

# LAURA MARZETTI

## PERSONAL INFORMATION

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Nationality Italian  
Place and date of birth Pescara, 11/10/1973  
Gender Female  
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## PRESENT POSITION

“G. d’Annunzio” University of Chieti-Pescara (UdA) – Chieti – Italy,  
Dept. Neuroscience, Imaging and Clinical Sciences  
*Associate Professor in Applied Physics*

“G. d’Annunzio” University of Chieti-Pescara (UdA) – Chieti – Italy  
Institute for Advanced Biomedical Technologies (ITAB)  
*Head of the "Methods and Models for Brain Oscillations - MAMBO" laboratory*

## EDUCATION AND TRAINING

2018 – September Italian Ministry of Education, Universities and Research (MIUR)  
National Scientific Qualification for the role of Full Professor in Applied Physics (02/D1)  
2008 – April “G. d’Annunzio” University of Chieti - Pescara (UdA) – Chieti, Italy  
Department of Clinical sciences and bioimaging  
PhD program title “Functional Neuroimaging: from cells to systems”.  
Thesis title: “METHODS FOR THE ESTIMATION OF FREQUENCY SPECIFIC FUNCTIONAL CONNECTIVITY IN THE BRAIN FROM EEG/MEG DATA”, A.Y. 2007/2008  
2000 – March University of Ancona - Ancona, Italy  
Master’s degree in Electronic Engineering with specialization in Biomedical Engineering,  
A.Y. 1999/2000

## RESEARCH EXPERIENCE

17 June 2015 - “G. d’Annunzio” University of Chieti e Pescara – Chieti – Italy  
16 June 2018 *Dept. Neuroscience, Imaging and Clinical Sciences*  
Assistant Professor in Tenure Track (art. 24, 3b L. 240/2010), SSD FIS/07  
01 January 2011 - “G. d’Annunzio” University of Chieti - Pescara – Chieti, Italy  
16 June 2015 *Department of Neuroscience and Imaging*  
Assistant Professor in Applied Physics  
Research program title “DEVELOPMENT OF METHODS FOR INVESTIGATING FUNCTIONAL CONNECTIVITY AT REST WITH MAGNETOENCEPHALOGRAPHY” - HUMAN CONNECTOME PROJECT (1U54MH091657-01), NATIONAL INSTITUTES OF HEALTH, USA  
01 November 2007 - “G. d’Annunzio” University of Chieti - Pescara – Chieti – Italy  
31 December 2010 *Department of Clinical Sciences and Bioimaging*  
PostDoc  
01 June 2007 - Fraunhofer FIRST Institute – Berlin – Germany  
31 August 2007 *IDA - Intelligent Data Analysis group (Head: Prof. KR Mueller)*  
Visiting student funded by POR C3/IC4E of the Abruzzo region  
23 February 2005 - “G. d’Annunzio” University of Chieti - Pescara – Chieti – Italy  
22 February 2008 *Department of Clinical Sciences and Bioimaging*  
PhD training in “Functional Neuroimaging: from cells to systems”  
16 September 2002 - Universitaet Ulm, Ulm, Germania  
31 July 2004 *Zentralinstitut fuer Biomedizinische Technik, Arbetisbereich Biosignal- und Bildgebungstechnologie, ZIBMT*  
Research Associate, BAT IIa  
08 March 2001 - *Advanced Technologies Biomagnetics srl – Pescara - Italy*  
15 September 2002 Software development for MEG and MCG data analysis (R&D department)

## CONTRIBUTION TO SCIENCE

My early publications (2002-2005) reflect the contribution to the development of methods for computing solutions to the forward and inverse biomagnetic problems. A method based on the spherical harmonics' approximation (Lead Field Method, currently implemented as default in the FieldTrip Open source MEG toolbox), outperformed the classical Boundary Element Method in approximating the known magnetic field in simulations. For this work, I received the Samuel Williamson Prize at the 2004 International conference for Biomagnetism, Boston, USA. Later, as a PhD student (2005-2008), I began investigating methods to explore brain functional connectivity through MEG and EEG. My work, as principal investigator, has been grounded on the neurophysiologic hypothesis that large-scale communication in the brain is mediated by phase synchronization and has provided one of the earliest demonstrations that stable phase-relationships exist across multiple sets of brain areas for the different oscillatory components (methods available at [METH toolbox](#) by Guido Nolte).

