# MARCO BUIATTI

*CURRICULUM VITAE*
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## GENERAL

Date and place of birth: 20/01/1972, Firenze (Italy)
Nationality: Italian
Languages: Italian (native), English and French (fluent)
Status: Married, 2 children (2003, 2008)

## WORK EXPERIENCE

**2023**            **Italian National Habilitation (ASN) for Associate Professor** in the area
                    **Applied Physics** (SC: 02/D1, SSD: FIS/07)

**2015 – present**  **Research Engineer (Cat. EP), Lab Manager of the**
                    **Neonatal Neuroimaging Unit and Baby Lab**,
                    Center for Mind/Brain Sciences (CIMeC), University of Trento, Italy

**2010 – 2014**     **Research Engineer (Cat. IR2), Technical Director of the MEG Lab,**
                    INSERM Cognitive Neuroimaging Unit (U992), Neurospin, France

**2007- 2009**      **Postdoctoral Research Fellow**
                    Center for Mind/Brain Sciences, University of Trento, Italy

**2005 –2006**      **Postdoctoral Research Fellow**, INSERM Cognitive Neuroimaging Unit
                    (U992), Orsay, France. PI: Ghislaine Dehaene-Lambertz

**2002 - 2005**     **Postdoctoral Research Fellow**, Neurophysics and Physiology Laboratory
                    (CNRS U8119), Paris, France. PI : Carl Van Vreeswijk

**1998 - 1999:**    **Postgraduate Research Fellow**, Biophysics Institute (CNR) Pisa, Italy.
                    PI: Prof. Paolo Grigolini.

## EDUCATION

**2002 - 2006**     **PhD in Cognitive Neurosciences**, Université Paris VI, Paris, France.
                    Supervisor: Dr. Carl van Vreeswijk.

| 1999 - 2001 | **Master (Mphil) in Computational Neurosciences**, Gatsby Computational Neuroscience Unit (UCL), London, UK. Supervisor: Prof. Geoffrey Hinton. |
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| 1990 - 1997: | **Laurea Degree in Physics** (110/110 summa cum laude), University of Pisa, Italy. Supervisor: Prof. Paolo Grigolini. |

## PROFESSIONAL AND SCIENTIFIC TRAINING

| 2015 | Professional training on the use of pediatric EEG EGI system (Electrical Geodesic, Inc.), CIMeC, Rovereto, Italy |
|---|---|
| 2012 | Cryogenics, Centre Energie Atomique, Saclay, France. |
| 2012 | Brainstorm (software for EEG/MEG data analysis), Satellite Course of Biomag, 18th International Conference on Biomagnetism, Paris, France. |
| 2011 | EEG/MEG SPM (software for EEG/MEG data analysis), Functional Imaging Laboratory, University College London, London, UK. |
| 2011 | Professional training on the use of Elekta MEG, Hopital La Salpetriere, Paris, France. |
| 2007 | EEGLAB Workshop (software for EEG/MEG data analysis), Aspet, France. |
| 2005 | Synchronization in nonlinear systems and complex networks, Societa' Italiana Caos e Complessita', Firenze, Italy |
| 2004 | Advanced methods of elaboration of biomedical signals, Italian national Group of Bioengineering, Bressanone, Italy. |
| 1999 | School on Neural Information Processing, Abdus Salam International Centre for Theoretical Physics, Trieste, Italy. |

## EDITORIAL ACTIVITY

**Editorial boards**
Guest Editor of the Special Issue "Developmental EEG: Advances on Data Analysis Methods", Sensors (2023-)
Editorial board member, Frontiers in Computational Neuroscience (2023-)
Editorial board member, Biology Forum (2008-2014)

**Ad-Hoc Reviewer for scientific journals:** PNAS, Neuroimage, Journal of Neural Engineering, Cerebral Cortex, Developmental Cognitive Neuroscience, Developmental Science, iScience, Psychophysiology, Journal of Neuroscience Methods, Measurement, Physical Review E, Chaos Solitons & Fractals, Physica A, Journal of Biological Physics, IEEE Transactions Biomedical Engineering, IEEE Transactions on Neural Systems and Rehabilitation Engineering, Computers in Biology and Medicine, Sensors, ICASSP (IEEE Signal Processing Society), European Signal Processing Conference, PeerJ, Scientific Reports, International Journal of Psychophysiology, Frontiers in Human Neuroscience, Frontiers in Neuroscience –

Brain Imaging Methods, Cognitive Neuropsychology, Laterality, Brain Connectivity, Theoretical Biology Forum.

