

# CURRICULUM VITAE ET STUDIORUM

## LAURA MARZETTI

### PERSONAL INFO

Born October 11, 1973, Pescara, Italy

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### CONTACTS

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### PRESENT POSITION

**“G. d’Annunzio” University of Chieti-Pescara – Chieti – Italy**

**Dept. Neuroscience, Imaging and Clinical Sciences**

Senior Researcher (art. 24 comma 3-b L. 240/10), SSD FIS/07.

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### ACADEMIC DEGREES

**2013 - dic** National Scientific Qualification as Associate Professor of Applied Physics

**2009 - apr.** **“G. d’Annunzio” University of Chieti-Pescara – Chieti**  
**Dept. Clinical Sciences and Bioimaging**  
PhD in “Functional Neuroimaging: from cells to systems.” Dissertation title:  
“METHODS FOR THE ESTIMATION OF FREQUENCY SPECIFIC FUNCTIONAL  
CONNECTIVITY IN THE BRAIN FROM EEG/MEG DATA”

**2000 – mar.** **University of Ancona - Ancona**  
Master degree in Electronic Engineering with specialization in Biomedical Engineering

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### RESEARCH POSITIONS

17/06/2015-  
present **“G. d’Annunzio” University of Chieti-Pescara – Chieti – Italy**  
**Dept. Neuroscience, Imaging and Clinical Sciences**  
Senior Researcher (art. 24 comma 3-b L. 240/10), SSD FIS/07.

01/01/2011-  
16/06/2015 **“G. d’Annunzio” University of Chieti-Pescara – Chieti – Italy**  
**Dept. Neuroscience, Imaging and Clinical Sciences**  
Junior Researcher (art.1 comma 14 L. 230/05), SSD FIS/07.  
Research program title “METHODS FOR THE ESTIMATION OF RESTING STATE FUNCTIONAL  
CONNECTIVITY WITH MEG” - HUMAN CONNECTOME PROJECT (1U54MH091657-01),  
NATIONAL INSTITUTES OF HEALTH, USA

01/11/2007-  
31/12/2010 **“G. d’Annunzio” University of Chieti-Pescara – Chieti – Italy**  
**Dept. Clinical Sciences and Bioimaging**  
**PostDoc, SSD FIS/07.**  
Research program title “DEVELOPMENT OF METHODS FOR MULTIMODAL INTEGRATION OF  
MEG AND FMRI”  
*Obligatory maternity work break from 02/09/2008 until 02/02/2009*

2007 june - september **Fraunhofer FIRST Institute – Berlin – Germany**  
visiting student at IDA - Intelligent Data Analysis group (Prof. K.R.  
Mueller).

01/11/2004 -  
31/10/2007 **“G. d’Annunzio” University of Chieti-Pescara – Chieti – Italy**  
**Dept. Clinical Sciences and Bioimaging**  
PhD training in “Functional Neuroimaging: from cells to systems.”

16/09/2002 -  
31/07/2004 **Universitaet Ulm, Ulm, Germania**  
**Zentralinstitut fuer Biomedizinische Technik, Arbetisbereich Biosignal- und  
Bildgebungstechnologie, ZIBMT**  
Research Associate, BAT IIa

08/03/2001 -  
15/09/2002 **Advanced Technologies Biomagnetics srl - Pescara**  
Software development for biomedical data analysis

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## SCIENTIFIC ACTIVITY

Since 2002 my research is focused on physics applied to medicine, with particular reference to the development of methods and models for the study of the electromagnetic field related to brain activity as measured by non-invasive electrophysiological techniques such as Magnetoencephalography (MEG) and electroencephalography (EEG).

In 2002-2004, as a Research Associate at the University of Ulm (Germany), I have investigated methods for removing artifacts from brain signals and for the solution of direct and inverse electromagnetic problems. This work was awarded the prize "S. J. Williamson Award" by the International Conference on Biomagnetism - BIOMAG2004.