As a PostDoc and Junior Researcher (2008-2015), I investigated the MEG correlates of functional connectivity as defined by the concept of the Resting State Network (RSN), a collection of brain regions that exhibits synchronous activity, in BOLD fMRI. It is noteworthy that, when I began work in the field, there was no direct evidence of electrophysiological correlates of fMRI RSNs. Although the functional role of ongoing electrophysiological activity has been recognized for decades, it was (and partially still is) debated whether and how such activity relates to the concept of RSNs. I devoted the major part of my research to investigating methods to answer this question. This research was part of the scientific work carried under the EU FP7 project Brainsync and under the Human Connectome Project. The major finding of this work is that MEG reveals rich coupling schemes that only partially overlap with RSNs. These results strongly contribute to the hypothesis that different coupling mechanism serve different functions: slow aperiodic signal fluctuations, e.g., those giving rise to fMRI RSNs, might represent coherent excitability fluctuations leading to coordinated changes in the activation of brain areas, while phase coupling mechanism might facilitate communication between neuronal populations during perceptual analyses or cognitive processing.

More recently (2015-2020), as leader of the Methods and Models for Brain Oscillation (MAMBO) laboratory of the Institute for Advanced Biomedical Technologies (ITAB) in Chieti, I continued to work along the lines sketched above. The goal of my research group is to continue developing robust functional connectivity methods for MEG and EEG. A recent example is the development of the Multivariate Phase Slope Index approach (Basti et al., 2018). Additionally, an important aspect of the MAMBO research activity is to investigate how modulations of brain activity (e.g., through externally induced brain stimulations as well as through internally driven state changes) influence the phase relationships among brain areas. A recent example is the study of MEG functional connectivity in visuo-spatial attention (D'Andrea et al., 2019). Finally, my current interests include approaches for real-time connectivity analysis.

## PUBLICATIONS

I authored more than 50 peer-reviewed publications, with over 1500 citations and h-index equal to 19 (Scopus).

5 selected recent articles are listed below (full list of publications at

<https://www.ncbi.nlm.nih.gov/sites/myncbi/1FqSc14T-5Z5L/bibliography/44605801/public/?sort=date&direction=descending>):

1. 2019 - D'Andrea A, Chella F, Marshall TR, Pizzella V, Romani GL, Jensen O, Marzetti L. Alpha and alpha-beta phase synchronization mediate the recruitment of the visuospatial attention network through the Superior Longitudinal Fasciculus. *Neuroimage*. 2019 Mar;188:722-732. doi: 10.1016/j.neuroimage.2018.12.056.
2. 2018 - Basti A, Pizzella V, Chella F, Romani GL, Nolte G, Marzetti L. Disclosing large-scale directed functional connections in MEG with the multivariate phase slope index. *Neuroimage*. 2018 Jul 15;175:161-175. doi: 10.1016/j.neuroimage.2018.03.004.
3. 2016 - Chella F, Pizzella V., Zappasodi F, Marzetti L., Impact of the reference choice on scalp EEG connectivity estimation. *J Neural Eng*. May 3;13(3):036016.
4. 2013 - Larson-Prior L.J., Oostenveld R., Della Penna S., Michalareas G., Prior F., Babajani-Feremi A., Schoffelen J.M., Marzetti L., de Pasquale F., Di Pompeo F., Stout J., Woolrich M., Luo Q., Bucholz R., Fries P., Pizzella V., Romani G.L., Corbetta M., Snyder, A.Z Adding dynamics to the Human Connectome Project with MEG. *Neuroimage* 80:190-20
5. 2013 - Marzetti L., Della Penna S., Snyder A.Z., Pizzella V., Nolte G., de Pasquale F., Romani G.L., Corbetta M. Frequency specific interactions of MEG resting state activity within and across brain networks as revealed by the Multivariate Interaction Measure. *Neuroimage* 7:172-183

## RESEARCH AWARDS AND FELLOWSHIPS

2017 December      Italian Ministry of University and Research  
*Financing fund for research activities (FFABR)*

2013 April	19 <sup>th</sup> Annual Meeting of the Organization for Human Brain Mapping <i>Travel Award</i>
2007 June	Abruzzo region POR C3/IC4E <i>Fellowship</i>
2007 October	Joint Meeting of the 6 <sup>th</sup> International Symposium on Noninvasive Functional Source Imaging of the Brain and Heart and The International Conference on Functional Biomedical Imaging <i>Student Paper Competition Award</i>
2005 June	11 <sup>th</sup> Annual Meeting of the Organization for Human Brain Mapping <i>Travel Award</i>
2004 August	BIOMAG 2004 <i>Samuel Williamson Award</i>

