innovation

Saraceno G., Markatou M., *QuadratiK: A Comprehensive Tool for Goodness-of-Fit Tests and Spherical Data Clustering*, 12-13/04/2024, Rochester, NY (USA)
Contributed talk at UPSTAT, Upstate New York Statistics Conference

Saraceno G., Markatou M., *Poisson Kernel-Based Tests for Uniformity on the d-dimensional Sphere with the* `QuadratiK` *package*, 18-21/12/2023, Lisbon (Portugal)
Contributed talk at ICSDS2023, the 2023 **IMS** *Conference on Statistics and Data Science*

Saraceno G., Markatou M., *Goodness-of-fit and clustering of spherical and directional data: A comprehensive R package*, 22-25/08/2023, London (UK)
Contributed talk at COMPSTAT2023, the 25^{th} International Conference on Computational Statistics

Saraceno G., Markatou M., *A unified framework for two-sample and k-sample quadratic distance goodness-of-fit tests*, 5-10/08/2023, Toronto (Ontario, Canada)
Contributed talk at **JSM**, *Joint Statistical Meeting*

Saraceno G., Markatou M., Ding Y., *Poisson Kernel-Based Tests for Uniformity on the d-Dimensional Torus and Sphere*, 21-22/04/2023, Rochester, NY (USA)
Contributed talk at UPSTAT, Upstate New York Statistics Conference

Saraceno G., Agostinelli C., *Case-wise and cell-wise outliers detection based on statistical depth filters*, 14-16/09/2022, Valladolid (Spain)
Conference paper at SMPS 2022, 10th International conference on Soft Methods in Probability and Statistics

Saraceno G., Greco L., Agostinelli C., *Robust classification for Toroidal data*, 20-24/07/2022, Porto (Portugal)
Contributed Abstract at IFCS 2022, Classification and Data Science in the Digital Age - 17th conference of the International Federation of Classification Societies

Saraceno G., Ghosh A., Basu A., Agostinelli C., *Robust estimation under Linear Mixed Models: a Minimum Density Power Divergence approach*, 20-24/09/2021, Vienna (Austria)
Contributed Paper session at ICORS 2021, International Conference on Robust Statistics

Saraceno G., Agostinelli C., *Robust Multivariate Estimation based on Statistical Depth Filter*, 22-26/07/2019, Palermo (Italy)
Poster presented at the European Meeting of Statisticians

Saraceno, G., Lauria, M., *Predictive biomarker of response to seasonal influenza vaccination*, 16-18/06/2018, Napoli (Italy)
Poster presented at the 12^{th} seminar of **SIBBM** - *Italian Society of Biophysics and Molecular Biology*

Teaching Experience

2026–2027 **Lecturer**, *Master Degree in Data Science for Managament*, Department of Economics and Management, University of Parma, Course: Introduction to Data Science

2026–2027 **Lecturer**, *Bachelor Degree in Economics and Management*, Department of Economics and Management, University of Parma, Course: Statistics for the Digital Economy

2026–2027 **Lecturer**, *Master Degree in Economics and Managament of sustainable food systems*, Department of Economics and Management, University of Parma, Course: Data Management for Sustainability Assessment

2024–2026 **Lecturer**, *Bachelor's Degree in Biotechnology*, Department of Biology, University of Padua, Course: Matematica e Statistica (Mathematics and Statistics)
Probability theory and basic statistics.

2024–2026 **Lecturer**, *PhD in Neuroscience*, PNC - Padova Neuroscience Center, University of Padua, Course: Statistics for Neuroscience
Introduction to the basic knowledge in statistical methods used in Neuroscience applications, with `R`.

2019–2021 **Teaching Assistant**, *Bachelor's Degree in Biomolecular Sciences and Technology*, CIBIO, University of Trento, Course: Matematica e Statistica II (Mathematics and Statistics II)
Exercises about probability theory and basic statistics with an introduction in R.

2020–2021 **Teaching Assistant**, *Bachelor's Degree in Civil Engineering*, DICAM, University of Trento, Course: Geometria e Algebra Lineare con elementi di Statistica (Geometry and Linear Algebra with elements of Statistics)
Exercises about probability theory and basic statistics.

Awards

- **Travel Award** (18/06/2018), *Società Italiana di Biofisica e Biologia Molecolare.* Awarded to the best posters presented by participants from institutions geographically farthest from the conference venue.

Scientific Service

- **Member of Scientific Program Committee** *EcoSta 2026 (International Conference on Econometrics and Statistics)*, Kyoto, Japan, 8-10, August 2026.

Institutional Service

- Member of the Retreat Committee, Department of Statistical Sciences, University of Padua.
- Member of the Orientation Committee, Department of Statistical Sciences, University of Padua.

Peer Review

- Bernoulli Journal
- International Statistical Review
- Computational Statistics and Data Analysis
- Journal of Multivariate Analysis
- Computational Statistics
- Electronic Journal of Statistics
- Environmental and Ecological Statistics

Associations

- Member of ASA - American Statistical Association
- Member of IMS - Institute of Mathematical Statistics
- Member of SIS - Società Italiana di Statistica

Relevant Skills

- Proficient knowledge of R program.
- Good working knowledge in Python.
- Good working knowledge in MATLAB.

Languages

- Italian: mother tongue
- English: Certificate EDI Level 2 Certificate in ESOL International JETSET Level 6 (CEF C1)

Autorizzo il trattamento dei miei dati personali presenti nel CV ai sensi dell'art. 13 d. lgs. 30 giugno 2003 n. 196 - "Codice in materia di protezione dei dati personali" e dell'art. 13 GDPR 679/16 - "Regolamento europeo sulla protezione dei dati personali".