From 2005 to 2007, during the PhD in Functional Neuroimaging at the University "G. D'Annunzio" of Chieti - Pescara, my research interests have expanded to the study of "functional brain connectivity". In particular, I have developed methods, robust to the effects of volume conduction, based on the properties in the frequency domain of the MEG/EEG signal. For the implementation of these methods in EEG data, I also conducted a study to assess the effect of the choice of the reference electrode in the EEG functional connectivity estimated from sensor level information. In the same context, in cooperation with the Fraunhofer Institute in Berlin First, I have designed and implemented a method to isolate the contribution of functional systems consisting of pairs of sources related to brain activity at a specific frequency and to estimate their position. Winning a Travel Award (Human Brain Mapping 2005, Toronto) and a Student Paper Competition (NFSI 2007 Hangzhou, China) supported the participation in congresses.

From November 2007 to December 2010, as PostDoc at the University "G. D'Annunzio" of Chieti - Pescara, I studied the functional connectivity in the brain at rest investigating the electrophysiological correlates of so-called Resting State Networks identified on the basis of hemodynamics. In this context, the difficulty lies mainly in the low signal to noise ratio of MEG/EEG signals generated by the brain at rest. To characterize the modulations in time and / or in the frequency domain of the behavior of such networks, I developed analysis methods inherently robust to noise to allow, in the first place, to achieve adequate separation between the signal subspace and noise subspace and, subsequently, to assess the functional connectivity between the generators with a class of dedicated methods. The comparison of the results provided by MEG and EEG and fMRI approaches to functional connectivity, both in the execution of tasks in the brain at rest, has also established an important stage of study during this period. This research formed part of the European project Brainsynch FP7 HEALTH-2007-200728.

From January 2011 to date, I have continued the research activities focusing on the development of methods for studying phase relationships between brain areas. The particular relevance of this class of methods is linked to the fact that it allows to investigate the functional interactions in the brain from a perspective close to the mechanisms of neuronal communication based on phase synchronization and highlight its relations with the power modulations as observed by fMRI. The work was supported in part with funding from the Human Connectome Project (1U54MH091657-01) - NIH - USA, aiming to characterize the map of the anatomical and functional interactions in the brain. Moreover, during these years, my research has ranged from the study of the plasticity of the brain networks induced by meditation practices, to alterations in brain function after stroke or brain stimulation current, to the role of brain rhythms in social interaction tasks.

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## TEACHING ACTIVITY

Since the 2005/06 academic year to date, Laura Marzetti teaches at the University "G. d'Annunzio" University of Chieti - Pescara within the scientific sector FIS/07 in the application of methodologies physical in the biomedical field in undergraduate courses and Master's courses. The detailed schematic of the complete teaching activity is provided below:

### TEACHING ACTIVITY IN UNDERGRADUATE AND MASTER DEGREE COURSES

### TEACHING ACTIVITY IN PHD COURSES

- Member of the PhD faculty collegiums in Neuroscience and Imaging, University of Chieti and Pescara "G. D'Annunzio" - Chieti, Department of Neuroscience and Imaging for the XXVIII cycle

- PhD program in "Functional Neuroimaging: from cells to systems" – “Programming in Matlab, basic course” for the XXIV cycle , University of Chieti and Pescara " G . D' Annunzio " - Chieti , Department of Clinical Sciences and Bioimaging
  - PhD program in "Functional neuroimaging to molecular biology to cognitive sciences"- “Programming in Matlab, basic course” for the XXV, XXVI , XXVII, XXVIII cycles, University of Chieti and Pescara " G . D' Annunzio " - Chieti , Department of Neuroscience and Imaging
  - PhD program in " Neuroscience and Imaging" - “Programming in Matlab, basic course” for the XXIX , XXX cycle , University of Chieti and Pescara " G . D' Annunzio " - Chieti, Department of Neuroscience and Imaging
- **Student supervisor in the PhD program "Neuroscience and Imaging"**, bound theme “Tools and methods of neuroimaging in the study of brain connectivity”, Department of Neuroscience, Imaging and Clinical Sciences, University G. d' Annunzio: Dott.ssa Antea D'Andrea, XXIX cycle
  - **Research fellow supervisor** in "Methods for the study of functional connectivity in aging" Department of Neuroscience, Imaging and Clinical Sciences, University G. d' Annunzio: Dott . Federico Chella

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## LIST OF MAJOR PUBLICATIONS

