Maria Grazia Puxeddu, Ph.D.

PERSONAL INFORMATIONS

Date of birth
Nationality
Email
Work address

PROFESSIONAL EXPERIENCE

03/2022 – date	**Postdoc** at Department of Psychological and Brain Sciences, Indiana University, Bloomington
03/2020 – 02/2022	**Postdoc** at Department of Computer, Control and Management Engineering "Antonio Ruberti", University of Rome La Sapienza

EDUCATION AND TRAINING

Oct 2016 – Feb 2020	**PhD Student in Bioengineering** at the University of Rome La Sapienza, Department of Computer, Control and Management Engineering "Antonio Ruberti" (thesis title: "The structural and functional multilayer modular organization of the human brain") (ING-INF/06)
Oct 2016 – Feb 2020	Visiting student at laboratory of Neuroelectrical Imaging and BCI at IRCCS Fondazione Santa Lucia, Rome
Apr 2018 – Oct 2018	**Visitor scholar at Indiana University**, Bloomington, Indiana (USA), at the Department of Psychological and Brain Science, in the Olaf Sporns's laboratory
Sep 4-8, 2017	IV Mediterranean School of Complex Networks, Salina (ME)
Dec 2015 – Jul 2016	Internship at laboratory of Neuroelectrical Imaging and BCI at IRCCS Fondazione Santa Lucia, Rome
A.A. 2013/14 – 2015/16	**Master's degree in Biomedical engineering** at University of Rome La Sapienza, grade: 110/110 cum laude (thesis title: "Algoritmi di clustering per lo studio di reti stazionarie e tempo-varianti: studio di simulazione ed applicazione alla connettività cerebrale") (ING-INF/06)
A.A. 2009/10 – 2012/13	**Bachelor's Degree in Clinical Engineering** at University of Rome La Sapienza, (thesis title: "Studio dosimetrico per il posizionamento del microelettrodo intraoperatorio nella stimolazione cerebrale profonda") (ING-INF/06)

RESEARCH ACTIVITY

Research activity broadly includes methodological development in the field of complex brain network analysis. Specifically, the focus is on the analysis of electroencephalographic (EEG) and magnetic resonance imaging (f-MRI) based brain networks. In particular:

- Analysis of multilayer brain networks through advanced techniques of graph theory;
- Multilayer networks and community detection;
- Definition of new indicators of brain patterns related to motor and cognitive functions;
- Analysis of EEG and MRI data.

PARTICIPATION IN RESEARCH GROUPS

- *Bioengineering and Bioinformatic Laboratory* (BiBiLab), at the Department of Computer, Control and Management Engineering, University of Rome Sapienza. Responsible: prof. Laura Astolfi.
- *Neuroelectrical Imaging and BCI Laboratory* (NeiLab), at IRCCS Fondazione Santa Lucia, Rome. Responsible: doc. Donatella Mattia.
- *Computational Cognitive Neuroscience Laboratory*, at Department of Psychological and Brain Sciences, Indiana University, Bloomington. Responsible: prof. Olaf Sporns.
- *Brain Networks and Behavior Lab* (BNBL), at Department of Psychological and Brain Sciences, Indiana University, Bloomington. Responsible: prof. Richard Betzel.

ACADEMIC ACTIVITY

- Teaching activity (seminar and tutorials) in:
  · "*Brain networks*" (Psychology), A.A.2023, fall semester
  · "*Neuroscienze Industriali*" (Biomedical Engineering, ING-INF/06, 9CFU), A.A. 2016/17, 2017/18, 2018/19, 2019/20, 2020/21
  · "*Modelli di sistemi biologici*" (Biomedical Engineering, ING-INF/06, 9CFU), A.A. 2017/18, 2018/19
  · "*Metodi avanzati per l'analisi di segnali biomedici*" (Biomedical Engineering, ING-INF/06, 12CFU), A.A 2016/17, 2017/18
  · "*Modelling and simulation of biomolecular dynamical systems*" (Bioinformatics, ING-INF/06, 6CFU), A.A. 2018/19

