

CURRICULUM OF SEBASTIANO STRAMAGLIA

- Born in Milan (Ita)
- Master Degree in Physics on 07/18/1991, at the University of Bari, 110/110 cum laude
- PhD in Physics, PhD course held at the Department of Physics of the University of Bari, November 1991- October 1994, degree awarded in 1995.
- In 1995 he received an annual scholarship at the Research Institute in Applied Mathematics (IRMA) of the CNR of Bari.
- In the two-year period 1997-1998 he received a two-year scholarship at the Institute of Signal and Image Processing (IESI) of the CNR of Bari.
- In the period from 01/09/1999 to 28/02/2001 he was research fellow at the Department of Physics of the University of Bari.
- From 1st March 2001 to 30th October 2015, he was Assistant Professor at the Physics Department of the University of Bari Aldo Moro, sector FIS / 02 Theoretical Physics.
- From 31st October 2015 to 2nd May 2021, Associate Professor at the Department of Physics University of Bari Aldo Moro, sector FIS / 07, Applied Physics.
- From 3rd May 2021, Full Professor at the Department of Physics University of Bari Aldo Moro, sector FIS / 07, Applied Physics.
- Since 4 July 2019 he is Director of the Interdepartmental Research Center of Excellence "On Innovative Technologies for Revelation and Processing of Signal - TIRES ", University of Bari Aldo Moro.
- From December 2018 to July 2020 he was a member of "Senato Accademico", University of Bari Aldo Moro, representing the 02- Physics Area.
- VISITING PROFESSOR at Biocruces Health Institute, Bilbao, Spain, since November 2013 to October 2014.
- VISITING SCIENTIST at Nordita Institute, Copenhagen, in 1994; at the Physics Dept. of Boston University, in 2003; at CERN in 2004; at Gent University, Gent, Belgium October-November 2015.
- "EXTERNAL SCIENTIFIC MEMBER" of the Basque Center for Applied Mathematics (BCAM), Bilbao, since 2015 to 2019.
- He gave more than 30 invited talks at conferences and workshops.

SCIENTIFIC ACTIVITY

- To date he is co-author of over 150 publications in international journals indexed on the ISI Web of Science and Scopus databases.
- To date his h-index is equal to 28 according to Scopus.
- From 2002 to 2015 he was a member of the National Scientific Commission V of the National Institute of Nuclear Physics, as Group IV Observer.
- Editor roles in FRONTIERS: Associate Editor in Fractal Physiology; Associate Editor in Information Theory; Review Editor in Cognitive Neuroscience
- Guest Editor, together with Luca Faes and Alberto Porta, of the Special Issue "Information Dynamics in Brain and Physiological Networks" in the journal ENTROPY, year 2019, a collection of 18 peer reviewed publications on the subject.
- Referee of dozens of international journals including Physical Review Letters, Physical review E, PLoS Computational Biology, Cognitive Brain Research, Brain Research Bulletin, Brain Connectivity, Cerebral Cortex, Journal of Physics A, Physica A, Physica D, New Journal of Physics , Europhysics Letters, Journal of Statistical Mechanics, Physical Review E, BMC Bioinformatics,

Journal of Neuroscience Methods, PLoS ONE, IEEE Transactions on Automatic Control, IEEE Transactions on Neural Networks, Neural Computation, BMC Neuroscience, Frontiers in Physiology, Frontiers in Systems Neuroscience, Measurement, Nature Scientific Reports and many more.

RESEARCH ACTIVITY DESCRIPTION

The degree thesis dealt with a strongly correlated electron model on a crystal lattice relevant for the description of superconducting ceramic materials with high critical temperature. The PhD thesis in Physics concerned Statistical Mechanics models known as Matrix Models, describing random surfaces for string theory. After the PhD, the research activity continued for a short time in the study of statistical mechanics in equilibrium and out of equilibrium.

