JORDI SORIANO FRADERA

Personal, professional and academic information

Name: Jordi Soriano Fradera
Birthdate: 14 december1970
Birth place: Barcelona (Spain)
Languages: Catalan and Spanish (native)
English (advanced)
German (basic)

Present position: Associate professor ("Professor agregat d'Universitat").
Permanent position since 2015.
E-mail: jordi.soriano@ub.edu
Work place: Facultat de Física. Universitat de Barcelona
Av. Diagonal 645, 08028 Barcelona, Spain

Previous positions:
- Researcher "Programa de Retenció de Talent" (2013-2015).
- "Ramón y Cajal" researcher (2008-2013).
- Postdoc at Weizmann Institute of Science, Israel (2005-2008).
- Postdoc at Universität Bayreuth, Germany (2003-2005).

Education:
1999-2003: Doctorate in Physics, Universitat de Barcelona.
1991-1998: Bachelor's in physics, Universitat de Barcelona.

Awards and committees:

- PhD award (Facultat de Física, Universitat de Barcelona, 2003).
- 'Best Young Researcher' award (Automium Culture, European Commission, 2011).
- Award 'Ciutat de Barcelona' (2020) for the article "Patient-specific iPSC-derived astrocytes contribute to non-cell-autonomous neurodegeneration in Parkinson's disease", published in Stem Cell Reports, 2019.
- Vice-director of 'University of Barcelona Institute of Complex Systems' (2017- present).
- Evaluator of ANEP, NSF and other international evaluation agencies since 2010.
- Editor and reviewer of different publishers, such as Springer-Nature y American Physical Society.
- PhD committees: 14 since 2009.

Research Projects (most important last 5 years):

1) Title: NEU-ChiP: Neuronal networks from Cortical human iPSCs for Machine Learning Processing.
Funding agency: European Research Council (H2020, FET-OPEN).
Budget: €535.750,00. Code: 964877.
Principal investigator: Jordi Soriano. Period: 2021-2024.

2) Title: Fenómenos colectivos en mataria blanda, tejidos celulares y redes neuronales.
Funding agency: Ministerio de Ciencia, Innovación y Universidades.
Budget: €221.430,00. Code: PID2019-108842GB-C21.
Principal investigator: Jaume Casademunt, Jordi Soriano Period: 2020-2023.

3) Title: Modulation of Tau seeding and pathology in tauopathies by BBB nanocarriers, epitope selective vaccination and ectoPrP Tau receptor bodies.
Funding agency: Fundació Bancària "La Caixa" (HEALTH RESEARCH call).
Budget: € 763.002,00. Code: HR19-00452.
Principal investigator: Jordi Soriano. Coordinator: José A. del Río. Period: 2019-2022.

4) Title: MESO_BRAIN: Custom architecturally defined 3D stem cell derived functional human neural networks for transformative progress in neuroscience and medicine.
Funding agency: European Research Council (FET-OPEN call).
Budget: €466.236,25. Code: 713140.
Principal investigator: Jordi Soriano. Period: 2016-2020.

5) Title: Fenómenos de no-equilibrio en Materia Blanda: de fluidos complejos a tejidos celulares
Funding agency: Ministerio de Economía y Competitividad.
Budget: €145.200,00. Code: FIS2016-78507-C2-2-P.
Principal investigator: Jaume Casademunt Viader. Period: 2016-2019.

Publications (last 5 years):

Original research articles:

1) Matamoros-Angles, A., Hervera, A., Soriano, J., Martí, E., Carulla, P., Llorens, F., Nuvolone, M., Aguzzi, A., Ferrer, I., Gruart, A., Delgado-García, J.M., Del Río, J.A., "Analysis of co-isogenic prion protein deficient mice reveals behavioral deficits, learning impairment, and enhanced hippocampal excitability", BMC Biology **20**, article 17 (2022).

2) Faci-Lázaro, S., Lor, T., Ródenas, G., Mazo, J.J., Soriano, J. "Dynamical robustness of collective neuronal activity upon targeted damage in interdependent networks". Eur. Phys. J. Spec. Top., 1-7 (2022).

3) Carola G., Malagarriga D., Calatayud C., Richaud-Patin Y., Beltramone S., Dell'Era P., Tolosa E., Soriano J., Muotri A., Raya A., Consiglio A. "Parkinson's disease patient-specific neuronal networks carrying the LRRK2 G2019S mutation unveil early functional alterations that predate neurodegeneration". npj Parkinson's Disease **7**, article 55 (2021).

4) Hernández-Navarro, L.; Faci-Lázaro, S.; Orlandi, J.G.; Feudel, U.; Gomez-Gardeñes, J.; Soriano, J. "Noise-driven amplification mechanisms governing the emergence of coherent extreme events in excitable systems", Phys. Rev. Research **3**, 023133 (2021).