**Other reviewer activities:**
External reviewer for the European Research Council (ERC Starting Grants, 2018)
External reviewer for the Fund for Scientific Research-FNRS, Belgium (2020, 2021, 2023).

## SCIENTIFIC COMMITTEES

Member of the scientific committee of the [Centro Interdipartimentale per lo Studio dei Sistemi Complessi](#) (Interdepartmental Center for Complex Systems Studies), University of Pisa (2022-)

## STUDENT SUPERVISION

*14 Master students, 2 Phd students (co-supervised).*

## TEACHING

"Lo sviluppo della specializzazione corticale per l'elaborazione dei volti" within the course "Metodi di ricerca in neuroscienze cognitive", Prof. Maria Paola Paladino, Corso di Laurea in Scienze e Tecniche di Psicologia, Dipartimento di Psicologia e Scienze Cognitive, Universita' di Trento (2017: 2 h).

"L'uso dell'EEG per studiare le basi neurali del senso del numero" within the course "Le basi neurali della abilità di calcolo e di lettura", Prof. Manuela Piazza, Corso di Laurea in Scienze e Tecniche di Psicologia, Dipartimento di Psicologia e Scienze Cognitive, Universita' di Trento (2016: 4 h).

"Advanced Methods of EEG/MEG Data Analysis" within the course "Foundations of Brain Imaging", Prof. Jorge Jovicich, Master of Cognitive Neuroscience, CIMeC, Università di Trento (2015: 2 h).

"Advanced Methods of EEG/MEG Data Analysis" within the course "Metodi Indagine Neuroscienze Cliniche Cognitive" Prof. Jorge Jovicich, Corso di Laurea in Scienze e Tecniche di Psicologia, Dipartimento di Psicologia e Scienze Cognitive, Universita' di Trento (2008: 3 h; 2009: 8 h).

"Metodi di visualizzazione dell'attivita' cerebrale", Course for Tecnici Operatori Socio Sanitari, Opera Armida Barelli, Rovereto (2016: 8 h).

## INVITED TALKS

"Frequency-tagging: A powerful method to investigate neurocognitive development with EEG", [CuttingGardens: EEG and MEG methods multi-hub meeting, Genova](#), 2023

"Functional relevance and limits of scale-free temporal brain fluctuations", [Dynamics and Complexity Pisa](#), 2023

"Developmental cognitive neuroimaging out of noisy, short-duration EEG data: a methodological challenge", CReSCo Seminars on Developmental Neuroscience, Università di Trento/Istituto Italiano di Tecnologia, Rovereto (TN), 2022.

"Cortical route for face processing in human newborns", Center for Cognitive Neuroscience, Dartmouth College, Hanover, USA, 2020.

"Una via corticale per il riconoscimento dei volti nei neonati.", IRCCS Fondazione Stella Maris, Pisa, 2019.

"Basi cerebrali della percezione dei volti nei neonati",
Convegno "La Ricerca, tra Università, Ospedale e Istituzioni", Rovereto (TN), 2017.

"MEG and Brain Dynamics", Convegno annuale dell'Institut Federatif de Recherche 49, Gif-sur-Yvette, France, 2013.

"Neuromagnetic imaging: a MEG platform to track the spatiotemporal patterns of brain activity underlying sensory and cognitive functions", CIMeC, Università di Trento, Rovereto (TN), 2012.

"Frequency-tagging", nell'ambito del corso "Ecole Oscillations Cerebrales en MEG-EEG", Institute Cerveau Moelle epiniere, Paris, France, 2011.