Since 1995 he has been involved in the development of Statistical Physics models for the description of complex systems in Medicine and Biology, and in the development of algorithms for data classification and for the analysis of signals in various application sectors, mainly in Medicine and Biology.

Briefly, his research activity can be summarized according to the following main research lines.

MODELS AND ALGORITHMS OF NEURAL NETWORKS.

PHASE UNWRAPPING ALGORITHMS FOR THE ANALYSIS OF DATA FROM SATELLITE.

ALGORITHMS FOR DATA CLASSIFICATION.

NETWORK PHYSIOLOGY.

NETWORK NEUROSCIENCE.

HIGHER ORDER NETWORK DYNAMICS.

ORGANIZER OF THE FOLLOWING CONFERENCES

- (1) **Modelling Bio-Medical Signals** (20-21 settembre 2001, Bari Italy).
- (2) **Theoretical Methods in Quantitative Biology and Medicine** (7-9 settembre 2005, Bari, Italy).
- (3) **Modeling Migraine: From Nonlinear Dynamics to Clinical Neurology** (22-23 July 2009, Berlino, as part of the Eighteenth Annual Computational Neuroscience Meeting CNS*2009).
- (4) NIPS-2011 Satellite Meeting on **CAUSAL GRAPHS: LINKING BRAIN STRUCTURE TO FUNCTION**, Granada December 2011.
- (5) **SM&FT 2011** The XV Workshop on Statistical Mechanics and nonperturbative Field Theory, Bari (Italy), September 21-23, 2011
- (6) Nonlinear dynamics in electronic systems **NDES 2013**, Bari 10-12 July 2013.
- (7) Nonlinear dynamics in electronic systems **NDES 2014**, Albena (Bulgaria) 4-6 July 2014. (8) Nonlinear dynamics in electronic systems **NDES 2015**, Como (Italia) 7-11 September 2015.
- (9) **Quantitative Biomedicine for Health and Disease**, February 17-18, 2015, BCAM, Bilbao Spain.
- (10) **SMFT 2015**, The XVI workshop on Statistical Mechanics and non-perturbative Field Theory, Bari 9-11 december 2015;
- (11) **Q BIO 2016** Quantitative Biomedicine for Health and Disease, February 24-25, 2016, Bilbao Spain.
- (12) Meeting Biophys & Pieces, 26-28 September 2016, Bari, Italy
- (13) **Q BIO 2017** Third BCAM Workshop on Quantitative Biomedicine for Health and Disease. February 21-22, 2017 BCAM-Basque Center for Applied Mathematics
- (14) **Summer Solstice 2017**: 9th International Conference on Discrete Models of Complex Systems,

Catania 21-23 June 2017, Italy.

(15) **SMFT 2017**, The XVI workshop on Statistical Mechanics and non-perturbative Field Theory, Bari 13-15 december 2017;

(16) **Q BIO 2018** Fourth BCAM Workshop on Quantitative Biomedicine for Health and Disease. February 28- March 1, 2018 BCAM-Basque Center for Applied Mathematics

(17) **Q BIO 2019** Fifth BCAM Workshop on Quantitative Biomedicine for Health and Disease. February 13-14 2019 BCAM-Basque Center for Applied Mathematics

(18) **SMFT 2019**, The XVII workshop on Statistical Mechanics and non-perturbative Field Theory, Bari 11-13 december 2019.