1. Marzetti L., Di Lanzo C., Zappasodi F., Chella F., Raffone A., Pizzella V. (2014) Magnetoencephalographic alpha band connectivity reveals differential Default Mode Network interactions during focused attention and open monitoring meditation. *Front Hum Neurosci.* 8(832):1-11, doi: 10.3389/fnhum.2014.00832, ISSN: 1662-5161.
2. Vittorio Pizzella V., Marzetti L., Della Penna S., de Pasquale F., Zappasodi F., Romani G.L. (2014) Magnetoencephalography in the study of brain dynamics. *Functional Neurology* 2014; 29(4): 1-13.
3. Zappasodi F., Olejarczyk E., Marzetti L., Assenza G., Pizzella V., Tecchio F. (2014) Fractal dimension of EEG activity senses neuronal impairment in acute stroke. *PLoS One.* 9(6):e100199., ISSN: 1932-6203.
4. Brunetti M., Zappasodi F., Marzetti L., Perrucci M.G., Cirillo S., Romani G.L., Pizzella V., Aureli T. (2014) Do you know what I mean? Brain oscillations and the understanding of communicative intentions. *Front Hum Neurosci.* 8:36. ISSN: 1662-5161.
5. Chella F., Marzetti L., Pizzella V., Zappasodi F., Nolte G. (2014). Third order spectral analysis robust to mixing artifacts for mapping cross-frequency interactions in EEG/MEG. *Neuroimage* 91:146-61. ISSN: 1053-8119.
6. Notturmo F., Marzetti L., Pizzella V., Uncini A., Zappasodi F. (2014) Local and remote effects of Transcranial Direct current Stimulation on the Electrical activity of the Motor Cortical Network. *Hum Brain Mapp.* 35(5):2220-32. ISSN: 1065-9471.
7. Nolte G., Marzetti L. (2014) Methods to estimate functional and effective brain connectivity from MEG data robust to artifacts of volume conduction. In: *Magnetoencephalography: from Signals to Dynamic Cortical Networks.* Supek S., Aine C. (Eds.), (Heidelberg: Springer Verlag), 477-501.
8. de Pasquale F., Marzetti L. (2014) Temporal and spectral signatures of the Default Mode Network. In: *Magnetoencephalography: from Signals to Dynamic Cortical Networks.* Supek S., Aine C. (Eds.), (Heidelberg: Springer Verlag), 451-476.
9. 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 (2013). Adding dynamics to the Human Connectome Project with MEG. *Neuroimage* 80:190-20, ISSN: 1053-8119.
10. Pittaccio S., Zappasodi F., Tamburro G., Viscuso S., Marzetti L., Garavaglia L., Tecchio F., Pizzella V.(2013). Passive ankle dorsiflexion by an automated device and the reactivity of the motor cortical network. *Conf Proc IEEE Eng Med Biol Soc.* 2013;2013:6353-6. doi: 10.1109/EMBC.2013.6611007.
11. Marzetti L., Della Penna S., Snyder A.Z., Pizzella V., Nolte G., de Pasquale F., Romani G.L., Corbetta M. (2013) Frequency specific interactions of MEG resting state activity within and across brain networks as revealed by the Multivariate Interaction Measure. *Neuroimage* 7:172-183, ISSN: 1053-8119.

