

Javier G. Orlandi

systems neuroscience / statistical physics / complex systems

about

Javier Orlandi Gómez
Lab for Neural Circuits
and Behavior
RIKEN Center for Brain
Science
2-1 Hirosawa, Wako-shi
Saitama 351-0198
Japan

+81 0808.706.4340 (cell)

javier.orlandigomez@riken.jp
javierorlandi@javierorlandi.com

javierorlandi.com

profiles

[ORCID
0000-0001-5683-1717](https://orcid.org/0000-0001-5683-1717)

[ResearchGate
Javier_Orlandi](https://www.researchgate.net/profile/Javier-Orlandi)

github.com/orlandi

Research experience and education

2019+	Research Scientist Human Frontier Science Program LTF fellow Lab. for Neural Circuits and Behavior, RIKEN Center for Brain Science Team Leader: Andrea Benucci	Wako-shi, Japan
2016–2018	Postdoctoral researcher Eyes-High fellow Dept. of Physics and Astronomy, University of Calgary Advisor: Jörn Davidsen	Calgary, Canada
2015–2016	Postdoctoral researcher Faculty of Medicine and Faculty of Physics, Universitat de Barcelona Advisors: Jordi Alberch and Jordi Soriano	Barcelona, Spain
2015	Ph.D. in Physics Universitat de Barcelona Advisor: Jaume Casademunt “Noise, coherent activity and network structure in neuronal cultures”	Barcelona, Spain
2012 & 2013	Visiting researcher (3 months) Max Planck Institute for Dynamics and Self-Organization Advisors: Theo Geisel and Demian Battaglia	Göttingen, Germany
2009–2010	Research Assistant Faculty of Physics, Universitat de Barcelona Advisor: Jaume Casademunt	Barcelona, Spain
2009	M.Sc. in Biophysics Faculty of Physics, Universitat de Barcelona Advisor: Jose M. Sancho	Barcelona, Spain
2008	B.Sc. in Physics Universitat de Barcelona 4 years bachelor's degree equivalent (licenciado en física)	Barcelona, Spain

Selected publications

2020	Deficits in coordinated neuronal activity and network topology are striatal hallmarks in Huntington's disease Fernández-García, S., Orlandi, J. G. , García-Díaz Barriga, G. A., Rodríguez, M. J., Masana, M., Soriano, J., and Alberch, J. BMC Biol. 18 (1): 58
2017	NETCAL: An interactive platform for large-scale, NETWORK and population dynamics analysis of CALcium imaging recordings Orlandi, J. G. , Fernández-García, S., Comella-Bolla, A., Masana, M., García-Díaz Barriga, G., Yaghoubi, M., Kipp, A., Canals, J. M., Colicos, M. A., Davidsen, J., Alberch, J., and Soriano, J. Zenodo research data repository. 2017

- 2015 **First connectomics challenge: from imaging to connectivity**
Orlandi, J. G., Ray, B., Battaglia, D., Guyon, I., Lemaire, V., Saeed, M., Soriano, J., Statnikov, A., and Stetter, O.
 Journal of Machine Learning: WCP, 46: 1–22
- 2014 **Transfer Entropy Reconstruction and Labeling of Neuronal Connections from Simulated Calcium Imaging**
Orlandi, J. G., Stetter, O., Soriano, J., Geisel, T., and Battaglia, D.
 PLoS ONE, 9 (6): e98842
- 2013 **Noise focusing and the emergence of coherent activity in neuronal cultures**
Orlandi, J. G., Soriano, J., Alvarez-Lacalle, E., Teller, S., and Casademunt, J.
 Nature Physics, 9 (9): 582–590

