Alessio Basti

Scientific (short) CV (v. 2026-06-19)

PERSONAL DETAILS

Birth	May 14, 1991
Univ. Addr.	Scala Azzurra, Viale Pindaro 42, Pescara (Italy)
Email	`alessio.basti@unich.it`

MAIN RESEARCH AREAS

• Computational Science; Neuroimaging; Theoretical Aspects of Numerical Analysis

PRESENT AND PAST POSITIONS

Assistant Professor of Numerical Analysis Mar 2025 -
Dept. Engineering and Geology, Ud'A
(RTD-A, SSD: MATH-05/A - analisi numerica).

Post-Doctoral Fellow in Applied Physics Nov 2019 - Aug 2021
Dept. Neuroscience, Imaging and Clinical Sciences, Ud'A
(Assegnista di ricerca, SSD: FIS/07 - fisica applicata, SC: 02/D1).

Research Fellow in Applied Physics Nov 2018 - Oct 2019
Dept. Neuroscience, Imaging and Clinical Sciences, Ud'A
(Borsista di studio per attività di ricerca, SSD: FIS/07 - fisica applicata, SC: 02/D1).

EDUCATION

National Scient. Qualification as Associate Professor in Applied Physics
Ministry of University and Research (MUR)
SSD: PHYS-06/A - fisica per le scienze della vita (già FIS/07 - fisica applicata).

PhD Neuroscience and Imaging Nov 2015 - Mar 2019
University "G. d'Annunzio" Chieti-Pescara (Ud'A)
Additional label of "Doctor Europaeus"; supervisor: Prof. Laura Marzetti; thesis title: "Computational methods for investigating statistical dependencies between multivariate neural signals".

Visiting PhD Student/Scientist May 2018 - Aug 2018
University of Cambridge
Additional position: MCR affiliated member of the Downing College; supervisor: Dr. Olaf Hauk.

MSc. Applied Mathematics Oct 2013 - Oct 2015
Sapienza University of Rome
Summa Cum Laude with completion of the "Excellence Path" (reserved to the 6 most proficient students); thesis supervisor: Prof. Dario Benedetto; thesis title: "Approaches of nonlinear dynamical systems to analyse time series".

BSc. Mathematics Oct 2010 - Oct 2013

Sapienza University of Rome

Thesis supervisor: Prof. Eugenio Montefusco; thesis title: "Existence and blow-up of solutions for some parabolic systems".

UNIVERSITY TEACHING ACTIVITIES

• Taught the course "Mathematics and Statistics for Cognitive Sciences" (7 CFU, SSD MAT/08) for the degree program in Computational Cognitive Sciences at UdA, 2025-2026.

• Taught the course "Mathematical Analysis II" (7/9 CFU, SSD MAT/05) for the degree programs in Biomedical Engineering (L9), and in Building Engineering (L23), at UdA, 2025-2026.

• Taught the course "Mathematical Physics" (12 CFU, SSD MAT/07) within the first-level Master's program for teaching in CdC-A028 at UNIDAV, 2023.

• Held the teaching assignment "Mathematical Methods for Neuroimaging: from Linear Algebra to Complex Analysis" (1 CFU: 6 hours for the XXXV cycle; 8 hours for the XXXVI cycle; 8 hours for the XXXVII cycle) for the PhD in Neuroscience and Imaging, UdA, 2019-2022.

• Collaborated in the teaching activities for the course "EEG/MEG Laboratory" (1 CFU course, SSD FIS/07) under the direction of Prof. Filippo Zappasodi within the second-level Master's program "Neuroimaging: from Methods to Applications in Neuroscience" at UdA, 2020-2021.

• Served as Subject Expert in Applied Physics (SSD FIS/07) and as a member of the examination committees for "Physics" and "Physics 2" for the degree program in Biomedical Engineering (L9), and in Building Engineering (L23) at UdA, 2019-2024.

• Served as Subject Expert in Applied Physics (SSD FIS/07) and as a member of the examination committees for "Medical Physics" for the degree program in Medicine and Surgery at UdA, 2019-2024.

TALKS TO CONFERENCES AND ADVANCED SCHOOLS (LAST FIVE YEARS)

• Oral contribution to the conference "Hamilton-Jacobi Equations and Mean Field Games: From Modeling to Numerics via Analysis", Pisa, 01 October 2026 (forthcoming).

• Invited talk to "Seminars of Numerical Analysis", Department of Mathematical Sciences, Polytechnic University of Turin, 18 June 2026.

• Oral contribution to symposium "Beyond Neural Connectivity: Exploring Higher Order Interactions in the Brain", XXX annual conference of the Italian Association of Psychology, 23 September 2024.

