Curriculum Vitae

RAUL CRISTIAN MUREŞAN

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Date and place of birth: August 23rd 1978, Cluj-Napoca, Romania

Education and professional degrees

Since 2018	Scientist grade I (equivalent to university Professor)
2006 – 2008	Postdoc at Frankfurt Institute for Advanced Studies (FIAS – Neuroscience department) and Max Planck Institute for Brain Research (MPI – Neurophysiology department), Frankfurt am Main, Germany.
2004 – 2005	Visiting PhD student at FIAS and MPI, Frankfurt am Main, Germany.
2002 – 2005	PhD from Technical University of Cluj-Napoca, in collaboration with FIAS and MPI.
1997 – 2002	Diplomat engineer degree in Computer Science from Technical University of Cluj-Napoca with a degree exam mark of 10 out of 10.

Professional experience

Since 2017	President of the Transylvanian Institute of Neuroscience and director of the Experimental and Theoretical Neuroscience Department, Cluj-Napoca, Romania
Since 2022	Scientist grade I at STAR-UBB Institute, Cluj-Napoca
2007 – 2017	Principal Investigator – Experimental and Theoretical Neuroscience Laboratory at the Center for Cognitive and Neural Studies (Coneural), Romanian Institute of Science and Technology, Cluj-Napoca, Romania
Since 2012	Organizer of the Transylvanian Experimental Neuroscience Summer School (TENSS – https://tenss.ro)
2008 – 2013	Head of Max Planck Partner Group in Romania during 2008-2013. (Partner Groups details: http://www.mpg.de/272644/Partner_Groups)
2011 – 2013, 2017	Member of Biology Committee of the National Research Council of Romania (CNCS)

2002 – 2004 Head of research group in applied Neuroscience at S.C. Nivis S.R.L. during 2002-2004

Reviewer, evaluator

Reviewer Cell Reports Physical Sciences, Nature Computational Science, Cellular and Molecular Life Sciences, Addition Biology, Nature Translational Psychiatry, Frontiers Neuroscience, Frontiers in Human Neuroscience, Neuroscience, Journal of Neurophysiology, Neural Computation, Neural Networks, Neurocomputing, International Journal of Information Fusion, ICANN: 2005-2008, CNS Meeting: 2012-Present, IFAC World Conference, IEEE Transactions on Neural Networks, IEEE TETCI, IEEE TNSRE, New Ideas in Psychology, etc.

Evaluator Fullbright, National Research Council of Romania, Estonian Science Foundation, FIAS Summer School on Theoretical Neuroscience and Complex Systems, Transylvanian Experimental Neuroscience Summer School, etc.

Grants

Research grants

2007 – 2009 Reintegration Grant funded by the Romanian Government. Title: "Dynamics of Cortical Microcircuits: Oscillations, Resonance, Synchronization". Amount: ~119,000 EUR. Project ID: RP5/2007, Contract No. 1/2007.

2007 – 2010 Ideas Grant funded by the Romanian Government. Title: "Complexity of Cortical Dynamics During Perceptual Binding: Gamma Oscillations". Amount: ~196,000 EUR. Project ID: ID48/2007, Contract No. 204/2007.

2008 – 2013 Coneural – Max Planck Partner Group, funded by the Max Planck Society from Germany. Amount: 20,000 EUR/year for 5 years. Purpose: to strengthen collaboration of the PI's lab with the Max Planck Institute for Brain Research in Frankfurt am Main.

2010 – 2013 Human Resources Grant, funded by the Romanian Government. Title: "Object Recognition via Attractors in the Human Brain". Amount: ~175,000 EUR. Project ID: TE11/2010, Contract No. 23/28.07.2010.

2011 – 2013 Mentor for two post-doc grants won by Dr. Moca Vasile Vlad and Dr. Ţincaş Ioana, for the period 2011-2013. Each grant is in amount of: ~ 70,000 EUR.