Peer-reviewed articles

- 2021 **Stochastic quorum percolation and noise focusing in neuronal networks**
Orlandi, J. G., and Casademunt, J.
 arXiv (accepted Europhys. Lett.)
- 2020 **Human Pluripotent Stem Cell-Derived Neurons Are Functionally Mature In Vitro and Integrate into the Mouse Striatum Following Transplantation**
 Comella-Bolla, A., **Orlandi, J. G.**, Miguez, A., Straccia, M., García-Bravo, M., Bombau, G., Galofré, M., Sanders, P., Carrere, J., Segovia, J. C., Blasi, J., Allen, N. D., Alberch, J., Soriano, J., and Canals, J. M.
 Mol. Neurobiol. 57 (6): 2766–2798
- 2020 **Deficits in coordinated neuronal activity and network topology are striatal hallmarks in Huntington's disease**
 Fernández-García, S., **Orlandi, J. G.**, García-Díaz Barriga, G. A., Rodríguez, M. J., Masana, M., Soriano, J., and Alberch, J.
 BMC Biol. 18 (1): 58
- 2020 **Unraveling the hidden complexity of quasideterministic ratchets: Random walks, graphs, and circle maps**
 Blanch-Mercader, C., **Orlandi, J. G.**, and Casademunt, J.
 Phys. Rev. E, 101 (1): 012203
- 2018 **Neuronal avalanche dynamics indicates different universality classes in neuronal cultures**
 Yaghoubi, M., Graaf, T. de, **Orlandi, J. G.**, Giroto, F., Colicos, M. A., and Davidsen, J.
 Scientific Reports, 8 (1): 3417
- 2018 **Neuronal spatial arrangement shapes effective connectivity traits of in vitro cortical networks**
 Tibau Martorell, E., Ludl, A. A., Rudiger, S., **Orlandi, J. G.**, and Soriano, J.
 IEEE Transactions on Network Science and Engineering, early acc: 1–1
- 2017 **7,8-dihydroxyflavone ameliorates cognitive and motor deficits in a Huntington's disease mouse model through specific activation of the PLC γ 1 pathway**
 García-Díaz Barriga, G., Giralt, A., Anglada-Huguet, M., Gaja-Capdevila, N., **Orlandi, J. G.**, Soriano, J., Canals, J.-M., and Alberch, J.
 Human Molecular Genetics, 26 (16): 3144–3160

- 2017 **Noise focusing in neuronal tissues: Symmetry breaking and localization in excitable networks with quenched disorder**
Orlandi, J. G., and Casademunt, J.
Physical Review E, 95 (5): 052304
- 2017 **Dominance of Metric Correlations in Two-Dimensional Neuronal Cultures Described through a Random Field Ising Model**
Hernández-Navarro, L., Orlandi, J. G., Cerruti, B., Vives, E., and Soriano, J.
Physical Review Letters, 118 (20): 208101
- 2015 **Activity and High-Order Effective Connectivity Alterations in Sanfilippo C Patient-Specific Neuronal Networks**
Canals, I., Soriano, J., Orlandi, J. G., Torrent, R., Richaud-Patin, Y., Jiménez-Delgado, S., Merlin, S., Follenzi, A., Consiglio, A., Vilageliu, L., Grinberg, D., and Raya, A.
Stem Cell Reports, 5 (4): 546–557
- 2015 **First connectomics challenge: from imaging to connectivity**
Orlandi, J. G., Ray, B., Battaglia, D., Guyon, I., Lemaire, V., Saeed, M., Soriano, J., Statnikov, A., and Stetter, O.
Journal of Machine Learning: WCP, 46: 1–22
- 2014 **Transfer Entropy Reconstruction and Labeling of Neuronal Connections from Simulated Calcium Imaging**
Orlandi, J. G., Stetter, O., Soriano, J., Geisel, T., and Battaglia, D.
PLoS ONE, 9 (6): e98842
- 2013 **Noise focusing and the emergence of coherent activity in neuronal cultures**
Orlandi, J. G., Soriano, J., Alvarez-Lacalle, E., Teller, S., and Casademunt, J.
Nature Physics, 9 (9): 582–590
- 2010 **Cooperativity of self-organized Brownian motors pulling on soft cargoes**
Orlandi, J. G., Blanch-Mercader, C., Brugués, J., and Casademunt, J.
Physical review. E, Statistical, nonlinear, and soft matter physics, 82 (6): 61903
- 2009 **Theoretical study of a membrane channel gated by ATP**
Orlandi, J. G., and Sancho, J. M.
The European Physical Journal E, 29 (3): 329–336

