Alessio Perinelli

Curriculum Vitae

Alessio Perinelli is a physicist holding a PhD awarded by the University of Trento (Italy). His research experience is mostly focused on the development of statistical methods and numerical algorithms for the analysis of signals generated by complex systems. He is currently an Assistant professor (RTdA) at the Department of Physics, University of Trento. His research activity concerns the development of analytical tools to investigate nonlinear dynamics in geophysics within the framework of the Limadou project, which aims at unraveling the litosphere-magnetosphere coupling mechanisms.

Born in **Brescia (Italy)**
on **Sept., 24th 1993**
alessio.perinelli@unitn.it
+39 348 27 64 220

Current position (since February 2022)

Assistant professor (*ricercatore RTdA*) at the Department of Physics, University of Trento (Trento, IT).

Past positions

Jan.2021—Jan.2022 – **Research fellow** (*assegnista di ricerca*) at the Attention, Perception and Ageing Lab in the Center for Mind/Brain Sciences (CIMeC), University of Trento (Trento, IT). Topic: *Advanced data analysis of neuroimaging recordings to assess the effects of ageing on brain connectivity of healthy elderly adults.*
Nov.2020—Jan.2021 – **Research collaborator** (*collaboratore di ricerca*) at the NSE Laboratory in the Department of Physics, University of Trento (Trento, IT). Topic: *Development of numerical methods for the analysis of signals generated by complex, nonlinear systems; analysis and optimization of a chaotic circuit to simulate coupled laser systems.*

Education

PhD in Physics – November 2020, Dept. of Physics, University of Trento, Trento (IT)
        Mark: Excellent *cum laude*
        Thesis title: *"A new approach to optimal embedding of time series"*
        Supervisor: Prof. Leonardo Ricci (University of Trento)

Master Degree in Physics – July 2017, University of Trento, Trento (IT)
        Mark: 110/110 *with honour*
        Thesis title: *"Characterising dynamical systems via distributions of distances"*
        Supervisor : Prof. Leonardo Ricci (University of Trento)

Bachelor Degree in Physics – September 2015, University of Trento, Trento (IT)
        Mark: 110/110 *with honour*
        Thesis title: *"Correlation matrix: a statistical method applied to light scattering in disordered systems"*
        Supervisor : Dr. Francesco Riboli (INO-CNR – Firenze)

Teaching activity

A.Y. 2019/20, 20/21, 21/22 – **Teaching assistant** of the course of *Laboratorio di Fisica III* (Bachelor Degree in Physics) at the Department of Physics, University of Trento.

A.Y. 2018/19 – **Teaching assistant** of the course of *Laboratory of Advanced Electronics* (Master Degree in Physics) at the Department of Physics, University of Trento.

A.Y. 2017/18, 18/19 – **Teaching assistant** of the course of *Fisica Generale III* (Bachelor Degree in Physics) at the Department of Physics, University of Trento.

A.Y. 2016/17 – **Tutor** for the course of *Fisica Generale I* (Bachelor Degree in Physics) at the Department of Physics, University of Trento.

Referee activity

Review editor of *Frontiers in Network Physiology* (editorial board of *Information Theory*).
Reviewer activity:
- **Chaos: An Interdisciplinary Journal of Nonlinear Science** (AIP)
- **Nonlinear Dynamics** (Springer)
- **International Journal of Bifurcation and Chaos** (World Scientific)
- **Journal of Healthcare Engineering** (Hindawi)

Association to scientific societies

Associated to **INFN** (Istituto Nazionale di Fisica Nucleare); member of **TIFPA** (Trento Institute for Fundamental Physics and Applications)
Associated to **SIFS** (Società Italiana di Fisica Statistica)

Work experience

Dec.2020—ongoing – **Co-founder of *Inspicio SRL**. Inspicio* is a Start-Up sponsored by the University of Trento. The company's core business concerns the research and development of sensors and devices for scientific and industrial metrology (www.inspicio.it).