• Oral contribution to symposium "Emerging Methods for Dynamic Multi-dimensional Brain Functional Connectivity Analysis", The annual meeting of the Organization for the Human Brain Mapping (OHBM), 23 june 2022.

• Oral contribution to symposium "Connecting to the networks of the human brain by EEG-guided closed-loop TMS", The 5th Basic and Clinical Multimodal Imaging (BaCI) International (virtual) Conference, 16 October 2021.

• Oral contribution to mini-symposium "New Mathematical Voices for Biomedicine and Neuroscience". XV bi-annual Conference of the Italian Society of Applied and Industrial Mathematics (SIMAI), University of Parma, 31 August 2021.

• Oral contribution to on-line "Istituto nazionale di alta matematica" (INDAM) Workshop "NonInvasive Mathematics". 16 April 2021.

BIBLIOMETRIC DATA

Num. of peer-reviewed papers indexed in Scopus: 26
H-Index Google Scholar/Scopus: 12/10
Total num. of citations Google Scholar/Scopus: 516/352

PREPRINTS

• Ancona, F., Basti, A., & Camilli, F. (2026). Kolmogorov ε-entropy of numerical solutions for scalar conservation laws with convex flux. arXiv preprint arXiv:2605.07427.

• Basti, A., Hindriks, R., Freddi, R., Romani, G. L., Pizzella, V., Nolte, G., & Marzetti, L. (2026). A Generalized Framework of Antisymmetric Polyspectral Indices for Identifying High-Order Neural Interactions. arXiv preprint arXiv:2605.04636.

• Basti, A., Camilli, F., & Festa, A. (2026). A Mean Field Games Perspective on Evolutionary Clustering. arXiv preprint arXiv:2603.27137.

• Freddi, R., Seseri, N., Nigrisoli, D., & Basti, A. (2026). Bridging Theory and Practice in Crafting Robust Spiking Reservoirs. arXiv preprint arXiv:2604.06395.

• Basti, A., and Camilli, F. (2025). L^p Estimates for Numerical Approximation of Hamilton-Jacobi Equations. arXiv preprint arXiv:2512.24051.

SELECTED PEER REVIEWED PUBLICATIONS

• Freddi, R., Cicala, F., Marzetti, L., and Basti, A. (2025). A mean-field approach to criticality in spiking neural networks for reservoir computing. Scientific Reports, 15(1).

• Pedota, M., Cicala, F., and Basti, A. (2025). Human agents, generative AI, and innovation: A formal model of hybrid creative process. Technovation, 148, 103323.

• Makkinayeri, S., Guidotti, R., Basti, A., Woolrich, M. W., Gohil, C., Pettorruso, M., ... and Marzetti, L. (2025). Investigating brain network dynamics in state-dependent stimulation: A concurrent electroencephalography and transcranial magnetic stimulation study using hidden Markov models. Brain Stimulation, 18(3), 800-809.

• Pieramico, G., Makkinayeri, S., Guidotti, R., Basti, A., Voso, D., Lucarelli, D., ... and Marzetti, L. (2025). Robustness of brain state identification in synthetic phase-coupled neurodynamics using Hidden Markov Models. Frontiers in Systems Neuroscience, 19.

• Guidotti R., Basti A., Pieramico G., D'Andrea A., et al. When neurostimulation met control theory (2024). Journal of Neural Engineering.

• Leone F., Caporali A., Pascarella A., Perciballi C., Maddaluno O., Basti A., Belardinelli P., et al. (2024). Investigating the impact of the regularization parameter on EEG resting-state source reconstruction and functional connectivity using real and simulated data. NeuroImage, 303, 120896.

• Basti, A., Nolte, G., Guidotti, R., Ilmoniemi, R. J., Romani, G. L., Pizzella, V., and Marzetti, L. (2024). A bicoherence approach to analyze multi-dimensional cross-frequency coupling in EEG/MEG data. Scientific Reports, 14(1), 8461.

• Guidotti, R., D'Andrea, A., Basti, A., Raffone, A., Pizzella, V., and Marzetti, L. (2023). Long-Term and Meditation-Specific Modulations of Brain Connectivity Revealed Through Multivariate Pattern Analysis. Brain Topography, 36(3), 409-418.

• Pieramico, G., Guidotti, R., Nieminen, A. E., D'Andrea, A., Basti, A., Souza, V. H., ... and Marzetti, L. (2023). TMS-Induced Modulation of EEG Functional Connectivity Is Affected by the E-Field Orientation. Brain Sciences, 13(3), 418.

