

Rodrigo Cofre

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rodrigocofre@gmail.com

EDUCATION	<p>Mathematical Engineering Pontificia Universidad Católica de Chile, 2002 to 2009. Graduated with honors. Professional degree (12 semesters).</p> <p>Bachelor in Aesthetics Pontificia Universidad Católica de Chile, 2004 to 2009.</p> <p>Master II in Computational Biology and Biomedicine École Polytechnique Universitaire de Nice Sophia Antipolis, 2010 to 2011.</p> <p>Ph.D Specialty: Control, Signal and Image Processing. University of Nice- Sophia-Antipolis. Thesis developed at INRIA Neuromathcomp team from October 2011 to November 2014 under the supervision of Bruno Cessac (Neural Networks, Spike Trains Statistics and Gibbs distributions). Mention Très honorable Jury Members: Pierre Collet, Roberto Fernandez, Fred Wolf, Olivier Faugeras, Jean Marc Gambaudo, Alain Destexhe, Adrian Palacios, Olivier Marre, Bruno Cessac.</p> <p>HDR University of Paris-Saclay "Mathematical and Statistical Models of Brain Activity at Different Scales" September 2023, Jury Members: Gaute Einevoll, Demian Wassermann, Sebastiano Stramaglia, Sabir Jacquir, Jorge Mejias, Denis Le Bihan.</p>
Honors and Awards	<p>Honor Scholarship for academic excellence at Pontificia Universidad Católica de Chile to study both engineering and Aesthetic simultaneously. (From 2005 to 2009)</p> <p>Full Scholarship from INRIA to study at École Polytechnique Universitaire de Nice Sophia Antipolis the Msc in Computational Biology and Biomedicine. (From September 2010 to February 2011)</p> <p>Full Scholarship from École Doctorale de Sciences et Technologies de l'Information et de la Communication et des télécommunications, to study the PhD at INRIA under the supervision of Bruno Cessac. (From October 2011 to October 2014)</p>
EXPERIENCE	<p>Undergraduate thesis November 2007 to March 2009. Stochastic analysis laboratory at Pontificia Universidad Católica de Chile Work with Rolando Rebolledo, Patricio Orio and Wolfgang Kliemann. "A Stochastic model of ion channel gating kinetic based on Langevin process in a double well potential"</p> <p>Research Assistant March 2009 to August 2010 Stochastic analysis laboratory at Pontificia Universidad Católica de Chile Part-time work in research in stochastic processes with Rolando Rebolledo.</p> <p>Research Assistant March 2009 to August 2010. Economy Department at Pontificia Universidad Católica de Chile Part-time work in research in education.</p> <p>Master-Internship March 2011 to August 2011. INRIA-Sophia Antipolis, Neuromathcomp team "From statistical analysis of spike trains to network structure" under the supervision of Bruno Cessac.</p> <p>Ph.D Student From October 2011 to November 2014. INRIA-Sophia Antipolis, Neuromathcomp team</p>

under the supervision of Bruno Cessac.

Scientific Collaborator (Postdoc) From February 2015 to June 2017.

Department of Theoretical Physics, University of Geneva under the supervision of Jean-Pierre Eckmann.

Joint Professor at CIMFAV From July 2017 to April 2021

Faculty of Engineering, University of Valparaiso.

Postdoc BRICON project From June 2021 to September 2023.

Institute of Neuroscience (NeuroPSI), Paris-Saclay University, Centre National de la Recherche Scientifique (CNRS), Gif-sur-Yvette, France under the supervision of Alain Destexhe.

Postdoc ENS From October 2023 to May 2024 .

Laboratoire de physique de l'école normale supérieure (PSL University), CNRS, Sorbonne Université, and Université de Paris, 75005 Paris, France, under the supervision of Thierry Mora.

Postdoc FLAG-ERA project From June 2024 .

Institute of Neuroscience (NeuroPSI), Paris-Saclay University, Centre National de la Recherche Scientifique (CNRS), Gif-sur-Yvette, France under the supervision of Alain Destexhe.