Jul.2017—Sep.2017 – **Consultant Physicist at Eoptis SRL** (Trento, IT). Task: *Analysis of a database of optical transmittance and fluorescence spectra. Development of a classification algorithm.*

Other relevant activities

Mar.2018—Nov.2020 – **Representative of the PhD students in Physics** within the Doctoral School Board (Dept. of Physics, University of Trento).

Set.—Nov.2018. – Organization of the *PhD Workshop 2018*, Dept. of Physics, University of Trento.

Nov.2018 – Participation to the *S/HPC Scientific High-Performance Computing* school, Trento.

Jul.2017. – Participation to *IPSP-2017 (Industrial Problem Solving with Physics)*, Dept. of Physics, University of Trento.

Languages

Italian – Native speaker.

English – Highly proficient in spoken and written English.

Other relevant skills

• Design of analog and digital electronic circuits for data acquisition and control of scientific instruments. Good knowledge of hardware-descriptive languages (Verilog) for the implementation of digital circuitry on FPGAs (field-programmable gate arrays).

• Scientific and numerical computing in C, C++, Matlab®, Python, R. Creator and maintainer of several software packages (NetOnZeroDXC, SpiSeMe, RemoteLab, MiRNAQCD). Good expertise in the development of parallelized code through OpenMP and MPI, as well as in writing GPU-targeting code by means of CUDA®.

• Development under Unix/Linux environment.

• Web front-end development (html and css); creator and maintainer of the NSE Lab website.

• Very good knowledge of LaTeX.

List of Publications

Journal articles

- G. Bassi, C. Giuliano, A. Perinelli, S. Forti, S. Gabrielli and S. Salcuni (2022). *Motibot - The Virtual Coach for Healthy Coping Intervention among adults with diabetes: A Proof-of-Concept study.* JMIR Human Factors **9**:e32211, `doi:10.2196/32211`

- G. Mijatovic, R. Pernice, A. Perinelli, Y. Antonacci, M. Javorka, L. Ricci and L. Faes (2021). *Measuring the Rate of Information Exchange in Point-Process Data with Application to Cardiovascular Variability.* Frontiers in Network Physiology **1**:765332, `doi:10.3389/fnetp.2021.765332`

- L. Ricci, A. Perinelli, M. Castelluzzo, S. Euzzor and R. Meucci (2021). *Experimental evidence of chaos generated by a minimal universal model oscillator.* International Journal of Bifurcation and Chaos **31**:2150205, `doi:10.1142/S0218127421502059`

- L. Ricci, A. Perinelli, M. Castelluzzo (2021). *Estimating the variance of Shannon entropy.* Phys. Rev. E **104**:024220, `doi:10.1103/PhysRevE.104.024220`

- A. Perinelli, M. Castelluzzo, D. Tabarelli, V. Mazza and L. Ricci (2021). *Relationship between mutual information and cross-correlation time scale of observability as measures of connectivity strength.* Chaos **31**:073106, `doi:10.1063/5.0053857`

- M. Missiaggia, E. Pierobon, M. Castelluzzo, A. Perinelli, F. Cordoni, M. Centis Vignali, G. Borghi, E. V. Bellinzona, E. Scifoni, F. Tommasino, V. Monaco, L. Ricci, M. Boscardin, C. La Tessa (2021). *A novel hybrid microdosimeter for radiation field characterization based on TEPC detector and LGADs tracker: a feasibility study.* Frontiers in Physics **8**:472, `doi:10.3389/fphy.2020.578444`

- M. Castelluzzo, A. Perinelli, D. Tabarelli and L. Ricci (2021). *Dependence of connectivity on the logarithm of geometric distance in brain networks.* Frontiers in Physiology **11**:611125, `doi:10.3389/fphys.2020.611125`

- A. Perinelli and L. Ricci (2020). *Chasing chaos by improved identification of suitable embedding dimensions and lags.* Chaos **30**:123104, `doi:10.1063/5.0029333`

- M. Castelluzzo, A. Perinelli, S. Detassis, M. A. Denti and L. Ricci (2020). *MiRNA-QC-and-Diagnosis: An R package for diagnosis based on MiRNA expression.* SoftwareX **12**:100569, `doi:10.1016/j.softx.2020.100569`