2014 – 2016 Grant funded by the Volkswagen Foundation. Title: "Investigation of cortical circuit dynamics: trajectories, complexity, chaos, oscillation mechanisms". Amount: 50,000 EUR.

2015 – 2017 Human Resources Grant, funded by the Romanian Government. Title: "Mechanisms of gamma oscillations in cortical networks: from emergence to functional role in perception and cognition". Amount: ~124,000 EUR.

2016 – 2017 Support Grant, funded by the Romanian Government. Award for participating in H2020 projects. Amount: ~31,500 EUR.

2016 – 2019 H2020-PHC-2015-two-stage grant, funded by the European Commission. Title: "Systems Biology of Alcohol Addiction: Modeling and validating disease state networks in human and animal brains for understanding pathophysiology, predicting outcomes and improving therapy". Amount: 414,125 EUR.

2016 – 2019 Associate partner in the INTERLEARN H2020 Marie Sklodowska-Curie ITN for a European Industrial Doctorate programme led by Birkbeck College, University of London.

2017 – 2021 IOS grant funded by the National Science Foundation from USA. Title: "A framework for analyzing converging feedforward and cortical-bulbar feedback dynamics in target detection from complex odor scenes". Project ID: NSF16-505. Amount: 140,800 USD.

2017 – 2019 Ideas grant, type PCE funded by the Romanian Government. Title: "Action planning and execution across fronto-parietal neural ensembles". Project ID: PN-III-P4-ID-PCE-2016-0010. Amount: 849,990 RON.

2017 – 2018 Experimental-demonstrator grant, type PED funded by the Romanian Government. Title: "High-bandwidth brain-computer interface demonstrator". Project ID: PN-III-P2-2.1-PED-2016-0007. Amount: 475,000 RON.

2018 – 2021 Era-Net NEURON grant. Title: "Understanding psychosis, cognitive impairment and motor symptoms induced by NMDA receptor dysfunction: from mechanisms to prevention and therapy". Project ID: COFUND-NEURON-NMDAR-PSY. Amount: 910,000 RON.

2020 – 2022 Experimental-demonstrator grant, type PED funded by the Romanian Government. Title: "Groundbreaking brain-computer interface for gaming based on gamma waves" (acronym: CONEXUS). Project ID: PN-III-P2-2.1-PED-2019-0277. Amount: 600,000 RON.

2021 – 2022 Support Grant, funded by the Romanian Government. Award for participating in H2020 projects (prize for PhenoTECH – H2020 ERC grant). Amount: ~37,000 EUR.

2021 – 2023 Support Grant, funded by the Romanian Government. Award for participating in H2020 projects (prize for NEUROTWIN). Amount: ~54,000 EUR.

2020 – 2024 Norway Grants funded through the EEA-NO financial mechanism. Title: "Treating Alzheimer's disease by characterizing and repairing circuit activity using GENUS therapy" (acronym: CIRCUITGENUS). Project ID: RO-NO-2019-0504. Amount: 1,164,000 EUR (in collaboration with Oslo University).

2021 – 2024 H2020-WIDESPREAD-2020-5 Twinning grant (Raul Mureşan / TINS is the coordinator), funded by the European Commission. Project acronym: NEUROTWIN. Amount: 799,425 EUR (of which, 544,175 EUR for TINS). In collaboration with Ernst Strüngmann Institute (Germany), Imagine Institute (France), and University College London (UK).

2021 – 2024 Merck 2020 Research Grant in 'Next Generation Machine Learning' funded by Merck KGaA. Title: "Invariant representations in dynamical, recurrent, fractal cortical circuits: From fundamental principles to mechanistic implementation" (acronym FRACORTEX). Amount: 300,000 EUR.

2022 – 2024 FLAG-ERA JTC2021 HBP Flagship. Title: "Combining model free and model based biomarkers for the consciousness diagnosis" (acronym ModelDXConsciousness). Amount: 200,000 EUR.