Publications

Neural mass modelling for the masses: Democratising access to whole-brain biophysical modelling with FastDMF Ruben Herzog, Pedro Mediano, Fernando E Rosas, Andrea I Luppi, Yonatan Sanz Perl, Enzo Tagliazucchi, Morten L Kringelbach, Rodrigo Cofre, Gustavo Deco *Network Neuroscience* 8 (4), 1590-1612

Dynamical structure-function correlations provide robust and generalizable signatures of consciousness in humans Pablo Castro, Andrea Luppi, Enzo Tagliazucchi, Yonatan Sanz Perl, Lorina Naci, Adrian M Owen, Jacobo Sitt, Alain Destexhe*, Rodrigo Cofre* ***Equal last-author contribution** *Communications Biology* 7 (1), 1224

Transcranial direct current stimulation modulates primate brain dynamics across states of consciousness Guylaine Hoffner, Pablo Castro, Lynn Uhrig, Camilo Miguel Signorelli, Morgan Dupont, Jordy Tasserie, Alain Destexhe, Rodrigo Cofre, Jacobo Sitt, Bechir Jarraya *eLife* 13:RP101688

Local Orchestration of Global Functional Patterns Supporting Loss and Restoration of Consciousness in the Primate Brain Andrea I. Luppi, Lynn Uhrig, Jordy Tasserie, Camilo M. Signorelli, Emmanuel Stamatakis, Alain Destexhe, Bechir Jarraya, Rodrigo Cofre *Nature Communications*, 15, 2171 (2024)

Computational modeling in disorders of consciousness: closing the gap towards personalized models for restoring consciousness Andrea I. Luppi, Joana Cabral, Rodrigo Cofre, Pedro A.M. Mediano, Fernando E. Rosas, Abid Y. Qureshi, Amy Kuceyeski, Enzo Tagliazucchi, Federico Raimondo, Gustavo Deco, James M. Shine, Morten L. Kringelbach, Patricio Orio, Jacobo Diego Sitt *NeuroImage*, 275 (15) 2023, 120162

A whole-brain model of the neural entropy increase elicited by psychedelic drugs Herzog, R., Mediano, P.A.M., Rosas, F.E. Lodder, P., Carhart-Harris, R., Sanz-Perl, Y., Tagliazucchi, E., Cofre, R. *Sci Rep* 13, 6244 , 2023

Entropy production of Multivariate Ornstein-Uhlenbeck processes correlates with consciousness levels in the human brain Matthieu Gilson, Enzo Tagliazucchi, Rodrigo Cofre *Phys. Rev. E* 107, 024121, 2023

Whole-brain modeling explains the context-dependent effects of cholinergic neuromodulation C Coronel-Oliveros, C Giessing, V Medel, R Cofre, P Orio
NeuroImage, Volume 265, 119782, 2023

Dynamical models to evaluate structure-function relationships in network neuroscience AI Luppi, J Cabral, R Cofre, A Destexhe, G Deco, ML Kringelbach.
Nature Reviews Neuroscience, 1-2, 2022

High-order functional interactions in ageing explained via alterations in the connectome in a whole-brain model Marilyn Gatica, Fernando E Rosas, Pedro AM Mediano, Ibai Diez, Stephan P Swinnen, Patricio Orio, Rodrigo Cofre*, Jesus M Cortes* *PLoS Comput Biol* 18(9), 20221

Structural Features of the Human Connectome That Facilitate the Switching of Brain Dynamics via Noradrenergic Neuromodulation Coronel-Oliveros C. & Castro S. & Cofre R. & Orio P.
Front. Comput. Neurosci. 15:687075, 2021

Scalable and accurate automated method for neuronal ensemble detection in spiking neural networks Herzog R. & Morales A. & Mora S. & Escobar M.J. & Palacios A. & Cofre R.
PLoS ONE 16(7): e0251647, 2021 **Hyperharmonic analysis for the study of high-order information-theoretic signals** Medina-Mardones, A., & Rodriguez, S. & Rosas F. & Cofre R.
J. Phys. Complex. 2(3) 035009, 2021