12. Betti V., Della Penna S., de Pasquale F., Mantini D., Marzetti L., Romani G., Corbetta M. (2013) Natural scenes viewing alters the dynamics of functional connectivity in the human brain. *Neuron* 79 (4):782-797, ISSN: 0896-6273.
13. Van Essen D.C., Smith S.M.; Barch D.M.; et al. Group Author(s): WU-Minn HCP Consortium (2013) The WU-Minn Human Connectome Project: An overview. *Neuroimage* 80: 62-79. ISSN: 1053-8119.
14. Ewald A., Marzetti L., Zappasodi F., Meinecke F.C., Nolte G. (2012). Estimating true brain connectivity from EEG/MEG data invariant to linear and static transformations in sensor space. *Neuroimage* 60 (1): 476-488, ISSN: 1053-8119.
15. de Pasquale F., Della Penna S., Snyder A.Z., Marzetti L., Pizzella V., Romani G.L., Corbetta M. (2012). A Cortical Core for Dynamic Integration of Functional Networks in the Resting Human Brain. *Neuron* 74:753-764, ISSN: 0896-6273.
16. Di Lanzo C., Marzetti L., Zappasodi F., De Vico Fallani F., Pizzella V. (2012). Redundancy as a Graph-Based Index of Frequency Specific MEG Functional Connectivity. *Computational and Mathematical Methods in Medicine* 2012: 207305-207313, ISSN: 1748-670X.
17. Chella F., Zappasodi F., Marzetti L., Della Penna S., Pizzella V. (2012). Calibration of a multichannel MEG system based on the Signal Space Separation method. *Phys Med Biol* 57:4855-4870, ISSN: 0031-9155.
18. Notturmo F., Zappasodi F., Maruotti V., Marzetti L., Caulo M., Uncini A. (2011). Cortical origin of myoclonus in early stages of corticobasal degeneration. *Movement Disorders* 26:1567-1569, ISSN: 0885-3185.
19. Mantini D., Della Penna S., Marzetti L., de Pasquale F., Pizzella V., Corbetta M., Romani G.L. (2011). A Signal-Processing Pipeline for Magnetoencephalography Resting-State Networks. *Brain Connectivity* 1: 49-59, ISSN: 2158-0014, doi: 10.1089/brain.2011.0001
20. de Pasquale F., Della Penna S., Snyder A.Z., Lewis C., Mantini D., Marzetti L., Belardinelli P., Ciancetta L., Pizzella V., Romani G.L., Corbetta M. (2010). Temporal dynamics of spontaneous MEG activity in brain networks. *Proc Natl Acad Sci USA*, 107: 6040-6045, ISSN: 0027-8424.
21. Mantini D., Marzetti L., Corbetta M., Romani G.L., Del Gratta C. (2010). Multimodal integration of fMRI and EEG data for high spatial and temporal resolution analysis of brain networks. *Brain Topography* 23: 150-158, ISSN: 0896-0267, doi: 10.1007/s10548-009-0132-3.
22. Betti V., Della Penna, S.; Mantini, D.; et al.(2010) Modulation of MEG resting state networks during rest and natural vision. Conference: 40th Annual Meeting of the Society-for-Neuroscience Location: San Diego, CA, USA Date: November 13 -17, 2010.
23. Marzetti, L.; Della Penna S.; De Pasquale F.; et al. (2010). Intra and inter network interaction revealed by spontaneous magnetoencephalographic activity. Conference: 40th Annual Meeting of the Society-for-Neuroscience Location: San Diego, CA, USA Date: November 13 -17, 2010.
24. Pizzella V., Della Penna S., Caulo M., Mollo G., Marzetti L., Tamburro G., Briganti C., Notturmo F., Uncini A., Romani G.L. (2009). Sensory-motor cortical reorganization in lower motor neuron syndrome. In: OHBM - 15th Annual Meeting. San Francisco (USA), 18-23 giugno 2009, vol. 47, Elsevier, doi:10.1016/S1053-8119(09)70741-4.
25. Nolte G., Marzetti L., Valdes Sosa P. (2009). Minimum Overlap Component Analysis (MOCA) of EEG/MEG data for more than two sources. *J Neurosci Methods* 183:72-76, ISSN: 0165-0270.
26. Del Gratta C., De Pasquale F., Mantini D., Marzetti L., Romani G.L. (2009). Reti corticali nell'uomo per gli stati di riposo e attenzionali stimato mediante tecniche elettroencefalografiche, magnetoencefalografiche ed emodinamiche.. In: F. Babiloni, G. Baselli, A. Bertoldo, E. Biondi, C. Cobelli. *Bioingegneria per le neuroscienze cognitive*. p. 199-218, Bologna:Pàtron Editore, ISBN: 9788855530361
27. Marzetti L., Del Gratta C., Nolte G. (2008). Understanding brain connectivity from EEG data by identifying systems composed of interacting sources. *Neuroimage* 42:87-98, ISSN: 1053-8119.
28. Marzetti L., Nolte G., Perrucci M.G., Romani G.L., Del Gratta C. (2007). The use of standardized infinity reference in EEG coherency studies. *Neuroimage* 36:48-63, ISSN: 1053-8119.