• D'Andrea, A., Basti, A., Tosoni, A., Guidotti, R., Chella, F., Michelmann, S., Romani, G.L., Pizzella, V., and Marzetti, L. (2022). Magnetoencephalographic spectral

fingerprints differentiate evidence accumulation from saccadic motor preparation in perceptual decision-making. iScience, 105246.

• Basti*, A., Chella*, F., Guidotti, R., Ermolova, M., D'Andrea, A., Stenroos, M., Romani, G.L., Pizzella, V., and Marzetti, L. (2022). Looking through the windows: a study about the dependency of phase-coupling estimates on the data length. (*equally contributing authors). Journal of neural engineering, 19.

• Syrjälä, J., Basti, A., Guidotti, G., Marzetti, L., and Pizzella, V. (2021). Decoding working memory task condition using MEG source level long-range phase coupling patterns. Journal of neural engineering, 18, 016027.

• Basti*, A., Nili*, H., Hauk, O., Marzetti, L., and Henson, R.H. (2020). Multi-dimensional connectivity: a conceptual and mathematical review. (*equally contributing authors). NeuroImage, 221, 117179.

• Basti, A., Mur, M., Kriegeskorte, N.,..., Marzetti, L., and Hauk, O. (2019). Analysing linear multivariate pattern transformations in neuroimaging data. PloS one, 14(10).

• Ramassone*, A., D'Argenio*, A., Veronese*, A., Basti, A., Soliman, S. H. A., Volinia, S., ... and Visone, R. (2019). Genetic dynamics in untreated CLL patients with either stable or progressive disease: a longitudinal study. (*equally contributing authors) Journal of hematology & oncology, 12(1), 1-5.

• Marzetti, L., Basti, A., Chella, F., D'Andrea, A., Syrjala, J., and Pizzella, V. (2019). Brain functional connectivity through phase coupling of neuronal oscillations: a perspective from magnetoencephalography. Frontiers in neuroscience, 13, 964.

• Basti, A., Chella, F., Snyder, A. Z., Pizzella, V., and Marzetti, L. (2019). Spatiotemporal Structures of Time Lags in the Brain as Revealed by Magnetoencephalography. In 2019 IEEE International Conference on Systems, Man and Cybernetics (SMC) (pp. 2762-2766). IEEE.

• Chella, F., Marzetti, L., Basti, A., Stenroos, M., Parkkonen, L., Ilmoniemi, R. J., and Pizzella, V. (2019). Influence of Co-Registration Errors on the Performance of Anatomical Constraints in MEG Source Connectivity Analysis. In 2019 IEEE International Conference on Systems, Man and Cybernetics (SMC) (pp. 2754-2761). IEEE.

• Basti, A., Pizzella, V., Chella, F., Romani, G. L., Nolte, G., and Marzetti, L. (2018). Disclosing large-scale directed functional connections in MEG with the multivariate phase slope index. NeuroImage, 175, 161-175.

• Chella, F., D'Andrea, A., Basti, A., Pizzella, V., and Marzetti, L. (2017). Non-linear analysis of scalp EEG by using bispectra: the effect of the reference choice. Frontiers in neuroscience, 11, 262.

• Basti, A., Pizzella, V., Nolte, G., Chella, F., and Marzetti, L. (2017). Disclosing brain functional connectivity from electrophysiological signals with phase slope based metrics. Journal of the Serbian Society for Computational Mechanics, 11(2), 50-62.

• Croce, P., Basti, A., Marzetti, L., Zappasodi, F., and Del Gratta, C. (2016). EEG–fMRI Bayesian framework for neural activity estimation: A simulation study. Journal of neural engineering, 13(6), 066017.

AWARDS ET SIMILIA

• Winner (#1 ranked candidate in Abruzzo) of the STEM A027 (Math and Physics - High School) public competition (Concorso Ordinario, D.D.G. 252/2022), Aug 2022.

• Winner of the STEM A028 (Math and Science - Middle School) public competition (Concorso Ordinario, art. 59 D.L. 73/2021, D.D. 499/2020), Aug 2021

• First prize winner for the best PhD thesis in the biomedical research given by Abruzzo Foundation for Life Sciences ONLUS, July 2020.

• Scholarship for the "Excellence path", Department of Mathematics "G. Castelnuovo", Sapienza University of Rome, Italy, November 2015 – October 2018.

SPARSE INFO AND SKILLS

Languages	Italian (Mother tongue) English (Advanced) Japanese (Elementary)
Software/prog. languages	MATLAB, Python, C++, LaTeX