High-Order Brain Interactions in aging Gatica M., Cofre R., Mediano P.A.M, Rosas F., Diez I, Swinner S., Orio P., & J. Cortes
Brain Connectivity, Vol. 11, No. 9, 2021

Cholinergic neuromodulation of inhibitory interneurons facilitates functional integration in whole-brain models Coronel C., & Cofre R. & Orio P.
PLoS Comput Biol 17(2): e1008737, 2021

Towards an interdisciplinary framework about intelligence Palanca N. & Sanchez-Tajadura B. & Cofre R. *Heliyon* 7(2), 2021

Linear Response of General Observables in Spiking Neuronal Network Models. Cessac B., I. Ampuero & Cofre R. *Entropy* 23(155), 2021

Thermodynamic Formalism in Neuronal Dynamics and Spike Train Statistics Cofre R. & Maldonado C. & Cessac B.
Entropy 22(11), 1330, 2020

A mechanistic model of the neural entropy increase elicited by psychedelic drugs Herzog R., Mediano P.A.M, Rosas F, Carhart-Harris R, Sanz-Perl Y, Tagliazucchi E. & Cofre R. *Sci. Rep.* 10:17725, 2020.

Whole-Brain Models to Explore Altered States of Consciousness from the Bottom Up Cofre R. & Herzog R. & Mediano, P.A. & Piccinini, J. & Rosas, F.E. & Sanz Perl, Y. & Tagliazucchi, E. *Brain Sci.* 10(9), 626, 2020.

A Comparison of the Maximum Entropy Principle Across Biological Spatial Scales Cofre R. & Herzog R. & Corcoran D. and Rosas F. *Entropy* 21(10), 1009, 2019

An Introduction to the Non-Equilibrium Steady States of Maximum Entropy Spike Trains Cofre R. & Videla L. and Rosas F. *Entropy* 21(9), 884, 2019

Large Deviations Properties of Maximum Entropy Distributions of Spike

Trains Cofre R. & Maldonado C. and Rosas F. *Entropy* 20(8), 573, 2018

Information Entropy Production of Maximum Entropy Markov Chains from Spike Trains, Cofre R. & Maldonado C. *Entropy* 20(1), 34, 2018

Exact computation of the Maximum Entropy Potential from spiking neural networks models, Cofre R & Cessac B. *Physical Review E, Volume 89, Issue 5, May 2014.*

Spike train statistics and Gibbs distributions, Cessac B. & Cofre R. *J. Physiol. Paris, Volume 107, Issue 5, Pages 360-368, November 2013*

Dynamics and spike trains statistics in conductance-based Integrate-and-Fire neural networks with chemical and electric synapses, Cofre R. & Cessac B. *Chaos, Solitons and Fractals, Volume 50, May 2013, Pages 13-31.*

Achievement versus aptitude in college admissions: a cautionary note based on evidence from Chile. Koljatic M & Silva M. & Cofre R , *International Journal of Educational Development* Volume 33, Issue 1, Pages 106-115 (January 2013)

Book Chapters **Information Theory in Neuroscience: Information Entropy Production of Maximum Entropy Markov Chains from Spike Trains** Cofre R. & Maldonado C. *Stefano Panzeri and Eugenio Piasini Editors, Reprinted from: Entropy 2019, 21, 62, doi:10.3390/e21010062*

A General and Accurate Method for Neuronal Ensemble Detection in Spiking Neural Networks R Herzog-Amuntegui, S Mora, G Prada, JG Minonzio, MJ Escobar, Cofre R. , A. Palacios *Carrillo-Reid, L. (eds) Identification, Characterization, and Manipulation of Neuronal Ensembles. Neuromethods, vol 215. Humana, New York, NY. https://doi.org/10.1007/978-1-0716-4208-5_3*