5) Koroleva, A; Deiwick, A; El-Tamer, A; Koch, L.; Shi, Y.; Estévez-Priego, E.; Ludl, A.-A.; Soriano, J.; Guseva, D.; Ponimaskin, E.; Chichkov, B. "In Vitro Development of Human iPSC-Derived Functional Neuronal Networks on Laser-Fabricated 3D Scaffolds", ACS Appl. Mater. Interfaces **13**, 7839–7853 (2021).

6) Tornero, D.; Soriano, J. "Neuronal cultures to study the brain and neurological disorders" (online dissemination article, 2020, https://researchoutreach.org/articles/neuronal-cultures-study-brain-neurological-disorders/).

7) Ludl, A.-A.; Soriano, J. "Impact of Physical Obstacles on the Structural and Effective Connectivity of in silico Neuronal Circuits", Front. Comput. Neurosci. **14**, article 77 (2020).

8) Estévez-Priego, E.; Teller, S.; Granell, C.; Arenas, A.; Soriano, J. “Functional strengthening through synaptic scaling upon connectivity disruption in neuronal cultures”, Network Neuroscience **4**, 1160-1180 (2020).

9) Grønning Hansen, M.; Laterza, C.; Palma-Tortosa, S.; Kvist, G.; Monni, E.; Tsupykov, O.; Tornero, D.; Uoshima, N.; Soriano, J.; Bengzon, J.; Martino, G.; Skibo, G.; Lindvall, O.; Kokaia, Z. “Grafted human pluripotent stem cell-derived cortical neurons integrate into adult human cortical neural circuitry”, Stem Cells Translational Medicine **9**, 1365-13771 (2020).

10) Fernández-García, S.; Orlandi, J.G.; García-Díaz Barriga, G.A.; Rodríguez, M.J.; Masana, M.; Soriano, J.; Alberch, J. “Deficits in coordinated neuronal activity and network topology are striatal hallmarks in Huntington’s disease”, BMC Biology 18, BMC Biology **18**, article 58 (2020).

11) 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.; Alberch, J.; Soriano, J.; Canals, J.M. “Human pluripotent stem cell-derived neurons are functionally mature in vitro and integrate into the mouse striatum following transplantation”, Molecular Neurobiology **57**, 2766-2798 (2020).

12) Crowe, J.A; El-Tamer, A.; Nagel, D.; Koroleva, A.V.; Madrid-Wolff, J.; Olarte, O.E.; Sokolovsky, S.; Estevez-Priego, E.; Ludl, A.-A.; Soriano, J.; Loza-Alvarez, P.; Chichkov, B.N.; Hill, E.J.; Parri, H.R.; Rafailov, E.U. “Development of two-photon polymerised scaffolds for optical interrogation and neurite guidance of human iPSC-derived cortical neuronal networks”, Lab on a Chip **20**, 1792-1806 (2020).

13) Tibau, E.; Ludl, A.-A.; Rüdiger, S.; Orlandi, J.G.; Soriano, J. “Neuronal spatial arrangement shapes effective connectivity traits of in vitro cortical networks”, IEEE Transactions on Network Science and Engineering **7**, 435 (2020).

14) Teller, S.; Estévez-Priego, E.; Granell, C.; Tornero, D.; Andilla, J.; Olarte, O.E.; Loza-Alvarez, P.; Arenas, A.; Soriano, J. “Spontaneous functional recovery after focal damage in neuronal cultures”, eNeuro **7** 0254-19.2019 (2020).

15) Faci-Lázaro, S.; Soriano, J.; Gómez-Gardeñes, J., “Impact of targeted attack on the spontaneous activity in spatial and biologically-inspired neuronal networks”, Chaos **29**, 083126 (2019).

16) Calatayud, C.; Carola, G.; Fernández-Carasa, I.; Valtorta, M.; Jiménez-Delgado, S.; Díaz, M.; Soriano, J.; Cappelletti, G.; García-Sancho, J.; Raya, Á.; Consiglio, A. “CRISPR/Cas9-mediated generation of a tyrosine hydroxylase reporter iPSC line for live imaging and isolation of dopaminergic neurons”, Scientific Reports **9**, 6811 (2019).

17) di Domenico, A,; Carola, G.; Calatayud, C.; Pons-Espinal, M.; Muñoz, J.P.; Richaud-Patin, Y.; Fernandez-Carasa, I.; Gut, M.; Faella, A.; Parameswaran, J.; Soriano, J.; Ferrer, I.; Tolosa, E.; Zorzano, A.; Cuervo, A.M.; Raya, A.; Consiglio, A. “Patient-specific iPSC-derived astrocytes contribute to non-cell-autonomous neurodegeneration in Parkinson's disease”, Stem Cell Reports **12**, 1-12 (2019).