Other peer-reviewed publications

- 2016 **Experimental approaches to assess connectivity in living neuronal networks**
Hernández-Navarro, L., Orlandi, J. G., Casademunt, J., and Soriano, J.
Artificial Neural Networks and Machine Learning – ICANN 2016, Springer International Publishing, 2016
- 2013 **The emergence of spontaneous activity in neuronal cultures**
Orlandi, J. G., Alvarez-Lacalle, E., Teller, S., Soriano, J., and Casademunt, J.
American Institute of Physics: Conference Proceedings, 1510 (25): 25–27
- 2012 **The role of connectivity and noise in the emergence of spontaneous activity in cultured neuronal networks**
Orlandi, J. G., Alvarez-Lacalle, E., Teller, S., Casademunt, J., Soriano, J., and Casademunt, J.
NOLTA 2012 International Symposium on Nonlinear Theory and its Applications, 1: 547–550

Software

- 2017 **NETCAL: An interactive platform for large-scale, NETWORK and population dynamics analysis of CALcium imaging recordings**
Orlandi, J. G., Fernández-García, S., Comella-Bolla, A., Masana, M., García-Díaz Bariga, G., Yaghoubi, M., Kipp, A., Canals, J. M., Colicos, M. A., Davidsen, J., Alberch, J., and Soriano, J.
Zenodo research data repository. 2017

Books

- 2017 **Neural Connectomics Challenge**
Battaglia, D., Guyon, I., Lemaire, V., **Orlandi, J. G.**, Ray, B., and Soriano, J.
The Springer Series on Challenges in Machine Learning, Springer International Publishing. 2017

Invited talks

- 2020 **Network interactions in the mouse visual cortex are predictive of perceptual decisions**
Orlandi, J. G.
8th RIEC Int. Symp. Brain Funct. Brain Comput. Sendai, Japan. 2020
- 2019 **Detecting neuron-glia communication through optic flow and synaptic stabilization in neuronal cultures**
Orlandi, J. G.
The 7th RIEC International Symposium on Brain Functions and Brain Computer, Sendai, Japan. 2019
- 2018 **Emergent behaviour in neuronal cultures**
Orlandi, J. G.
International Symposium on Complexity Science Approaches to Brain Dynamics, Calgary, Canada. 2018
- 2018 **Emergent behaviour in Neuronal Cultures. From activity to connectivity and back**
Orlandi, J. G.
RIKEN Center for Brain Science, Wakoshi, Japan. 2018
- 2016 **Noise focusing and the emergence of coherent activity in neuronal cultures**
Orlandi, J. G.
Complexity Science Seminar, University of Calgary, Calgary, Canada. 2016
- 2015 **First connectomics challenge in neuronal cultures. Crowdsourcing network reconstruction**
Orlandi, J. G.
Connectome Workbench, University of Cambridge, Cambridge, United Kingdom. 2015

Contributed talks

- 2018 **Network inference in neuroscience with Causal Deep Learning**
ICCS 2018 - 9th International Conference on Complex Systems, Boston, MA. 2018

- 2018 **Neuronal avalanche dynamics leading to diverse universality classes in neuronal cultures**
ICCS 2018 - 9th International Conference on Complex Systems, Boston, MA. 2018
- 2014 **Transfer entropy reconstruction of neuronal networks from calcium imaging data**
Causality, Information Transfer and Dynamical Networks, Dresden, Germany. 2014
- 2013 **Noise focusing: unfolding coherent activity in neuronal cultures**
Anacapri Workshop - The Brain: Criticality, Dynamics, Networks and Function, Anacapri, Italy. 2013
- 2013 **The emergence of spontaneous activity in neuronal cultures, coherence from noise**
CNS 2013, 22nd Annual Computational Neuroscience Meeting, Barcelona, Spain. 2013
- 2012 **The emergence of coherent activity in living neuronal networks**
FisEs '12 XVIII Congreso de Física Estadística, Palma de Mallorca, Spain. 2012
- 2012 **The role of connectivity and noise in the emergence of spontaneous activity in cultured neuronal networks**
Orlandi, J. G., Alvarez-Lacalle, E., Teller, S., Casademunt, J., Soriano, J., and Casademunt, J.
NOLTA 2012 International Symposium on Nonlinear Theory and its Applications, 1: 547–550
- 2012 **The emergence of spontaneous activity in neuronal cultures**
Physics, Computation, and the Mind - Advances and Challenges at Interfaces, La Heradura, Spain. 2012
- 2011 **Neuronal Cultures: Synchronization, Forcing, and the Mechanisms behind Spontaneous Activity**
IBERSINC: Red sobre Dinámica y Sincronización en Redes, Barcelona, Spain. 2011
- 2011 **Unraveling Spontaneous Activity in Neuronal Cultures**
BARCSYN: 2011 Barcelona Computational and Systems Neuroscience Meeting, Barcelona, Spain. 2011