Submitted Work **A computational approach to evaluate how molecular mechanisms impact large-scale brain activity** Maria Sacha, Federico Tesler, Rodrigo Cofre, Alain Destexhe *A computational approach to evaluate how molecular mechanisms impact large-scale brain activity*
https:- Submitted to Nature Computational Science

Network structure and neuromodulation orchestrate the informational architecture of mammalian brains Andrea Luppi, Lynn Uhrig, Jordy Tasserie, Pedro A. M. Mediano, Fernando E. Rosas, Daniel Gutierrez-Barragan, Camilo M. Signorelli, Daniel Golkowski, Andreas Ranft, Rdiger Ilg, Denis Jordan, S. Parker Singleton, Yohan Yee, Alain Destexhe, Rodrigo Cofre, David K. Menon, Alessandro Gozzi, Bechir Jarraya, Emmanuel A. Stamatakis
https:- Submitted to Science Translational Medicine

Emergence of High-Order Functional Hubs in the Human Brain Fernando A.N. Santos, Prejaas K.B. Tewarie, Pierre Baudot, Antonio Luchicchi, Danillo Barros de Souza, Guillaume Girier, Ana P. Milan, Tommy Broeders, Eduarda G.Z. Centeno, Rodrigo Cofre, Fernando E Rosas, Davide Carone, James Kennedy, Cornelis J. Stam, Arjan Hillebrand, Mathieu Desroches, Serafim Rodrigues, Menno Schoonheim, Linda Douw, Rick Quax *https://doi.org/10.1101/2023.02.10.528083*

Grants **INRIA RISE-ESTHETICS** *Exploring the functional Structure of THE rETIna with Closed loop Stimulation A Physiological and computational approach, (Joint Researcher) with Bruno Cessac, Adrian Palacios.*
(From 2023 to 2024)

PIM-IPICYT-MEXICO *"Numerical exploration of data in neuroscience, net-*

worked systems and out-of-equilibrium systems” (Joint Researcher) with Cesar Maldonado, Cesare Ovando, Daniel Salgado, Jorge Littin, Gerardo Barrera.
(From 2023 to 2025)

FONDECYT-1211750 Revealing the relationship between high-order Interdependencies and critical-like behavior in Biophysical neural networks, (Joint Researcher).
(From 2021 to 2023)

STIC/AMSUD-SILIDOC In silico modeling of single-subject neuroimaging data for the characterization and prognosis of patients with disorders of consciousness Project with Jacobo Sitt at Institut du Cerveau et de la Moelle épinière, (Joint Researcher).
(From 2021 to 2023)

MAGMA-EQA-041903 INRIA associated team, Joint project with Biovision team INRIA, France. (Joint Researcher).
(From 2019 to 2022)

REDI-170457 Interdisciplinary Network of Complex Systems in Neuroscience. Joint project with the Centre for Complexity Science, Imperial College, U.K. (PI).
(From 2018 to 2019)

FONDECYT-11181072 Population Coding in the Retina: Revealing the role of non-synchronous Correlations in the Markov Maximum Entropy Approach, (PI).
(From 2019 to 2021)

REDES-180151 Interdisciplinary network on dynamical systems, graph theory, and biological networks, Joint project with Institute of Physics, San Luis, Mexico. (Joint Researcher).
(From 2019 to 2021)

REDES-170217 International Research Network to Study Predictive Coding in the Retina. Joint project with Biovision team INRIA, France. (Joint Researcher)
(From 2018 to 2019)

PAI-79160120 Fortalecimiento de la investigación en Matemática Aplicada y apoyo a programas de pregrado y postgrado en el CIMFAV-Facultad de Ingeniería de la Universidad de Valparaíso (PI).
(From 2017 to 2020)

Conferences and Meetings

ENSCM 2024. Sao Paulo, Brazil, Septeemember 2024, la Escuela Nacional de Supercomputo **3 Lectures on Time Series in Neuroscience** (invited by Cesar Maldonado)