29. Marzetti L., Della Penna S., Nolte G., Franciotti R., Stefanics G., Romani G.L. (2007). A cartesian time--frequency approach to reveal brain interaction dynamics. *Brain Topography* 19: 147-154, ISSN: 0896-0267.
30. Marzetti L., Nolte G., Perrucci M.G., Romani G.L., Del Gratta C. (2007). Unbiased large-scale coherence mapping for simultaneously acquired EEG and fMRI data. In: -. *Proceedings of NFSI & ICFBI 2007*.
31. Hangzhou, China, October 12-14, 2007, p. 151-154, *Noninvasive Functional Source Imaging of the Brain and Heart and the International Conference on Functional Biomedical Imaging. NFSI-ICFBI 2007. Joint Meeting of the 6th International Symposium*, doi: 10.1109/NFSI-ICFBI.2007.4387712.
32. Marzetti L., Mantini D., Cugini S., Romani G.L., Del Gratta C. (2007). High-resolution spatio-temporal neuronal activation in the visual oddball task: A simultaneous EEG/fMRI study. In: *Proc. of 2007 Joint Meet. of the 6th Int. Symp. on Noninvasive Functional Source Imaging of the Brain and Heart and the Int. Conf. on Functional Biomedical Imaging, NFSI and ICFBI 2007*. p. 59-62, China.
33. Marzetti L., Del Gratta C., Romani GL., Nolte G. (2007). Frequency domain identification of interacting systems in the brain. *International Journal of Bioelectromagnetism* 9: 249-252, ISSN: 1456-7857.
34. Müller H.-P., Decesaris I., Demelis M., Marzetti L., Pasquarelli A., Ernè S.N., Ludolph A.C., Kassubek J. (2005). Open magnetic and electric graphic analysis. *IEEE Eng Med Biol Mag* 24:109-116, ISSN: 0739-5175.
35. Pasquarelli A., Rossi R., De Melis M., Marzetti L., Trebeschi A., Müller H.-P., Ernè S.N. (2004). Argos 500: Operation of a helmet vector-MEG. *Neurol Clin Neurophysiol* 2004:97, ISSN: 1538-4098
36. Pasquarelli A., De Melis M., Marzetti L., Müller H.-P., Ernè S.N. (2004). Calibration of a vector-MEG helmet system. *Neurol Clin Neurophysiol* 2004:94, ISSN: 1538-4098
37. Belardinelli P., Marzetti L., De Cesaris I., Mueller H.P., De Melis M., Romani G.L., Ernè S.N. (2004). A New Algorithm to Detect Coherent Brain Activities in Separated Cortical areas by MEG. *Biomedizinische Technik* 48: 60-62, ISSN: 0013-5585.
38. Marzetti L., De Melis M., Ernè SN. (2004). Dynamic Spatial Filter: A New Two Dimensional Tool for Improved Data Signal to Noise Ratio in Deep Source Localization. *Biomedizinische Technik* 48: 91-93, ISSN: 0013-5585.

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#### PRIZES AND ACKNOWLEDGEMENTS

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| <b>2013 - june</b> | Conference: <b>“Human Brain Mapping (HBM)” – 16-20 June 2013 – Seattle (USA)</b><br><b>“Travel Award “</b> for the scientific work <i>“Frequency Specific Interactions of MEG activity within and across resting state networks as revealed by MIM”</i>                               |
| <b>2007 – oct.</b> | Conference: <b>“Joint Meeting of the 6th International Symposium on Noninvasive Functional Source Imaging of the Brain and Heart and The 9th International Conference on Functional Biomedical Imaging” – Oct. 13, 2007 – Hangzhou – China,</b><br><b>“Student Paper Competition”</b> |
| <b>2005 - june</b> | Conference: <b>“Human Brain Mapping (HBM)” – 12-16 June 2005 – Toronto (Canada)</b><br><b>“Travel Award “</b> for the scientific work <i>“Performances of Boundary Element Method and Lead Field Method in the Inverse Problem Solution”</i>  |
| <b>2004 - aug.</b> | Conference: <b>“14th International Conference on Biomagnetism (BIOMAG)” - 8-12 August 2004</b><br><b>“Samuel Williamson Award”</b> for the scientific work <i>“Comparison of Boundary Element Method and Lead Field Method Performance in the Solution of the Inverse Problem”</i> .  |