"Neuromagnetic imaging: alla scoperta dei patterns spaziotemporali dell'attività cerebrale", Ciclo di Seminari 2011 dell'Istituto di Biofisica di Pisa, Pisa, 2011.

"Neural Temporal Tagging: Tracking the neural signatures of cognitive processes by their temporal structure", Cognitive Neuroimaging Unit, Neurospin, Gif-sur-Yvette, France, 2009.

"Multidimensional analysis of the neural dynamics underlying a cognitive process", nell'ambito della scuola estiva "Bioingegneria per le Scienze Cognitive", Bressanone, Italy, 2009.

"Beyond EEG event-related activity: correlations and oscillations in brain dynamics", CIMeC, Università di Trento, 2006.

"Correlations in DNA sequences: a tool to study their complex structure", Istituto Politecnico, Torino, Italy 2005.

"Variance normalisation: a key mechanism for temporal adaptation in natural vision?" The Annual Computational Neuroscience Meeting, Alicante, Spain, 2003.

"Variance normalisation: a crucial mechanism for dynamic adaptation in natural vision?" Complessita' e scienze della vita, Italian Society for Chaos and Complexity, 2002.

"Randomness, heterogeneity and scaling in DNA walks", American Physical Society Centennial Meeting Program, Atlanta, GA, 1999.

## PUBLICATIONS

Scopus: 1720 citations, h-index=15;

**Peer-reviewed articles:**

Kartsch V, Kumaravel VP, Benatti S, Vallortigara G, Benini L, Farella E, **Buiatti M**,
Efficient Low-Frequency SSVEP detection with wearable EEG using Normalized Canonical Correlation Analysis.
*Sensors 22(24)*, 9803 (2022)

Kumaravel VP, **Buiatti M**, Parise E, Farella E,
Adaptable and Robust EEG Bad Channel Detection Using Local Outlier Factor (LOF).
*Sensors 22(19), 7314 (2022)*

Kumaravel VP, Farella E, Parise E, **Buiatti M**,
NEAR: An artifact removal pipeline for human newborn EEG data.
*Developmental Cognitive Neuroscience*, 101068 (2022)

Kumaravel VP, Kartsch V, Benatti S, Vallortigara G, Farella E, **Buiatti M**,
Efficient Artifact Removal from Low-Density Wearable EEG using Artifacts Subspace Reconstruction,
*43rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)*, 333-336 (2021).

Kumaravel VP, **Buiatti M**, Farella E,
Hyperparameter selection for reliable EEG denoising using ASR: a benchmarking study.
*IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, 3638-3641 (2021).

Viganò S, Rubino V, **Buiatti M**, Piazza M,
The neural representation of absolute direction during mental navigation in conceptual spaces.
*Communications Biology* **4,** 1294 (2021).

Viganò S, Rubino V, Di Soccio A, **Buiatti M**, Piazza M,
Grid-like and distance codes for representing word meaning in the human brain.
*NeuroImage*, 117876 (2021).

**Buiatti M**, Di Giorgio E, Piazza M, Polloni C, Menna G, Taddei F, Baldo E, Vallortigara G,
Cortical route for facelike pattern processing in human newborns,
*Proceedings of the National Academy of Sciences,* doi.org/10.1073/pnas.1812419116 (2019).

Borghesani V, **Buiatti M**, Eger E, Piazza M,
Conceptual and Perceptual Dimensions of Word Meaning Are Recovered Rapidly and in Parallel during Reading,
*Journal of Cognitive Neuroscience*, doi:10.1162/jocn_a_01328 (2018).

Montagna F, **Buiatti M**, Benatti S, Rossi D, Farella E, Benini L,
A machine learning approach for automated wide-range frequency tagging analysis in embedded neuromonitoring systems
*Methods* 129, 96-107 (2017)

Borghesani V, Pedregosa F, **Buiatti M**, Amadon A, Eger E, Piazza M,

Word meaning in the ventral visual path: a perceptual to conceptual gradient of semantic coding,
*NeuroImage* 143,128-140 (2016)

Kabdebon C, Pena M, **Buiatti M**, Dehaene-Lambertz G,
Electrophysiological evidence of statistical learning of long-distance dependencies in 8-month-old preterm and full-term infants,
*Brain and Language* 148, 25-36 (2015)

Strauss M, Sitt JD, King JR, Elbaz M, Azizi L, **Buiatti M**, Naccache L, van Wassenhove V, Dehaene S,
Disruption of hierarchical predictive coding during sleep
*Proceedings of the National Academy of Sciences* 112 (11), E1353-E1362 (2015).