### SELECTED INVITED PRESENTATIONS

2021 August	“Functional and effective connectivity - useful concepts for network neuroscience?” workshop, organizers Andreas Engel and Christian Gerloff
2020 April	INDAM (National Institute for High Mathematics) workshop 2020 - Invited Speaker, postponed to 2021 due to COVID-19
2018 June	SIAM (Society for Industrial and Applied Mathematics) Conference on IMAGING SCIENCE, June 5 -8, Bologna, Italy - Invited Speaker
2018 February	Combined Annual Meeting of the Finnish Society for Medical Physics and Medical Engineering and BIOMEPP doctoral programme, Kuopio, Finland - Keynote Speaker
2017 September	Interdisciplinary Workshop Coupling and Causality in Complex Systems - September 25-27, 2017 - Cologne, Germany - Invited speaker
2017 July	5 <sup>th</sup> International Workshop on Neuroinformatics, dedicated to neuroimaging, and focus in EEG, MEG and MRI – July 7-9, 2017 - Key Laboratory for Neuroinformatics of Ministry of Education, Chengdou, China - Keynote speaker
2016 October	2016 Tübingen MEG Symposium - October 26-27, 2016 - Tübingen, Germany - Invited speaker
2013 June	"Disentangling the brain web: a perspective from MEG" Symposium CiMeC, 25-26 June 2013 - Rovereto (Italy) - Invited speaker

### ORGANIZATION OF SCIENTIFIC MEETINGS

2021 September	World Congress of the International Organization of Psychophysiology 2020, Member of Scientific Committee, Chengdu, China
2020 August	Biomag 2020, Member of the Award Committee, Birmingham, UK – postponed to 2021 due to COVID-19
2020 June	International Conference of Cognitive Neuroscience 2020, Member of Scientific Committee, Helsinki, Finland – postponed to 2021 due to COVID-19
2018 September	International Society of Psychophysiology, Chair and Symposium Organizer at the annual meeting– Lucca, Italy
2018 August	Biomag 2018, Chair and Symposium Organizer at – Philadelphia, USA
2017 June	Human Brain Mapping (HBM) – June 25-29, 2017 - Vancouver, Canada Chair and Organizer of the Symposium " <i>Interaction of neuronal oscillations in multiple spatio-temporal scales: from methods to cognition.</i> "
2016 October	20 <sup>th</sup> International Conference on Biomagnetism (BIOMAG2016), October 1-6, 2016 - Coex, Seoul, Korea. Chair and Organizer of the symposium: <i>Revealing signatures of intrinsic coupling modes by MEG: insights from new methods</i>
2015 September	MEG workshop: "Disentangling the brain Web: a perspective from MEG" – September 16-18, 2015 - Chieti, Italy Organizer and Chair
2015 June	Human Brain Mapping (HBM) – June 14-18, 2015 - Honolulu, Hawaii (USA) Chair and Organizer of the Morning Workshop " <i>Time is of the essence: the role of EEG and MEG in mapping the human brain</i> "

### EDUCATIONAL ACTIVITIES

2019 June	International Summer "Body, senses and Neural Oscillations: an integrated approach to human perception and behavior - Adriatica2019", Co-organizer, Pescara, Italy
2019 May	TMS-EEG Science Factory 2019, May 17 <sup>th</sup> -21 <sup>st</sup> , Aalto University School of Science, Finland - Invited Lecture
2018 November	Helsinki University, Finland, Opponent for PhD defense of Santeri Rouinen

2018 July	Webinar at the Biomedical Engineering Faculty of the University of Cagliari, Italy "Phase Synchronization in MEG/EEG: methodological considerations and empirical evidence", July 10, - Invited lecturer
2018 April	Aalto University, Finland, Opponent for PhD defense of Niko Mäkelä
2018 May	TMS-EEG Science Factory 2018, May 18 -22, Aalto University School of Science, Finland - Invited Lecturer
2017 July	University of Electronic Science and Technology of China Summer School – July 11-15, 2017 - UESTC, Chengdou, China – Invited Lecturer
2017 June	Human Brain Mapping (HBM) – June 25-29, 2017 - Vancouver, Canada - Speaker at the educational course: " <i>EEG and MEG connectivity: Basic principles, state-of-the-art methods, and emerging vistas</i> "
2009 – 2012 & 2018 – 2017 –	Member of the Board of Teachers for the PhD program in Neuroscience and Imaging, UdA, Italy BioMEP – H2020-MSCA-COFUND-2015 Doctoral Programme Co-supervisor of 1 PhD candidate University of Chieti-Pescara, Italy, Supervisor of 3 PhD students and 3 PostDocs

