

# Curriculum Vitae

## RAUL CRISTIAN MUREȘAN

muresan@tins.ro • +40-745-038694 • Transylvanian Institute of Neuroscience

**Date and place of birth:** August 23<sup>rd</sup> 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
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 – <a href="http://www.tenss.ro">www.tenss.ro</a> )
2008 – 2013	Head of Max Planck Partner Group in Romania during 2008-2013: <a href="http://www.mpg.de/272644/Partner_Groups">http://www.mpg.de/272644/Partner_Groups</a>
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 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 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. Țincaș 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 Skłodowska-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 – 2023 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).
- 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.
- 2021 – 2023 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 (FRACORTEX). Amount: 300,000 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 in amount of ~170,000 EUR.

## Patents

---

**Mureşan R.C.**, Moca V.V., Bârzan H. (2020) Method, Human Machine Interface, Machine Computing Unit and Computer Programs to Control at Least one Actuator to Carry out at Least One Task (WO/2020/100095). *World Intellectual Property Organization* (WIPO-Patent Cooperation Treaty), Geneva, Switzerland.  
<https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2020100095&tab=PCTBIBLIO>

## Selected publications

---

\* Corresponding author

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

Ciuparu A., Nagy-Dăbâcan A., **Mureşan 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., **Mureşan R.**, Kabashi E., Ciura S. (2020), Behavioral And Physiological Analysis In A Zebrafish Model Of Epilepsy. *J. Vis. Exp.* (JoVE), e58837, Inpress.

Bârzan H., Moca V.V., Ichim A.M., **Mureşan R.C.\*** (2020), Fractional Superlets. 28<sup>th</sup> *European Signal Processing Conference (EUSIPCO)*, Amsterdam, 18-22 January, 2021. Inpress.

Palcu L.D., Supuran M., Lemnaru C., Dinsoreanu M., Potolea R., **Mureşan 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., **Mureşan 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., **Mureşan 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., Dînşoreanu M., **Mureşan 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., **Mureşan 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., **Mureşan 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., Dînşoreanu M., **Mureşan 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., **Mureşan 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 **Mureşan 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., **Mureșan R.C.\*** (2009), A color-based visualization technique for multi-electrode spike trains. *J Neurophysiol* 102:3766-78.

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

**Mureșan 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 **Mureșan R.C.** (2008), Properties of multivariate data investigated by fractal dimensionality. *Journal of Neuroscience Methods* 172(1):27-33.

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

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

**Mureșan 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>