Posters and other conference contributions

- 2020 **Low-dimensional representations of perceptual decision making across the mouse dorso-parietal cortex**
Javier G. Orlandi, Abdolrahmani, M., Aoki, R., Lyamzin, D. R., and Benucci, A.
Int. Symp. Artif. Intell. Brain Sci. 2020
- 2019 **Network interactions in the mouse visual cortex are predictive of perceptual decisions**
Orlandi, J. G., Grzelkowski, S., Abdolrahmani, M., Aoki, R., Lyamzin, D. R., and Benucci, A.
Soc. Neurosci. SFN 2019, Chicago, USA. 2019
- 2017 **NETCAL: An interactive platform for large-scale, NETWORK and population dynamics analysis of CALcium imaging recordings**
Orlandi, J. G., Fernández-García, S., Comella-Bolla, A., Masana, M., García-Díaz Barriga, G., Yaghoobi, M., Canals, J.-M., Colicos, M. A., Davidsen, J., Alberch, J., and Soriano, J.
Neuroscience 2017, Washington DC, USA. 2017

- 2017 **Functional connectivity and dynamics in Huntington's disease striatal cultures revealed through large-scale calcium imaging**
Fernández-García, S., Masana, M., **Orlandi, J. G.**, García-Díaz Barriga, G., Soriano, J., and Alberch, J.
Neuroscience 2017, Washington DC, USA. 2017
- 2016 **Altered functional activity in vmDA neurons derived from Parkinson's disease-induced pluripotent stem cells (iPSC)**
Carola, G., Puxan, B. N., **Orlandi, J. G.**, Faella, A., Soriano, J., Raya, A., and Consiglio, A.
Human Gene Therapy 2016. 2016
- 2016 **First connectomics challenge: fostering research in network inference and its applications**
Orlandi, J. G., Battaglia, D., Stetter, O., Canals, I., Guyon, I., Saeed, M., and Soriano, J.
Brain Dynamics and Statistics: Simulation versus Data, Banff, Canada. 2016
- 2016 **Differentiation of human iPSC toward postmitotic forebrain neurons achieved a mature phenotype with spontaneous network activity**
Comella-Bolla, A., Straccia, M., Míguez, A., Sanders, P., **Orlandi, J. G.**, Bombau, G., Carrere, J., Kemp, P. J., Alberch, J., Soriano, J., Allen, N. D., and Canals, J. M.
10th FENS Forum of Neuroscience, Copenhagen, Denmark. 2016
- 2016 **Characterization of neuronal network structure and dynamics in striatal cultures**
Masana, M., **Orlandi, J. G.**, Fernández-García, S., García-Díaz Barriga, G., Alberch, J., and Soriano, J.
10th FENS Forum of Neuroscience, Copenhagen, Denmark. 2016
- 2016 **Spontaneous activity in cultures with dictated connectivity**
Hernández-Navarro, L., **Orlandi, J. G.**, and Soriano, J.
10th FENS Forum of Neuroscience, Copenhagen, Denmark. 2016
- 2016 **Deciphering Huntington's disease striatal network dynamics using high-speed high-resolution calcium imaging**
Fernández-García, S., Masana, M., **Orlandi, J. G.**, García-Díaz Barriga, G., Soriano, J., and Alberch, J.
10th FENS Forum of Neuroscience, Copenhagen, Denmark. 2016
- 2016 **First connectomics challenge: fostering research in network inference and its applications**
Orlandi, J. G., Battaglia, D., Stetter, O., Canals, I., Guyon, I., Ray, B., Saeed, M., and Soriano, J.
10th FENS Forum of Neuroscience, Copenhagen, Denmark. 2016
- 2014 **First neuronal connectomics challenge: From imaging to connectivity: From design to result harvesting and crowdpublishing**
Orlandi, J. G., Ray, B., Saeed, M., Soriano, J., Statnikov, A., Stetter, O., Guyon, I., and Battaglia, D.
Society for Neuroscience SFN 2014, Washington DC, USA. 2014
- 2014 **Design of the first neuronal connectomics challenge: From imaging to connectivity**
Guyon, I., Battaglia, D., Guyon, A., Lemaire, V., **Orlandi, J. G.**, Ray, B., Saeed, M., Soriano, J., Statnikov, A., and Stetter, O.
IEEE WCCI 2014, Beijing, China. 2014