Strauss M, Sitt JD, King JR, Elbaz M, Azizi L, **Buiatti M**, Naccache L, van Wassenhove V, Dehaene S,
Atteinte des processus de prédiction mais conservation de l'adaptation sensorielle au cours du sommeil,
*Médecine du Sommeil*, 12 (1), 58 (2015)

Andres M, Finocchiaro C, **Buiatti M**, Piazza M. Motor interference during lexico-semantic processing of action verbs,
*Cognition* 134, 174-184 (2015).

Pegado F, Comerlato E, Ventura F, Jobert A, Nakamura K, **Buiatti M**, Ventura P, Dehaene-Lambertz G, Kolinsky R, Morais J, Braga LW, Cohen L, Dehaene S. Timing the impact of literacy on visual processing,
*Proceedings of the National Academy of Sciences* 111 (49), E5233-E5242 (2014).

Borghesani V, Pedregosa F, Eger E, **Buiatti M**, Piazza M,
A perceptual-to-conceptual gradient of word coding along the ventral path,
*2014 International Workshop on Pattern Recognition in Neuroimaging, 1-4*.

Mognon A, Bruzzone L, Jovicich J, **Buiatti M**,
ADJUST: An Automatic EEG artifact Detector based on the Joint Use of Spatial and Temporal features.
*Psychophysiology* 48 (2), 229-240 (2011).

Forget J, **Buiatti M**, Dehaene S,
Temporal integration in visual word recognition,
*Journal of Cognitive Neuroscience* 22(5), 1054-1068 (2010).

**Buiatti M**, Pena M, Dehaene-Lambertz G,
Investigating the neural correlates of continuous speech computation with frequency-tagged neuroelectric responses,
*Neuroimage* 44, 509-519 (2009).

Kalashyan A, **Buiatti M**, Grigolini P,
Ergodicity breakdown and scaling in single sequences,
*Chaos, Solitons & Fractals* 39(2), 895-909 (2009).

**Buiatti M**
The correlated nature of large scale brain activity unveiled by the resting brain.
*Biology Forum* 101, 353-73 (2008).

Buiatti M, **Buiatti M**, Chance vs.
Necessity in Living Systems: A False Antinomy,
*Biology Forum* 101, 29-66 (2008).

**Buiatti M**, Papo D, Baudonniere PM, van Vreeswijk C,
Feedback modulates the temporal scale-free dynamics of brain electrical activity in a
hypothesis testing task,
*Neuroscience*, 146 (3), 1400-1412 (2007).

**Buiatti M**, Buiatti M,
Towards a statistical characterisation of the Living State of Matter,
*Chaos, Solitons & Fractals*, 20 (1), 55-61 (2004).

**Buiatti M**, Van Vreeswijk C,
Variance normalisation: a key mechanism for temporal adaptation in natural vision?,
*Vision Research* 43 (17), 1895-1906 (2003).

Buiatti M, Acquisti C, Mersi G, Bogani P, **Buiatti M**, The biological meaning of DNA
correlations, in ''Fractals in Biology and Medicine, Volume III, Mathematics and Biosciences
in interaction'', Birkhauser Ed., Berne (2002).

Buiatti M and **Buiatti M**,
The living state of matter,
*Biology Forum*, 94 (1), 59-82 (2001).

West BJ, Allegrini P, **Buiatti M**, Grigolini P,
Non-normal Statistics of DNA Sequences of Prokaryotes,
*Journal of Biological Physics* 26 (1), 17-25 (2000).