Since 2008-2009, responsible teacher of Applied Physics in the Medical Faculty, “G. d’Annunzio” University of Chieti-Pescara (UdA)

Since 2013-2014, responsible teacher of Physics in the Engineering Faculty, UdA

Since 2020-2021, responsible teacher of Physics in the Biomedical Engineering Faculty, UdA

## RESEARCH SUPPORT AND GRANTS

### Ongoing Research Support

Bial Foundation Grant for Scientific Research, Laura Marzetti (PI), September 2021 - February 2024 (49.000 €)  
*Mindfulness Meditation State And Trait Through The Eyes Of Brain Computational Modelling*

H2020-ERC-2018-SyG, Project Number: 810377, Imoniemi Risto (PI), September 2019 – August 2025, *ConnectToBrain*

Role: Investigator, delegate of the PI for Analysis Methods

H2020-MSCA-COFUND, Project Number: 713645, Rami Korhonen (PI) September 2016 - August 2021, *BIOMEPP*

Role: Co-supervisor in the PhD program

### Completed Research Support

Bial Foundation Grant for Scientific Research, Laura Marzetti (PI), September 2017 - August 2019 (42.000 €)  
*Mindfulness Meditation Shapes Synchronization of Brain Networks for Effective Perceptual Decision Making*

Faculty Resources Grant, "G. d'Annunzio" University of Chieti-Pescara, Laura Marzetti (PI), Years 2014-2019 (~40.000 €) *Development of methods for estimating functional connectivity with Magnetoencephalography and Electroencephalography and applications*

### Participation in Other Research Projects

H2020-FETOPEN-2014-2015-RIA, Project Number:686865, Imoniemi Risto (PI), January 2016 – December 2019, *BREAKBEN - Breaking the Nonuniqueness Barrier in Electromagnetic Neuroimaging*

Role: Investigator

NIH *Human Connectome Project*, 1U54MH091657-01, Van Essen David (PI), Fall 2010 - Winter 2015

Role: Team Member

FP7-HEALTH-200728, *BrainSync*, Maurizio Corbetta (PI), Spring 2008 - Spring 2011

Role: Team Member

## COMMISSION OF TRUST

### Institutional Responsibilities

2020 – University of Chieti-Pescara Library Management Committee

2018 – 2020 Referent for Research Quality, Department of Neuroscience, Imaging and Clinical sciences, UdA, Italy

2017 – Council Member of the Institute for Advanced Biomedical Technologies, UdA, Italy

2016 – 2018 Elected member in the Council of the Department of Neuroscience, Imaging and Clinical sciences, UdA, Italy

2016 –2019 Member of the Departmental Commission for Quality Insurance of Research Activities  
Department of Neuroscience, Imaging and Clinical sciences, UdA, Italy

#### **Grant reviewer service**

2020 - Evaluator for the Latvian Council of Science  
2013 – NOW Netherlands Organization for Scientific Research, FWO Flanders Organization for Scientific Research

#### **Editor and Reviewer service**

2019 – Editor for *Computational Intelligence and Neuroscience*, Hindawi ISSN: 1687-5273  
Editor for *Brain Sciences*, MDPI, ISSN: 2076-3425, dal 2019  
2018 – Editor for *Brain Topography*, Springer, ISSN: 0896-0267, dal 2018  
Associate Editor for *Frontiers in Neuroscience, Brain Imaging and Methods*, ISSN 1662-4548, dal 2018  
2015 Guest editor for Brain Topography special issue " Controversies in EEG Source Imaging"  
2004 – Ad hoc reviewer for: Cerebral Cortex, Neuroimage, Human Brain Mapping, Journal of Neuroscience Methods, Brain Topography, Brain Connectivity, Frontiers in Human Neuroscience, Frontiers in System Neuroscience, eNeuro, PlosOne, Computational Intelligence and Neuroscience, Behavioral and Brain Functions, IEEE Transactions on Biomedical Engineering, Psychology of Consciousness: Theory, Research and Practice, eNeuro

#### **PROFESSIONAL ORGANIZATION SERVICE**

2020 – 2023 Organization for Human Brain Mapping (OHBM) Diversity and Inclusivity  
Committee Member

#### **MEMBERSHIP IN SCIENTIFIC SOCIETIES**

2011 - 2012 Member of the Society for Neuroscience  
2013 Member of the Italian Society for Bioengineering  
2005 - 2006, 2013 – 2016, 2019 Member of the Organization for Human Brain Mapping  
2016 - 2017 Member of the International Organization of Psychophysiology  
2018 - Member of the Italian Society for Psychophysiology