- 2013 **Network reconstruction from calcium imaging data of spontaneously bursting neuronal activity**
Stetter, O., **Orlandi, J. G.**, Soriano, J., Battaglia, D., and Geisel, T.
CNS 2013, 22nd Annual Computational Neuroscience Meeting, 14 (Suppl 1): 139
- 2013 **The emergence of spontaneous activity in neuronal cultures, coherence from noise**
CNS 2013, 22nd Annual Computational Neuroscience Meeting, Barcelona, Spain. 2013
- 2012 **Experiments on clustered neuronal cultures**
Teller, S., **Orlandi, J. G.**, Alvarez-Lacalle, E., Casademunt, J., and Soriano, J.
8th FENS forum of European Neuroscience Societies, Barcelona, Spain. 2012
- 2012 **The emergence of coherent activity in neuronal cultures**
Orlandi, J. G., Alvarez-Lacalle, E., Teller, S., Soriano, J., and Casademunt, J.
8th FENS forum of European Neuroscience Societies, Barcelona, Spain. 2012
- 2011 **Spontaneous Activity in Neuronal Cultures: Experiments and Model**
Soriano, J., Teller, S., **Orlandi, J. G.**, Álvarez, E., Casademunt, J., and Moses, E.
XI Congreso de la Sociedad de Biofísica de España, Murcia, Spain. 2011
- 2011 **Experiments on Patterned Neuronal Cultures**
Teller, S., **Orlandi, J. G.**, Alvarez-Lacalle, E., Casademunt, J., Moses, E., and Soriano, J.
FisEs'11 XVII Congreso de Física Estadística, Barcelona, Spain. 2011
- 2011 **Self-similarity and chaos in coupled ratchets. Unfolding the complexity of cooperative Brownian motors**
Blanch-Mercader, C., **Orlandi, J. G.**, and Casademunt, J.
FisEs'11 XVII Congreso de Física Estadística, Barcelona, Spain. 2011
- 2011 **Local noise amplification and synaptic depression control the spontaneous activity in neuronal cultures**
Orlandi, J. G., Alvarez-Lacalle, E., Teller, S., Soriano, J., and Casademunt, J.
Ninth Göttingen Meeting of the German Neuroscience Society, Göttingen, Germany. March 23-27, 2011, Göttingen, Germany. 2011
- 2011 **Unraveling Spontaneous Activity in Neuronal Cultures**
BARCSYN: 2011 Barcelona Computational and Systems Neuroscience Meeting, Barcelona, Spain. 2011
- 2011 **Monitoring Dynamics in Living Neuronal Networks**
Teller, S., **Orlandi, J. G.**, Alvarez-Lacalle, E., Casademunt, J., and Soriano, J.
BARCSYN: 2011 Barcelona Computational and Systems Neuroscience Meeting. 2011
- 2010 **Nucleation and front propagation in patterned neuronal networks.**
Orlandi, J. G., Alvarez-Lacalle, E., Amigó, N., Soriano, J., and Casademunt, J.
7th FENS forum of European Neuroscience, Amsterdam, The Netherlands. 2010
- 2010 **Modelling Spontaneous Activity in Neuronal Cultures**
Orlandi, J. G., Alvarez-Lacalle, E., Amigó, N., Soriano, J., and Casademunt, J.
IV Spanish Portuguese Biophysical Congress, Zaragoza, Spain. 2010
- 2010 **Cooperativity of single-headed kinesin motors in axonal transport**
Orlandi, J. G., and Casademunt, J.
IV Spanish Portuguese Biophysical Congress, London, UK. 2010
- 2009 **Cooperativity of single-headed kinesin motors**
Orlandi, J. G., Blanch-Mercader, C., and Casademunt, J.
FiSeS '09 XVI Congreso de Física Estadística, Huelva, Spain. 2009