PROJECTS

- 2005, “Analisi di segnali fisiologici per la diagnostica dell’emicrania e della Corea di Huntington”. Budget: 120.000,00 €, cofunded by Fondazione Cassa di Risparmio di Puglia and Università degli Studi di Bari.
- **PRIN 2009** “Dynamics of communities”, funded by MIUR, PI: Prof. Amos Maritan, Università di Padova.
- **PRIN 2012** “Statistical Physics of Active Matter: Disentangling Complexity Patterns in Biological Systems”, funded by MIUR, PI: Prof. Amos Maritan, Università di Padova.
- Since 2002 “Biological applications of Theoretical Physics Methods”, funded by INFN , about 10 keuro per year.
- “BRAhMS – Brain Aura Mathematical Simulation” cofunded by Bizkaia Talent and European Commision through the COFUND programme, 2014 - 2016, reference number AYD-000-285 (budget: 44.625,00 €).
- REDES EPILEPTICAS MULTI ESCALA (multiscale epileptic networks) Networks epilettiche multiscala) funded by Spanish Ministry of Health budget 121 keuro, 2016-2018 PI: Paolo Bonifazi, Biocruces Health Research Inst., Bilbao, Spagna.
- 2017-2020. CRITICOGN: Longitudinal study of cognitive functioning in critical patients with multiple organ dysfunction syndrome and its relation to brain networks obtained from neuroimaging. Principal Investigators: Jesus M Cortes and Juan Carlos Arango. Employer: MINECO (Retos). budget: 205 700 EUR
- 2014-2015. Retrospective study for characterization and analysis of gliomas (grade, infiltration and recurrence). Principal Investigators: Jesus M Cortes (Biocruces), Estibaliz Garrote (Tecnalia). Employer: Euskampus. budget: 34.666 EUR
- 2013-2014. Longitudinal variations of whole-brain functional connectivity in a mouse model of mesial temporal lobe epilepsy. Principal investigators: Jesus M Cortes (Biocruces), Juan Manuel Encinas (Achucarro), Amanda Sierra (University of the Basque Country). Employer: Euskampus. budget: 11.000 EUR
- FABBR 2017: funded by MIUR.
- **PRIN 2017** “Stochastic forecasting in complex systems”, funded by MIUR, PI: il prof. Rosario Mantegna, Università di Palermo.

BOOKS

- 1) **MODELLING BIOMEDICAL SIGNALS**, Editors: Giuseppe Nardulli and Sebastiano Stramaglia, **World Scientific** (Singapore) 292pp. Maggio 2002 ISBN: 978-981-02-4843-7.
- 2) **Emergent Complexity from Nonlinearity, in Physics, Engineering and the Life Sciences**. Proceedings of the XXIII International Conference on Nonlinear Dynamics of Electronic Systems, Como, Italy, 7-11 September 2015 Editors: Mantica, Giorgio, Stoop, Ruedi, Stramaglia, Sebastiano (Eds.). **Springer Proceedings in Physics**. ISBN 978-3-319-47810-4