**Buiatti M**, Grigolini P, Montagnini A,
Dynamic Approach to the Thermodynamics of Superdiffusion,
*Physical Review Letters* 82, 3383-3387 (1999).

**Buiatti M**, Grigolini P, Palatella L,
A non extensive approach to the entropy of symbolic sequences,
*Physica A* 268, 214 (1999).

Allegrini P, **Buiatti M**, Grigolini P, West BJ,
Non-Gaussian statistics of anomalous diffusion: the DNA sequences of prokaryotes,
*Physical Review E* 58, 3640-3648 (1998).

Allegrini P, **Buiatti M**, Grigolini P, West BJ,
Fractional Brownian Motion as a Nonstationary Process: an Alternative Paradigm for DNA
sequences,
*Physical Review E*57, 4558-4567 (1998).

**Book Chapters:**

**Buiatti M,**
Fractal brain dynamics: Origins, limits and functional relevance of scale-free temporal brain fluctuations,
In *Paolo Grigolini and 50 Years of Statistical Physics*, Cambridge Scholars Publishing (2023).

**Buiatti M**, Analisi multidimensionale della dinamica neurale di un processo cognitivo,
in *Bioingegneria per le Scienze Cognitive*, Edizioni Patron, Bologna (Italy), (2009).

**Buiatti M**, Correlations, in Marcello Buiatti, *Lo stato vivente della materia*, Edizioni UTET, Torino (2000).

## Conference abstracts:

**Buiatti M**, Di Giorgio E, Piazza M, Polloni C, Menna G, Taddei F, Baldo E, Vallortigara G,
Una via corticale per l'elaborazione delle facce nei neonati,
XXIV Congresso Nazionale della Societa' Italiana di Neonatologia, Roma (Italia), 2018.

**Buiatti M**, Di Giorgio E, Piazza M, Polloni C, Menna G, Taddei F, Baldo E, Vallortigara G,
A neural signature of face-like selectivity in human newborns,
Sensory Plasticity, Adaptation and Development Workshop, Pisa Vision Laboratory, Pisa (Italia), 2018.

Polloni C, Menna G, Liguori A, Agnese M, Baldo E, Taddei F, **Buiatti M**, Frasnelli E, Caffini M, Tosoni D, Piazza M, Vitali A, Vallortigara G, Lo studio delle attivita' cerebrali del neonato con il metodo "EEG Frequency Tagging" e della fNIRS (functional Near Infrared Spectroscopy): la ricerca universitaria inserita nella pratica ospedaliera,
XXII Congresso Nazionale della Societa' Italiana di Neonatologia, Napoli (Italia), 2016.

Monto S, **Buiatti M**, Salti M, Dehaene S,
Decoding for information in oscillatory amplitude, phase and synchrony,
Biomag, 20th International Conference on Biomagnetism, Seoul, South Corea, 2016.

Borghesani V, Pedregosa F, Eger E, **Buiatti M**, Piazza M, A perceptual-to-conceptual gradient of word coding along the ventral path.
IEEE Pattern Recognition in Neuroimaging, Tubingen (Germany), 2014.

Kabdebon C, **Buiatti M**, Pena M, Dehaene-Lambertz G, EEG evidence of statistical learning in preverbal infants, Biomag, 19th International Conference on Biomagnetism, Halifax, Canada, 2014.

Kabdebon C, **Buiatti M**, Pena M, Dehaene-Lambertz G, Neural Correlates of Statistical Language Learning, Organization of Human Brain Mapping, Hamburg (Germany), 2014.

Kabdebon C, **Buiatti M**, Pena M, Dehaene-Lambertz G, EEG evidence of statistical learning in preverbal infants, DuCog Conference on Language and Conceptual Development, Dubrovnik (Croatia), 2014.

Borghesani V, Eger E, **Buiatti M**, Piazza M, Conceptual spaces in the brain: the quest for semantic representations with fMRI, Rovereto Workshop on Concepts, Actions, and Objects, Rovereto, 2014.

Strauss M, Sitt J, King J-R, Elbaz M, Azizi L, **Buiatti M**, van Wassenhove V, Dehaene S Disruption of hierarchical auditory predictive coding during sleep. Association for the Scientific Study of Consciousness, Brisbane, Australia, 2014.