- 2009 **Collective dynamics of interacting Brownian motors under unequal loading**
Orlandi, J. G., Blanch-Mercader, C., Brugués, J., and Casademunt, J.
 FiSeS '09 XVI Congreso de Física Estadística, Huelva, Spain. 2009
- 2009 **Quasi-deterministic collective ratchets. Some exact results.**
 Blanch-Mercader, C., **Orlandi, J. G.**, and Casademunt, J.
 FiSeS '09 XVI Congreso de Física Estadística, Huelva, Spain. 2009

Grants and fellowships

- 2019–2022 **Human Frontier Science Program LT Fellowship** RIKEN CBS
 Long Term Postdoctoral Fellowship. LT000582/2019.
 250 000 \$ CAD.
- 2017–2020 **Research Project Collaborator** University of Barcelona
 "Modulation of neuronal network dynamics as a therapeutic strategy to tackle basal ganglia dysfunction in movement disorders." Spanish Ministry of Science. SAF2017-88076-R.
 PI: Jordi Alberch. 500 000 \$ CAD.
- 2016–2018 **Postdoctoral fellowship** University of Calgary
 Eyes High Fellowship.
 Supervisor: Jörn Davidsen
- 2014–2018 **Research Project Collaborator** University of Barcelona
 "Modulation of synaptic plasticity deficits as therapeutic strategy in Huntington's Disease". La Marato Foundation 201401-30-31.
 PI: Jordi Alberch. 450 000 \$ CAD.
- 2012 **Visiting researcher travel award (3 months)** University of Barcelona
 Visiting researcher at the Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany
- 2010–2014 **Ph.D. Fellowship** University of Barcelona
 APIF fellowship
 Supervisor: Jaume Casademunt

Teaching

- 2019+ **Brain Science Training Program: Academic writing, presentaion skills and Python workshops** Wako-shi Japan
 RIKEN Center for Brain Science
- 2011–2014 **Laboratory fundamentals** Barcelona, Spain
 Faculty of Physics, Universitat de Barcelona
 Course from the second semester B.Sc. in Physics
 Three academic years (24h / year)

Research coverage (editorials, news and views)

- 2013 **Focus amidst the noise**
 Beggs, J. M.
 Nature Physics, 9 (9): 533–534

Popular science

- 2014 **Dinámica colectiva de las redes neuronales**
Casademunt, J., **Orlandi, J. G.**, and Soriano, J.
Mente y Cerebro - Investigación y Ciencia (Spanish Scientific American), 67: 49–50
- 2014 **Avalanchas mentales**
Orlandi, J. G.
Revista Española de Física (Journal of the Spanish Royal Society of Physics), 28 (1): 43–44

Workshop organization

- 2019 **APCTP, Asia Pacific Center for Theoretical Physics** Pohang, KOREA
[International Workshop on Function, Information Spreading, and Percolation in Brain Networks](#)
- 2018 **University of Calgary** Calgary, Canada
[International Symposium on Complexity Science Approaches to Brain Dynamics](#)

Science policy

- 2019+ **RIKEN Center for Brain Science** Wako-shi, Japan
Postdoctoral Fellow Association
- 2012–2014 **Universitat de Barcelona** Barcelona, Spain
PhD student elected representative at the University governing council and senate
- 2012–2015 **Universitat de Barcelona** Barcelona, Spain
PhD student elected representative at the Department of Estructura i Constituents de la Matèria governing unit
- 2011–2013 **Spanish federation of young researchers (FJI)** Spain
Vice president in 2013. Institutional contacts coordinator in 2011–2012
- 2011–2013 **Catalan association of young researchers (D-Recerca)** Catalonia, Spain
President

Other

Reviewer for: Cerebral Cortex, Network Neuroscience, Frontiers in Computational Neuroscience, Scientific Reports, Physical Review E, Applied Network Science, Entropy and Chaos

Co-organized the first Chalearn Neural Connectomics Challenge "From Imaging to Connectivity" hosted on the Kaggle platform
<http://www.kaggle.com/c/connectomics>

Co-organized a Systems Neuroscience seminar series involving a dozen research groups of several universities and research centers (2013–2014)

Organized an interdepartmental seminar series on nonlinear physics, soft matter and complex systems (2012–2014)