- Co-supervision to 3 master's degree thesis in Biomedical Engineering:
  i. "*Analisi di algoritmi di clustering multilayer per lo studio di reti dinamiche cerebrali*", Dissertation on January 2016
  ii. "*Impiego di metodi avanzati di teoria dei grafi per lo studio dell'evoluzione dei pattern di connettività cerebrale a seguito di un intervento riabilitativo post ictus*", Dissertation on October 2019
  iii. "*Sviluppo e validazione di algoritmi basati su grafi multilayer per lo studio in frequenza della connettività cerebrale*", Dissertation on October 2019

- Named 'subject expert' (i.e. cultore della materia) in Industrial Neuroscience (ING-INF/06)

PUBLICATIONS (H-index: 6 *Google Scholar; ResearchGate; Scopus)*

International Journal Papers:

I. **M.G. Puxeddu**, J. Faskowitz, C. Seguin, Y. Yovel, Y. Assaf, R.F. Betzel1, O. Sporns, "Relation of connectome topology to brain volume across 103 mammalian species", PLOS Biology, 2023, (Impact Factor: 9.8)

II.   T.F. Varley, M. Pope, **M.G. Puxeddu**, J. Faskowitz, O. Sporns, "Partial entropy decomposition reveals higher-order information structures in human brain activity", Proceedings of the National Academy of Science (PNAS), 2023, (Impact Factor: 11.1)

III.   J. Faskowitz, **M.G. Puxeddu**, M. Van Den Heuvel, B. Misic, Y. Yovel, Y. Assaf, R. Betzel, O. Sporns, "Connectome topology of mammalian brains and its relationship to taxonomy and phylogeny", Frontiers in Neuroscience, 2023 (Impact Factor: 5.12)

IV.   **M.G. Puxeddu**, J. Faskowitz, O. Sporns, L. Astolfi, R. Betzel, "Multi-modal and multi-subject modular organization of human brain networks", NeuroImage, 2022 (Impact Factor: 7.4)

V.   F.Z. Esfahlani*, Y. Jo*, **M.G. Puxeddu***, H. Merritt, J.C. Tanner, S. Greenwell, R. Patel, J. Faskowitz, R.F. Betzel, "Modularity maximization as a flexible and generic framework for brain network exploratory analysis", NeuroImage, 2021 (Impact Factor: 6.556)

VI.   **M.G. Puxeddu**, M. Petti, L. Astolfi, "A comprehensive analysis of multilayer community detection algorithms for the application to EEG-based brain networks", Frontiers in System Neuroscience, accepted in January 2021 (Impact Factor: 3.293)

VII.   **M.G. Puxeddu**, J. Faskowitz, R. Betzel, M. Petti, L. Astolfi, O. Sporns, "The modular organization of brain cortical connectivity across the human lifespan", NeuroImage, 2020 (Impact Factor: 5.902)

VIII.   A. Paffi, F. Apollonio, **M.G. Puxeddu**, M. Parazzini, G. D'Inzeo, P. Ravazzani and M. Liberti: *"A numerical study to compare stimulations by intraoperative microelectrodes and chronic macroelectrodes in the DBS technique"*, BioMed Research International, Aug. 2013. (Impact Factor: 2.276)

Papers in International Conferences indexed in ISI Web of Science:

I.   **M. G. Puxeddu**, M. Petti, L. Astolfi, *"Multi-layer analysis of multi-frequency brain networks as a new tool to study EEG topological organization"*, in 43rd Annual International Conference of the IEEE EMBS, Nov 1-5, 2021

II.   **M.G. Puxeddu**, M. Petti, D. Mattia, L. Astolfi, *"The optimal setting for multilayer modularity optimization in multilayer brain networks"*, in 41st Annual International Conference of the IEEE EMBS, Berlin, Germany, July 23-27, 2019.

III.   **M.G. Puxeddu**, M. Petti, F. Pichiorri, F. Cincotti, D. Mattia, L. Astolfi: *"Community detection: comparison between clustering algorithms and application to EEG-based brain networks"*, in 39th Annual International Conference of the IEEE EMBS, Jeju Island, Korea, Jul 11-15, 2017. (Selected for oral presentation).

IV.   A. Paffi, F. Apollonio, **M.G. Puxeddu**, M. Parazzini, G. D'Inzeo, P. Ravazzani, F. Camera, M. Liberti: *"A dosimetric study comparing intra-operatory microelectrode and chronic macroelectrode in the DBS technique"*, in 6th International IEEE EMBS Conference on Neural Engineering, San Diego, CA, Nov 6-8, 2013, pp. 1206 – 1209.

