

# Javier G. Orlandi

systems neuroscience / statistical physics / complex systems

## about

Javier Orlandi Gómez  
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## home address

205-1022 16th Ave NW  
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CANADA T2M 0k5

## profiles

[ORCID](#)  
0000-0001-5683-1717

[ResearchGate](#)  
Javier\_Orlandi

[github.com/orlandi](https://github.com/orlandi)

## languages

English  
Spanish  
Catalan

## programming expertise

C/C++, Matlab

## proficiency

Python, Mathematica,  
parallelisation, JavaScript,  
L<sup>A</sup>T<sub>E</sub>X, HTML, PHP, ...

## Research experience and education

- |             |  |                     |
|-------------|--|---------------------|
| 2016+       | <b>Postdoctoral researcher</b><br>Dept. of Physics and Astronomy, University of Calgary<br>Advisor: Jörn Davidsen  | Calgary, Canada     |
| 2015–2016   | <b>Postdoctoral researcher (8 months)</b><br>Faculty of Medicine and Faculty of Physics, Universitat de Barcelona<br>Advisors: Jordi Alberch and Jordi Soriano                             | Barcelona, Spain    |
| 2015        | <b>Ph.D. in Physics</b><br>Universitat de Barcelona<br>Advisor: Jaume Casademunt<br>“Noise, coherent activity and network structure in neuronal cultures”                                  | Barcelona, Spain    |
| 2012 & 2013 | <b>Visiting researcher (3 months)</b><br>Max Planck Institute for Dynamics and Self-Organization<br>Advisors: Theo Geisel and Demian Battaglia   | Göttingen, Germany  |
| 2009–2010   | <b>Research Assistant (18 months)</b><br>Faculty of Physics, Universitat de Barcelona<br>Advisor: Jaume Casademunt   | Barcelona, Spain    |
| 2009        | <b>Summer School (1 month)</b><br>École de Physique des Houches, “New Trends in the Physics and Mechanics of Biological Systems”   | Les Houches, France |
| 2009        | <b>M.Sc. in Biophysics</b><br>Faculty of Physics, Universitat de Barcelona<br>Advisor: Jose M. Sancho<br>“Biological transport in membrane channels, a white noise flashing ratchet model” | Barcelona, Spain    |
| 2008        | <b>B.Sc. in Physics</b><br>Universitat de Barcelona<br>4 years bachelor’s degree equivalent (licenciado en física)   | Barcelona, Spain    |

## Selected awards

- |      |  |                  |
|------|--|------------------|
| 2016 | <b>Postdoctoral fellowship (2 years)</b><br>University of Calgary. Eyes High Fellowship<br>Supervisor: Jörn Davidsen   | Calgary, Canada  |
| 2012 | <b>Visiting researcher travel award (3 months)</b><br>Universitat de Barcelona<br>Visiting researcher at the Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany | Barcelona, Spain |
| 2010 | <b>Ph.D. Fellowship (4 years)</b><br>Universitat de Barcelona. APIF fellowship<br>Supervisor: Jaume Casademunt   | Barcelona, Spain |

## Research coverage (editorials, news and views)

### Focus amidst the noise

Beggs, J. M.

Nature Physics, 9 (9): 533–534. **2013**

## Selected publications

### 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**

### 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: Workshop and Conference Proceedings, 46: 1–22. **2015**

### 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. **2014**

### 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. **2013**

## Peer-reviewed articles

### 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**

### 7,8-dihydroxyflavone ameliorates cognitive and motor deficits in a Huntington's disease mouse model through specific activation of the PLC $\gamma$ 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. **2017**

### 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: Workshop and Conference Proceedings, 46: 1–22. **2015**

### **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. **2014**

### **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. **2013**

### **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. **2010**

### **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. **2009**

## **Other peer-reviewed publications**

### **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**

### **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. **2013**

### **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**

## **Articles under review**

### **Neuronal spatial arrangement shapes effective connectivity traits in in vitro cortical networks**

Tibau, E., Ludl, A.-A., Rüdiger, S., **Orlandi, J. G.**, and Soriano, J.

IEEE Transactions on Network Science and Engineering. **2018**

### **Stochastic quorum percolation and noise focusing in neuronal networks**

**Orlandi, J. G.**, and Casademunt, J.

Physical Review Letters. **2018**

## **Software**

### **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**

## Books

### 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

### Inferring structural and functional neuronal networks from calcium imaging recordings

**Orlandi, J. G.**

Instituto de Neurociencias de Alicante, Alicante, Spain. **2017**

### Noise focusing and the emergence of coherent activity in neuronal cultures

**Orlandi, J. G.**

Complexity Science Seminar, University of Calgary, Calgary, Canada. **2016**

### First connectomics challenge in neuronal cultures. Crowdsourcing network reconstruction

**Orlandi, J. G.**

Connectome Workbench, University of Cambridge, Cambridge, United Kingdom. **2015**

## Contributed talks

### Transfer entropy reconstruction of neuronal networks from calcium imaging data

Causality, Information Transfer and Dynamical Networks, Dresden, Germany. **2014**

### Noise focusing: unfolding coherent activity in neuronal cultures

Anacapri Workshop - The Brain: Criticality, Dynamics, Networks and Function, Anacapri, Italy. **2013**

### The emergence of spontaneous activity in neuronal cultures, coherence from noise

CNS 2013, 22nd Annual Computational Neuroscience Meeting, Barcelona, Spain. **2013**

### The emergence of coherent activity in living neuronal networks

FisEs '12 XVIII Congreso de Física Estadística, Palma de Mallorca, Spain. **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 Herradura, Spain. **2012**

### Neuronal Cultures: Synchronization, Forcing, and the Mechanisms behind Spontaneous Activity

IBERSINC: Red sobre Dinámica y Sincronización en Redes, Barcelona, Spain. **2011**

### Unraveling Spontaneous Activity in Neuronal Cultures

BARCSYN: 2011 Barcelona Computational and Systems Neuroscience Meeting, Barcelona, Spain. **2011**

## **P**osters and other conference contributions

### **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**

### **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**

### **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, 27. **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**

### **Differentiation of human iPSC toward postmitotic forebrain neurons achieved a mature phenotype with spontaneous network activity**

Comella-Bolla, A., Straccia, M., Miguez, 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**

### **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**

### **Spontaneous activity in cultures with dictated connectivity**

Hernández-Navarro, L., **Orlandi, J. G.**, and Soriano, J.  
10th FENS Forum of Neuroscience, Copenhagen, Denmark. **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**

### **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**

### **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**

### **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**

### **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**

### **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**

### **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**

### **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**

### **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**

### **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**

### **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**

### **Unraveling Spontaneous Activity in Neuronal Cultures**

BARCSYN: 2011 Barcelona Computational and Systems Neuroscience Meeting, Barcelona, Spain. **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**

### **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**

### **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**

### **Cooperativity of single-headed kinesin motors in axonal transport**

**Orlandi, J. G.**, and Casademunt, J.  
IV Spanish Portuguese Biophysical Congress, London, UK. **2010**

### **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**

### **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**

### **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**

## Popular science

### 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. **2014**

## Teaching

2011–2014 **Laboratory fundamentals** Barcelona, Spain  
Faculty of Physics, Universitat de Barcelona  
Course from the second semester B.Sc. in Physics  
Teached for three academic years (24h / year)

## Science policy

2012–2014 **Universitat de Barcelona** Barcelona, Spain  
PhD student elected representative at the University governing council and senate

2012+ **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, Scientific Reports, Physical Review E, 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)