**Buiatti M**, Finocchiaro C, Caramazza A, Dehaene S, Piazza M, Word meaning in the human brain: evidence for distinct category specific neural semantic spaces. Biomag, 18th International Conference on Biomagnetism, Paris, France, 2012.

Roger C, **Buiatti M**, van Wassenhove V Self-monitoring of internal clock shifts: automatic vs. conscious access to time. Biomag, 18th International Conference on Biomagnetism, Paris, France, 2012.

Roger C, **Buiatti M**, van Wassenhove V How do cognitive mechanisms react and adjust after a disruption of the internal clock? A combined MEG-EEG study. Society for Neurosciences, New-Orleans, USA, 2012.

Assecondi S, Bianchi A, **Buiatti M**, Ferrari P, Mazza V, Schwarzbach JV, Jovicich J. A nonlinear template-based approach for BCG artifact removal in EEG-fMRI recordings at high fields. Organization of Human Brain Mapping, Barcelona, 2010.

Assecondi S, **Buiatti M**, Ferrari P, Mazza V, Schwarzbach JV, Jovicich J. Ballistocardiographic artifact removal from simultaneous EEG-fMRI recordings at 4 T. ISMRM Italian Chapter Annual Meeting, Milan, Italy, 2010.

**Buiatti M**, Pena M, Dehaene-Lambertz G, Using brain 'frequency-tagging' resonance properties to disentangle neural responses to different hierarchical units of continuous speech. , XIX Congresso Nazionale della Società Italiana di Biofisica Pura e Applicata (SIBPA), Roma (Italy), September 17-20, 2008 (*refereed abstract*).

Sigman M, **Buiatti M**, Dehaene S, Neurophysiologic correlates of sequential processing in the human brain, Society for Neuroscience Meeting, Atlanta (USA), October 13-17, 2006 (*refereed abstract)*.

Garello R, **Buiatti M**, Galleani L, On the study of correlation in DNA sequences, I FIMA (Federazione Italiana Matematica Applicata) International Conference "Models and Methods for Human Genomics", Ayas-Champoluc, Aosta Valley (Italy), January 23-27, 2006 *(refereed abstract and selected oral presentation)*.

**Buiatti M**, Van Vreeswijk C, Variance normalisation: a key mechanism for temporal adaptation in natural vision? The Annual Computational Neuroscience Meeting, Alicante, Spain, July 5-9, 2003. *(refereed abstract and selected oral presentation)*

**Buiatti M**, Van Vreeswijk C, Variance normalisation: a crucial mechanism for dynamic adaptation in natural vision? Complessita' e scienze della vita, Italian Society for Chaos and Complexity, June 14-15 2002, Pisa, Italy. *(refereed abstract and oral presentation)*

Buiatti M, Acquisti C, Mersi G, Bogani P, **Buiatti M**, The biological meaning of DNA correlations, Fractals 2000 in Biology and Medicine, March 8-11 2000, Ascona, Switzerland.

**Buiatti M**, Allegrini P, Grigolini P, Randomness, heterogeneity and scaling in DNA walks,

American Physical Society Centennial Meeting Program, March 20-26, 1999, Atlanta, GA. *(refereed abstract and oral presentation)*

Allegrini P, **Buiatti M**, Grigolini P, West B, Fractional Brownian motion in DNA sequences as a non-stationary process, Meeting of the Texas District of the American Physical Society, October 1996, Arlington, TX. *(refereed abstract)*

## SCIENTIFIC COLLABORATIONS

Eugenio Parise, Velu Kumaravel, Giorgio Vallortigara, Manuela Piazza, Roberto Bottini, Giuliano Giari (CIMeC, University of Trento).

Elisabetta Farella (ICT, Fondazione Bruno Kessler).

Simone Benatti, Victor Kartsch (DEI, University of Bologna).

Sampsa Vanhatalo (University of Helsinki).

Maria Concetta Morrone (Università di Pisa).