- A. Perinelli, M. Castelluzzo, L. Minati and L. Ricci (2020). *SpiSeMe: A multi-language package for spike train surrogate generation.* Chaos **30**:073120, `doi:10.1063/5.0011328`

- L. Ricci, A. Perinelli and M. Franchi (2020). *Asymptotic behavior of the time-dependent divergence exponent.* Phys. Rev. E **101**:042211, `doi:10.1103/PhysRevE.101.042211`

- L. Ricci, M. Castelluzzo, L. Minati and A. Perinelli (2019). *Generation of surrogate event sequences via joint distribution of successive inter-event intervals.* Chaos **29**:121102, `doi:10.1063/1.5138250`

- L. Minati, H. Ito, A. Perinelli, L. Ricci, L. Faes, N. Yoshimura, Y. Koike and M. Frasca (2019). *Connectivity Influences on Nonlinear Dynamics in Weakly-Synchronized Networks: Insights From Rössler Systems, Electronic Chaotic Oscillators, Model and Biological Neurons.* IEEE Access **7**:174793, `doi:10.1109/ACCESS.2019.2957014`

- A. Perinelli, F. Finotti, A. M. Tonelli, L. Ricci and R. Albatici (2019). *Experimental apparatus for the determination of thermal conductivity and humidity in building materials by means of electrical permittivity measurements.* Tema **5**:29, `doi:10.17410/tema.v5i2.226`

- A. Perinelli, D. Tabarelli, C. Miniussi and L. Ricci (2019). *Dependence of connectivity on geometric distance in brain networks.* Scientific Reports **9**:13412, `doi:10.1038/s41598-019-50106-2`

- A. Perinelli and L. Ricci (2019). *NetOnZeroDXC: A package for the identification of networks out of multivariate time series via zero-delay cross-correlation.* SoftwareX **10**:100316, `doi:10.1016/j.softx.2019.100316`

- N. Pace, L. Ricci, M. Scotoni, A. Perinelli and J. Jovicich (2019). *Characterization of time-varying magnetic fields and temperature of helium gas exit during a quench of a human magnetic resonance system.* Biomedical Physics & Engineering Express **5**:045021, `doi:10.1088/2057-1976/ab2300`

- A. Perinelli and L. Ricci (2018). *Identification of suitable embedding dimensions and lags for time series generated by chaotic, finite-dimensional systems.* Phys. Rev. E **98**:052226, `doi:10.1103/PhysRevE.98.052226`

- A. Perinelli, D. E. Chiari and L. Ricci (2018). *Correlation in brain networks at different time scale resolution.* Chaos **28**:063127, `doi:10.1063/1.5025242`

Conference talks & posters

- A. Perinelli, M. Castelluzzo, V. Mazza and L. Ricci (2021). *Cross-correlation time scale of observability: a new measure of connectivity strength and its relationship with mutual information.*, XXV Convegno Nazionale di Fisica Statistica e dei Sistemi Complessi – 23rd-25th June 2021

- A. Perinelli, D. Tabarelli and L. Ricci (2019). *Are observable links between brain nodes due to geometric proximity?*, in Second International Summer Institute on Network Physiology (ISINP). Proceedings of: ISINP, Como, 28 July 2019 - 02 August 2019.

- A. Perinelli and L. Ricci (2018). *Embedding-Dependent, Full Scale Characterization of Sample Correlation Integrals*, in Chaos 2018 - Book of Abstracts - 11 th Chaotic Modeling and Simulation International Conference: Springer proceedings in complexity. - ISBN: 978-3-030-15296-3. Proceedings of: Chaos 2018 - 11 th Chaotic Modeling and Simulation International Conference, Rome, Italy, 05th-08th June 2018. p. 89-89

Works under review

- A. Perinelli, S. Assecondi, C. F. Tagliabue and V. Mazza (2022). *Power shift and connectivity changes in healthy aging during resting-state EEG.* Submitted to: NeuroImage.

Trento, 01/02/2022