2024 – 2027 COFUND-FLAGERA-JTC2023-MONAD. Title: "Impaired coordination between cortical areas as a key to diagnose autism spectrum disorders". Amount: 200,000 EUR.

2024 – 2027 ERANET-NEURON-II-JTC2023-IBRAA: Title: "Inflamed brain response in alcohol addiction: Understanding the role of neuroinflammation, immunotypes and gut-brain reactivity for heterogeneity in disease course and therapy response". Amount: 200,000 EUR.

Grants for the Transylvanian Experimental Neuroscience Summer School (TENSS)

2011 School of Advanced Studies Grant, funded by the Romanian Government. Title: "First Transylvanian Summer School on Experimental Systems Neuroscience". Amount: ~19,000 EUR. Funding for TENSS 2012.

2012 Hertie Alumni Grant, funded by the Hertie Foundation in Germany. Amount: 3,000 EUR. Funding for TENSS 2012. European Neuroscience Schools Program grant for TENSS 2013, funded by FENS-IBRO in amount of 20,000 EUR. Office of Naval Research Global (ONRG) grant in amount of 19,900 US dollars. Funding for TENSS 2013.

2012 School of Advanced Studies Grant, funded by the Romanian Government. Amount: ~18,500 EUR. Funding for TENSS 2013.

2013	Hertie Alumni Grant, funded by the Hertie Foundation in Germany. Amount: 3,000 EUR. Funding for TENSS 2013. Training Centre grant funded by FENS-IBRO in amount of 40,000 EUR. Funding for TENSS 2014.
2015	Gatsby & Wellcome Trust grant for TENSS 2015 in amount of 50,000 EUR. FENS, IBRO, The Company of Biologists, and EBBS funding for TENSS 2015 in total amount of ~15,000 EUR.
2016	Gatsby & Wellcome Trust grant for TENSS 2016 in amount of 50,000 EUR. Grants from IBRO-PERC, FENS-NENS, The Company of Biologists, Simons Foundation for TENSS 2016 in amount of ~75,000 EUR
2017	Grants from IBRO-PERC, FENS-NENS, The Company of Biologists, Simons Foundation, Botnar Foundation for TENSS 2017 in amount of ~74,000 EUR
2018	Grants from IBRO-PERC, FENS-NENS, The Company of Biologists, Simons Foundation, Botnar Foundation for TENSS 2018 in amount of ~80,000 EUR
2019	Grants from IBRO-PERC, FENS-NENS, Simons Foundation, Botnar Foundation for TENSS 2019 in amount of ~80,000 EUR
2020-2023	Grants from IBRO-PERC, FENS-NENS, The Company of Biologists, Simons Foundation, Botnar Foundation for TENSS 2020-2023 in amount of ~170,000 EUR.
2024	Grants from IBRO-PERC, Simons Foundation, Google Deep Mind, Carnegie Mellon University, Howard Huges Medical Institute for TENSS 2024 in amount of ~75,000 EUR.

Patents

Mureșan R.C., Moca V.V., Bârzan H. (2021), US patent 11157082 / 26.10.2021, United States Patent Office. Title: Method, Human Machine Interface, Machine Computing Unit and Computer Programs to Control at Least One Actuator to Carry Out at Least One Task. https://patentcenter.uspto.gov/#!/applications/17315888

Mureșan R.C., Moca V.V., Bârzan H. (2022), European patent EP3843625 / 13.07.2022, European Patent Office. Title: Method, Human Machine Interface, Machine Computing Unit and Computer Programs to Control at Least One Actuator to Carry Out at Least One Task. https://register.epo.org/application?number=EP19809174

Selected publications

***** Corresponding author

Varga L., Moca V.V., Molnár B., Perez-Cervera L., Selim M.K., Diaz-Para A., Moratal D., Pentek B., Sommer W.H., **Mureșan R.C.***, Canals S.*, Ercsey-Ravasz M.* (2024), Brain dynamics supported by a hierarchy of complex correlation patterns defining a robust functional architecture. *Cell Systems*. In press.