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#### ORAL PRESENTATIONS AND INVITED TALKS

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| <b>2015 – June</b> | <b>Human Brain Mapping (HBM) – June 14-18, 2015 - Honolulu, Hawaii (USA)</b><br>Organizer and chairman of the Workshop <i>“Time is of the essence: the role of EEG and MEG in mapping the human brain”</i> |
| <b>2013 - June</b> | <b>Disentangling the brain web: a perspective from MEG” Simposio CiMeC Rovereto 25 e 26 giugno 2013 – Invited talk</b>   |

<b>June</b>	<b>Human Brain Mapping (HBM) – 16-20 giugno 2013 – Seattle (USA)</b> Oral Presentation
<b>2012 – March</b>	<b>SBAI Univ. Sapienza Roma, "Multivariate Interaction Measure" - Invited talk</b>
<b>2011 - June</b>	<b>Donders Institute for Brain, cognition and Behaviour - Radboud University Nijmegen - The Netherlands - Invited talk</b>
<b>2010 – March</b>	<b>Meeting “BrainSynch” European Project (HEALTH FP7) „BrainSync“ „Large Scale Interaction in Brain Networks and their Breakdown in Diseases Brain“ - Praga - Oral Presentation</b>
<b>2009 – July</b>	<b>Conference on Applied Inverse Problems 2009 –Lug. 20-24, 2009 - Vienna (Austria) - Oral Presentation</b>
<b>2009 – May</b>	<b>7<sup>th</sup> NFSI and ICBEM - Mag. 29-31, 2009 – Roma (Italia) - Oral Presentation</b>
<b>2007 - Oct.</b>	<b>“Joint Meeting of the 6th International Symposium on Noninvasive Functional Source Imaging of the Brain and Heart and The International Conference on Functional Biomedical Imaging”–Oct. 13, 2007 – Hangzhou (China) - Oral Presentation</b>
<b>2006 - Sept.</b>	<b>“17th Conference of the International Society for BioElectro Tomography (ISBET)” - 27-30 settembre 2006 - Chieti (Italia) - Oral Presentation</b>
<b>2003- Sept.</b>	<b>“Gemeinsamen Jahrestagung der Deutschen, der Oesterreichischen und der Schweizerischen Gesellschaften fuer Biomedizinische Technik” - 25-27 settembre 2003 – Salisburgo (Austria) - Oral Presentation</b>

## **OTHER**

### **Affiliation to national and international scientific societies**

Society for Neuroscience, USA in 2011 and 2012.  
Human Brain Mapping Organization (OHBM), USA in 2005, 2006, 2013, 2014 and 2015.  
Italian Bioengineering Society in 2013.

### **Editorial board for the following international journals**

Brain Topography, World Journal of Radiology, Biomed Research International

### **Reviewer for the following international journals**

Cerebral Cortex, NeuroImage, Human Brain Mapping, Journal of Neuroscience Methods, Brain  
Topography, Frontiers in System Neuroscience, Computational Intelligence and Neuroscience,  
Behavioral and Brain Functions

### **Reviewer for the following international congresses**

MBEC 2014 Dubrovnik, Croatia, 7<sup>th</sup> -11<sup>th</sup> September 2014;  
OHMB 2015 Honolulu, Hawaii, USA, 14<sup>th</sup>-18<sup>th</sup> June 2015.

### **Scientific involvement in international and national research projects:**

Human Connectome Project (1U54MH091657-01), National Institutes of Health, USA Scientific  
Team Member; PRIN 2005 Prof. Gian Luca Romani, title: "Integrazione multimodale di tecniche di  
imaging strutturale e funzionale per lo studio della connettività cerebrale"

**“Regional fellowship for research and higher education in technical scientific with priority to female ( POR C3 /  
IC4E )”, from the Abruzzo region in June 2007**