Preprints:

I.   R. Betzel, **M. G. Puxeddu**, C. Seguin, *"Hierarchical communities in the larval Drosophila connectome: Links to cellular annotations and network topology"*, BiorXiv, 2023.

Abstract in National and International Conferences not indexed in ISI:

I.   **M.G. Puxeddu**, T. Varley, M. Pope, O. Sporns, "A characterization of brain modular structure based on higher-order functional interactions", in Neuroscience 2023, Society for Neuroscience, Washington, DC, USA, November 2023.

II. C. Seguin, **M.G. Puxeddu**, R. Betzel, O. Sporns, "Connectome architecture favours communication via within-module diffusion and between-module routing", in Neuroscience 2023, Society for Neuroscience, Washington, DC, USA, November 2023.

III. **M.G. Puxeddu**, J. Faskowitz, C. Seguin, Y. Yovel, Y. Assaf, R. Betzel, O. Sporns "Relation of connectome topology and brain volume across mammalian brains", in OHBM 2023, Montreal, Canada, July 2023.

IV. **M.G. Puxeddu**, J. Faskowitz, Y. Yovel, Y. Assaf, O. Sporns, "Scaling laws in connectome topology across mammalian brains", in Neuroscience 2022, Society for Neuroscience, San Diego, CA, USA, November 2022.

V. **M.G. Puxeddu**, J. Toppi, D. Mattia, L. Astolfi, "*Reduction of latency jitter in ERP through visibility graphs and community detection*", in 41st Annual International Conference of the IEEE EMBS, Berlin, Germany, July 23-27, 2019.

VI. **M.G. Puxeddu**, J. Faskowitz, M. Petti, L. Astolfi, O. Sporns, "*Modular structure of anatomical brain networks across the human lifespan*", Organization for Human Brain Mapping, Rome, June 9-13, 2019

VII. **M.G. Puxeddu**, M. Petti, F. Pichiorri, F. Cincotti, D. Mattia, L. Astolfi, "*Analysis of multilayer clustering algorithms for the application to brain functional connectivity*", VI Congresso Nazionale del GNB, Milano, June 25-27, 2018.

VIII. **M.G. Puxeddu**, M. Petti, L. Astolfi, "*Multilayer analysis for community detection in evolving brain networks*", Mediterranean School of Complex Networks, Salina, Italy, Sep 4 – 8, 2017. (Selected for oral presentation).

IX. A. Paffi, **M.G. Puxeddu**, F. Apollonio, M. Parazzini, G. D'Inzeo, P. Ravazzani, M. Liberti: "*A numerical dosimetric study to clarify different stimulations by intra-operatory microelectrodes and chronic macroelectrodes in the DBS technique*", BioEM2013, Thessaloniki, Greece, Jun 10-14, 2013.

AWARDS AND ACHIEVEMENTS

I. Grant for the project *Avvio alla Ricerca* (AR1181643680C682) titled "*A multilayer network based analysis to infer dependencies among frequencies in EEG signals*", (Principal Investigator), received from Sapienza University of Rome, 01 Oct 2018.

II. Grant for the mobility project reserved for PhD students of the XXXI and XXXII cycles, titled *"MoRe-Net, Motor Recovery supported by hybrid Brain-Computer Interface and complex network theory"*, received from Sapienza University of Rome, 07 Dec 2017.

III. Best Thesis Award "Vincenzo Tagliasco" received from the Italian National Bioengineering Group in the occasion of the "*XXXVIII Scuola Nazionale del Gruppo di Bioingegneria*", Bressanone, Italy, 18 – 22 Sept 2017.

IV. Grant for the project *Avvio alla Ricerca,* (AR11715C821E23FC) titled "*Multilayer approaches for the detection of stable and dynamic communities in EEG-based brain networks*" (principal investigator), received from Sapienza University of Rome, 17 July 2017

V. Prize "Excellent graduate" for the academic year 2015/16, received from *Fondazione Roma Sapienza* and promoted by *NoiSapienza Associazione Alumni*, in the occasion of the V edition of "Giornata del Laureato", Rome, Italy, 15 May 2017.

PARTICIPATION IN RESEARCH PROJECTS

I.   Participant in the project titled "B2B: Brain-to-Brain Connectivity for the Real-time Monitoring of Social Interactions", funded by Bitbrain, December 2020.