18) Tibau, E.; Soriano, J. “Analysis of spontaneous activity in neuronal cultures through recurrence plots: impact of varying connectivity”, European Physical Journal **227**, 999-1014 (2018)

19) Yamamoto, H.; Moriya, S.; Ide, K.; Hayakawa, T.; Akima, H.; Sato, S.; Kubota, S.; Tanii, T.; Niwano, M.; Teller, S.; Soriano, J.; Hirano-Iwata, A. “Impact of modular organization on dynamical richness in cortical networks”, Science Advances **12**, eaau4914 (2018).

20) García-Díaz Barriga, G.; Giralt, A.; Anglada-Huguet, M.; Gaja-Capdevila, N.; Orlandi, J.G.; Soriano, J.; Canals, J.M.; Alberch, J. "7,8 Dihydroxyflavone ameliorates cognitive and motor deficits in a Huntington's disease mouse model through specific activation of the PLC-gamma pathway", Human Molecular Genetics **26**, 3144-3160 (2017).

21) Hernández-Navarro, L; Orlandi, J.G.; Cerruti, B.; Vives, E.; Soriano, J., "Dominance of metric correlations in two-dimensional neuronal cultures described through a Random Field Ising Model", Physical Review Letters **118**, 208101, (2017).

Supervised PhD thesis:

Title: Dynamics and effective connectivity in bi- and three-dimensional neuronal cultures: from self-organization to engineering
Student: Estefanía Estévez Priego
Centre: Facultat de Física & Facultat de Medicina, Universitat de Barcelona
From: September 2016
To: November 2019

Title: Theoretical and experimental approaches for the initiation and propagation of activity in spatially embedded neuronal cultures
Student: Lluís Hernández Navarro
Centre: Facultat de Física, Universitat de Barcelona
From: January 2014
To: May 2018

Title: Linear and nonlinear approaches to unravel dynamics and connectivity in neuronal cultures
Student: Elisenda Tibau Martorell.
Centre: Facultat de Física, Universitat de Barcelona
From: June 2013
To: September 2017

Title: Functional organization and network resilience in self-organizing clustered neuronal cultures
Student: Sara Teller Amado
Centre: Facultat de Física, Universitat de Barcelona
From: October 2012
To: February 2016

Invited talks in universities or research institutes (last 5 years):

1) "The MESOBRAIN Project and new industrial opportunities", POIETIS Biotechnology (Bordeaux, France), 17/09/2019.

2) "Connectivity and dynamics in neuronal cultures: from physical insights to medicine" Université Paris-Diderot (Paris, Fance), 09/07/2018.

3) "Connectivity and Dynamics in Neuronal Cultures: Experiments, Simulations, and Medical Applications", RIKEN Institute (Tokio, Japan), 29/01/2018.

4) “Connectivity inference in neuronal cultures: experiments, simulations and neurological disorders”, Universidad Pedagógica y Tecnológica de Colombia (Tunja, Colombia), 07/12/2017.

5) “Connectivity, activity fronts and resilience in neuronal cultures: experiments and models”, Max Planck Institute for Dynamics and Self-Organization (Göttingen, Germany), 02/06/2017.

6) “Multi-neuron Calcium Imaging: Activity and Connectivity in Neuronal Cultures Place”, Stem Cell Center, Lund University (Lund, Sweden), 08/07/2016.

7) “Neuronal Cultures as Model Systems: Exploring Open Questions in Physics and Medicine”, Aston University (Birmingham, United Kingdom), 18/03/2015.

Last 5 invited conferences in international congresses:

1) Congress: “8th RIEC International Symposium on Brain Functions and Brain Computer”
Title: “Strategies to dictate connectivity and functional organization in 2D and 3D neuronal cultures”
Contribution: invited conference. Place: Sendai (Japan), February 2020.

2) Congress: “2nd Latin American Conference on Complex Networks”
Title: “Effective Connectivity in Neuronal Cultures: from Physics to Engineering and Medicine”
Contribution: invited conference. Place: Cartagena de las Índias (Colombia), August 2019.

3) Congress: “Summer school and Workshop on Computational and Theoretical Models in Neuroscience”
Title: “Dynamics in neuronal cultures: importance for medicine”
Contribution: invited conference. Place: Venice (Italy), September 2019.

4) Congress: “7th RIEC International Symposium on Brain Functions and Brain Computer”
Title: “Three-dimensional neuronal cultures: challenges and opportunities”
Contribution: invited conference. Place: Sendai (Japan), February 2019.

5) Congress: “4th workshop on Advanced Methods in Theoretical Neuroscience”
Title: “Engineering neuronal cultures: shaping brain complexity in a dish”
Contribution: invited conference. Place: Göttingen (Germany), July 2019.