Gal C., Țincaș I., Moca, V.V., Ciuparu A., Dan E.L., Smith M.L., Gliga T., **Mureșan R.C.*** (2024), Randomness impacts the building of specific priors, visual exploration, and perception in object recognition. *Nature Scientific Reports* 14, 8527.

Ardelean E.R., Bârzan H., Ichim A.M., **Mureșan R.C.*** and Moca V.V.* (2023), Sharp detection of oscillation packets in rich time-frequency representations of neural signals. *Frontiers in Human Neuroscience* 17:1112415.

Grosu G.F., Hopp A.V., Moca V.V., Bârzan H., Ciuparu A., Ercsey-Ravasz M., Winkel M., Linde H., **Mureșan R.C.*** (2023), The fractal brain: scale-invariance in structure and dynamics. *Cerebral Cortex* 33(8):4574–4605.

Ardelean E.R., Coporiie A., Ichim A.M., Dînșoreanu M., **Mureșan R.C.*** (2023), A study of autoencoders as a feature extraction technique for spike sorting. *PLoS One* 18(3):e0282810.

Ardelean E.R., Ichim A.M., Dinsoreanu M., **Mureșan R.C.*** (2023), Improved space breakdown method – A robust clustering technique for spike sorting. *Frontiers in Computational Neuroscience* 17:1019637.

Bârzan H., Ichim A.M., Moca V.V., **Mureșan R.C.*** (2022), Time-Frequency Representations of Brain Oscillations: Which One Is Better? *Frontiers in Neuroinformatics* 16:871904, doi: 10.3389/fninf.2022.871904.

Moca V.V., Barzan H., Nagy-Dabacan A., **Mureșan R.C.*** (2021), Time-frequency super-resolution with superlets. *Nature Communications* 12, 337.

Ciuparu A., Nagy-Dăbâcan A., **Mureșan R.C.*** (2020), Soft++, a multi-parametric non-saturating non-linearity that improves convergence in deep neural architectures. *Neurocomputing*, vol. 384:376-388.

de Calbiac H., Dăbâcan A., **Mureșan R.**, Kabashi E., Ciura S. (2020), Behavioral And Physiological Analysis In A Zebrafish Model Of Epilepsy. *J. Vis. Exp.* (JoVE), e58837, In-press.

Bârzan H., Moca V.V., Ichim A.M., **Mureșan R.C.*** (2020), Fractional Superlets. 28th *European Signal Processing Conference (EUSIPCO)*, Amsterdam, 18-22 January, 2021. In-press.

Palcu L.D., Supuran M., Lemnaru C., Dinsoreanu M., Potolea R., **Mureșan R.C.*** (2020), Discovering discriminative nodes for classification with deep graph convolutional methods. In M. Ceci et al. (Eds.): NFMCP 2019, *Lecture Notes in Artificial Intelligence* 11948, pp. 1–16, 2020, Springer Nature.

Gheorghiu M., Ciuparu A., Mimica B., Whitlock J., **Mureșan R.C.*** (2020), A machine learning approach to investigate fronto-parietal neural ensemble dynamics during complex behavior. *IEEE International Conference on Automation, Quality and Testing, Robotics* (AQTR), In press.

Bârzan H., Ichim A.M., **Mureșan R.C.*** (2020), Machine learning-assisted detection of action potentials in extracellular multi-unit recordings. *IEEE International Conference on Automation, Quality and Testing, Robotics* (AQTR), In press.

Dan L., Dînșoreanu M., **Mureșan R.C.*** (2020), Accuracy of six interpolation methods applied on pupil diameter data. *IEEE International Conference on Automation, Quality and Testing, Robotics (AQTR)*, In press.