SELECTED PUBLICATIONS

1. G. Sebastiani, S. Stramaglia, "A Bayesian approach for the median filter in image processing", **SIGNAL PROCESSING** (62)3 (1997).
2. G. Lattanzi, G. Nardulli, G. Pasquariello, S. Stramaglia, "Stochastic learning in a neural network with adapting synapses", **PHYSICAL REVIEW E** 56, pp.4567-4573 (1997). Corresponding author.
3. L. Guerriero, G. Nico, G. Pasquariello, S. Stramaglia, "New regularization scheme for phase unwrapping", **APPLIED OPTICS**, 37 pp. 3053-8, (1998). Corresponding author.
4. A. Sternieri, P. Anelli, S. Stramaglia, U. Emiliani, "AGAPE: Parallel Genetic Algorithm Programming Environment developed for **APE100/QUADRICS**", **COMPUTERS AND ARTIFICIAL INTELLIGENCE**, Vol. 18, No.3, pp.217-237 (1999).
5. L. Angelini, F. De Carlo, C. Marangi, M. Pellicoro, S. Stramaglia, "Clustering data by inhomogeneous chaotic map lattices", **PHYSICAL REVIEW LETTERS** 85, p.554-557 (2000). Corresponding author.
6. M. Ambriola, R. Bellotti, M. Circella, R. Maglietta, S. Stramaglia, "Supervised algorithms for particle classification by a transition radiation detector". **NUCLEAR INSTRUMENTS AND METHODS IN PHYSICS RESEARCH A** 510 pp. 362-370 (2003).
7. N. Ancona, D. Marinazzo, S. Stramaglia, "Radial basis function approach to nonlinear Granger causality of time series", **PHYSICAL REVIEW E** 70, 56221-7 (2004). Selected for The Virtual Journal of Biological Physics Research. Corresponding author.
8. N. Ancona, S. Stramaglia, "An invariance property of predictors in kernel-induced hypothesis spaces", **NEURAL COMPUTATION** 18 pp.749-759 (2006). Corresponding author.
9. Marinazzo D, Pellicoro M, Stramaglia S, "Kernel method for nonlinear Granger causality", **PHYSICAL REVIEW LETTERS** 100, pp. 144103-144106 (2008). Selected for The Virtual Journal of Biological Physics Research. Corresponding author.
10. S. Stramaglia, J.M. Cortes, D. Marinazzo, "Synergy and redundancy in the Granger causal analysis of dynamical networks", **NEW JOURNAL OF PHYSICS** 16 (2014) 105003, 17 pages. Corresponding author.
11. A. Montalto, S. Stramaglia, L. Faes, G. Tessitore, R. Prevete, D. Marinazzo, "Neural Networks with Non-Uniform Embedding and Explicit Validation Phase to Assess Granger Causality", **NEURAL NETWORKS** Volume 71, November 2015, Pages 159-171
12. S. Stramaglia, L. Angelini, G. Wu, JM Cortes, L. Faes, D. Marinazzo, Synergetic and Redundant Information Flow Detected by Unnormalized Granger Causality: Application to Resting State fMRI **IEEE Transactions on Biomedical Engineering**, Volume 63, Issue 12, December 2016, Article number 7462237, Pages 2518-2524
13. L. Faes, G. Nollo, S. Stramaglia, D. Marinazzo, "Multiscale Granger causality", **Physical Review E** Volume 96, Issue 4, 25 October 2017, Article number 042150

14. L. Faes, D. Marinazzo, S. Stramaglia, "Multiscale information decomposition: Exact computation for multivariate Gaussian processes", **Entropy** Volume 19, Issue 8, 1 August 2017, Article number 408
15. J. Rasero, M. Pellicoro, L. Angelin, J.M. Cortes, D. Marinazzo, and S.Stramaglia, "Consensus clustering approach to group brain connectivity matrices" **Network Neuroscience** 2017 1:3, 242-253
16. J. Rasero, H. Aerts, M. Ontivero Ortega, J.M. Cortes, S. Stramaglia, D. Marinazzo, Predicting functional networks from region connectivity profiles in task based versus resting-state fMRI data, **Plos One** 13, e0207385 (2018).
17. Bonifazi, P., Erramuzpe, A., Diez, I., Gabilondo, I., Boisgontier, M.P., Pauwels, L., Stramaglia, S., Swinnen, S.P., Cortes, J.M., Structure–function multi-scale connectomics reveals a major role of the fronto-striato-thalamic circuit in brain aging, **Human Brain Mapping** 39, 4663 (2018).
18. Marinazzo, D, Angelini, L, Pellicoro, M, Stramaglia, S (2019). Synergy as a warning sign of transitions: The case of the two-dimensional Ising model. **PHYSICAL REVIEW E**, vol. 99, ISSN: 2470-0045, doi: 10.1103/PhysRevE.99.040101
19. Stramaglia S., Scagliarini T., Daniels B. C., Marinazzo D., "Quantifying Dynamical High-Order Interdependencies From the O-Information: An Application to Neural Spiking Dynamics, *Frontiers in Physiology*, vol. 11, 2021.
20. S. Stramaglia, T. Scagliarini, Y. Antonacci, and L. Faes, Local Granger causality, *Phys. Rev. E* 103, L020102, 2021.

Bari, 12 Settembre 2022

Sebastiano Stramaglia

A handwritten signature in dark ink, appearing to read 'Sebastiano Stramaglia', written in a cursive style.