II.   Principal Investigator for the project *Avvio alla Ricerca* (AR1181643680C682) titled "*A multilayer network based analysis to infer dependencies among frequencies in EEG signals*", funded by Sapienza University of Rome, 01 Oct 2018.

III.   Participant in the project "*Sviluppo di algoritmi per l'analisi di potenziali evento-correlati in presenza di jitter*", (Principal Investigator: Laura Astolfi), funded by Sapienza University of Rome – Progetto di Ateneo 2018.

IV.   Participant in the mobility project reserved for PhD students of the XXXI and XXXII cycles, titled *"MoRe-Net, Motor Recovery supported by hybrid Brain-Computer Interface and complex network theory"*, funded by Sapienza University of Rome, 07 Dec 2017.

V.   Participant in the project "*EMBRACING: Estimating Multiple-Brain connectivity in Autism during Cooperative Interaction: anew tool for real-time hyperscanninG*", (Principal Investigator: Laura Astolfi), funded by Sapienza University of Rome – Progetto di Ateneo 2017.

VI.   Principal Investigator in the project *Avvio alla Ricerca,* (AR11715C821E23FC) titled "*Multilayer approaches for the detection of stable and dynamic communities in EEG-based brain networks*", funded by Sapienza University of Rome, 17 July 2017.

VII.   Participant in the project "*MIME-BCI: Mindfulness Meditation training supported by Brain-Computer Interfaces*", (Principal Investigator: Febo Cincotti), funded by Sapienza University of Rome – Progetti di Ateneo 2016.

PARTICIPATION TO CONFERENCES AND SCIENTIFIC MEETINGS

- Nov 11-15, 2023   2023 SfN Annual Meeting, Washington, DC, USA
- Jul 22-26, 2023   2023 OHBM Annual Meeting, Montreal, Canada
- Nov 12-16, 2022   2022 SfN Annual Meeting, San Diego, CA, USA
- Nov 1-5, 2021   43rd Annual International Conference of the IEEE EMBS (virtual)
- Jul 23-27, 2019   41st Annual International Conference of the IEEE EMBS, Berlin, Germany
- Jun 9-13, 2019   2019 OHBM Annual Meeting, Rome, Italy
- Jun 6-8, 2019   OHBM Hackathon in Rome 2019, Rome, Italy
- May 2-4, 2018   BrainHack Global, Indiana University, Bloomington (USA)

TALKS

- "Modular Brain Networks", at 2022 ABRO Course on Advances in Bioengineering. October 3rd, 2022 (virtual).
- "Multi-layer models for brain networks", for IUNI Lunch Colloquium: Network Neuroscience. September 23rd, 2022, @ IUNI (Indiana University Network Science Institute). Link.
- "Multi-modal and multi-subject modular organization of human #brain networks" at the Brain and More Lab (PI Alessandro Crimi) for the series *Sano Neurospritz*. June 17, 2022 (virtual). Link.

EDITORIAL ACTIVITY

Reviewer for the international journals:

- Biomedical Signal Processing and Control, Elsevier
- Computer Methods and Programs in Biomedicine, Elsevier
- Frontiers
- NeuroImage
- Brain Topography
- Scientific Reports
- Human Brain Mapping
- Network Neuroscience

Reviewer for conference papers of the Annual International Conference of the IEEE EMB and IEEE BIBM.

PERSONAL SKILLS AND COMPETENCES

Languages	**Italian**	Mother tongue

	English	Reading: excellent
		Writing: excellent
		Speaking: excellent
		Certificates: FCE
		Abroad experiences:
		  - postdoc at Indiana University, Bloomington, Indiana, USA
		  - Intensive course of English, organized by MLA courses in Bristol (UK)

	French	Reading: excellent Writing: good Speaking: good
Computer skills		**MATLAB ENVIRONMENT** (daily use) **PYTHON** and **R** (occasional use, attendee of online tutorials and the course organized by LUG Sapienza) **MICROSOFT OFFICE SUITE**.
Technical skills		Competent with EEG acquisition devices such as BrainAmp, gTech. Good knowledge of software for the analysis of brain signals, such as EEGLAB and BRAINVISION ANALYZER.

I hereby authorize you to use my personal details contained in this document (D. lgs. n.196/2003).

Bloomington, 23/02/2024