Jurjuţ O.F., Gheorghiu M., Singer W., Nikolić D., **Mureșan R.C.*** (2019), Hold Your Methods! How Multineuronal Firing Ensembles Can Be Studied Using Classical Spike-Train Analysis Techniques, *Frontiers in Systems Neuroscience* 13:21, fnsys.2019.00021.

de Calbiac H., Dăbâcan A., Marsan E., Tostivint H., Devienne G., Ishida S., Leguern E., Baulac S., **Mureșan R.C.**, Kabashi E., Ciura S. (2018), Depdc5 knockdown causes mTOR-dependent motor hyperactivity in zebrafish. *Annals of Clinical and Translational Neurology*, 5(5):510-523.

Dolean S., Dînșoreanu M., **Mureșan R.C.**, Geiszt A., Potolea R., Ţincaş I. (2018), A Scaled-Correlation Based Approach for Defining and Analyzing Functional Networks. In: Appice A., et al. (eds) NFMCP 2017. *Lecture Notes in Computer Science*, vol. 10785, Springer.

Nedelcu E., Portase R., Tolas R., **Mureșan R.C.**, Dinsoreanu M., Potolea R. (2017), Artifact detection in EEG using machine learning. *Intelligent Computer Communication and Processing* (ICCP), 13th IEEE International Conference on, pp. 77-83.

Ciuparu A. and **Mureșan R.C.*** (2016), Sources of bias in single-trial normalization procedures. *European Journal of Neuroscience* 43(7):861–869.

Moca V.V., Nikolić D., Singer W., **Mureşan R.C.*** (2014), Membrane Resonance Enables Stable and Robust Gamma Oscillations. *Cerebral Cortex* 24:119-142.

Nikolić D., **Mureşan R.C.**, Feng W., Singer W. (2012) Scaled correlation analysis: a better way to compute a cross-correlogram. *European Journal of Neuroscience* 35(5), 742-762.

Jurjuţ O.F., Nikolić D., Singer W., Yu S., Havenith M.S., **Mureşan R.C.*** (2011), Timescales of Multineuronal Activity Patterns Reflect Temporal Structure of Visual Stimuli. *PLoS One* 6(2): e16758.

Moca V.V., Ţincaş I., Melloni L., **Mureşan R.C.*** (2011), Visual exploration and object recognition by lattice deformation. *PLoS One* 6(7): e22831.

Jurjuț O.F., Nikolić D., Pipa G., Singer W., Metzler D., **Mureşan R.C.*** (2009), A color-based visualization technique for multi-electrode spike trains. *J Neurophysiol* 102:3766-78.

Moca V.V., Scheller B., **Mureşan R.C.**, Daunderer M., Pipa G. (2009), EEG under anesthesia - feature extraction with TESPAR. *Computer Methods and Programs in Biomedicine* 95:191-202.

Mureşan R.C.*, Jurjuț O.F., Moca V.V., Singer W., Nikolić D. (2008), The Oscillation Score: An Efficient Method for Estimating Oscillation Strength in Neuronal Activity. *J Neurophysiol* 99:1333-53.

Nikolić D., Moca V.V., Singer W. and **Mureşan R.C.** (2008), Properties of multivariate data investigated by fractal dimensionality. *Journal of Neuroscience Methods* 172(1):27-33.

Lazăr A., **Mureşan R.C.**, Stadtler E., Munk M., Pipa G. (2007), Importance of electrophysiological signal features assessed by classification trees. *Neurocomputing* vol. 70:2017-2021.

Mureşan R.C.*, Savin C. (2007), Resonance or Integration? Self-sustained Dynamics and Excitability of Neural Microcircuits. *J Neurophysiol* 97:1911-1930.

Mureşan R.C.* (2003) Pattern recognition using Pulse-Coupled Neural Networks and Discrete Fourier Transforms. *Neurocomputing* 51, 487-493.

The complete list of publications is available at:
https://muresanlab.tins.ro/publications/index.php

Google scholar profile: http://scholar.google.com/citations?user=97ZOGx0AAAAJ&hl=en