Collège de France 2024. Paris, March 2024, UNICOG NeuroSpin Seminar **Talk Title:** “Three faces of the structure-function interdependence of the brain under diverse consciousness states”

Strasbourg 2023. Strasbourg, May 2023, Funsy Team Seminar **Talk Title:** “Novel perspectives on the structure-function dynamics of the primate and human brain under diverse consciousness states”

Saclay 2023. INRIA SACLAY, March 2023, MIND team Seminar **Talk Title:** “Novel perspectives on the structure-function dynamics of the primate and human brain under diverse consciousness states”

EBRAINS 2023. EBRAINS Workshop, March 2023, Anatomy and function of the prefrontal cortex across species **Talk Title:** “Dynamical aspects of the structure-function relationship modulation by anesthetics of the primate and human brains”

IHP 2023. *Institute Henri Poincare, March 2023, Stochastic process in the brain*
Talk Title: “Scalable and accurate method for neuronal ensemble detection in spiking neural networks”

IAS 2023. *Institute of Advanced studies Amsterdam, December 2023, High-Order Interactions in Complex Systems* **Talk Title:** “High-order interdependencies in the brain”

IAS 2022. *Amsterdam, December 2022, Workshop on Perspectives and Challenges in High-Order Interactions in Complex Systems* **Talk Title:** “High-order interdependencies in the brain”

FENS 2022. *Paris, July 2021, Talk Title:* “Whole-brain simulations of wakefulness, slow-wave sleep, and anesthetized states in the macaque monkey”

CNS 2021. *(Online), July 2021, Workshop on Methods of Information Theory in Computational Neuroscience* **Talk Title:** “High-order interdependencies in the aging brain”

NETSCI-TOPONETS 2020. *Rome, Italy (online), September 2020, Talk Title:* “Dimensionality reduction of high-order signals via hyperharmonic modes”

NETSCI-TOPONETS 2020. *Rome, Italy (online), September 2020, Talk Title:* “High-order interdependencies in the aging brain”

LASCON 2020. *Sao Paulo, Brazil, January 2020, LASCON Summer School 3 Lectures on Retinal Coding (invited by Antonio Roque)*

PSY 2019. *London, U.K, December 2019, Group meeting Centre for psychedelics science, Imperial College, London* **Talk Title:** “Multivariate information theory in psychedelics science”

CNS 2019. *Barcelona Spain, July 2019, Workshop on Methods of Information Theory in Computational Neuroscience* **Talk Title:** “Exploring information-theoretic high-order effects of LSD in a Whole-Brain Model”

MATPUC 2019. *Santiago, Chile, June 2019, Math Colloquium* **Talk Title:** “Neurons, Brains and Birds: Characterizing Collective Behavior in Neuroscience”

LACONEU 2019. *Valparaiso, Chile, January 2019, 3 Weeks Summer School*
Speaker and 1 of the 3 Main Organizers

UCN 2018. *Antofagasta, Chile, December 2018, V Encuentro de Investigadores Emergente,* **Talk Title:** “Ideas and Tools From Statistical Mechanics to Characterize Collective Behavior in Neuroscience”

CMM 2018. *Santiago, Chile, Noviembre 2018, Seminario Nucleo Milenio en Modelos Estocsticos y Desordenados* **Talk Title:** “Collective behavior of spiking neuronal networks and other biological systems inferred from the Maximum Entropy Principle”

ICMN 2018. *Nice, France, June 2018, 4th International Conference on Mathematical NeuroScience* **Talk Title:** “Linear Response of General Observables in Spiking Neuronal Network Models”

ICL 2018. *London, U.K, February 2018, Group meeting Centre of complexity science, Imperial College, London* **Talk Title:** “Criticality of inferred processes from Spike Trains”

SCHN 2017. *Chiloé, Chile, September 2017, Symposium From Neural Connectivity to Network Dynamics* **Talk Title:** “Irreversibility and Non-equilibrium Maximum

Entropy Processes from Spike Trains

CNS 2017. Antwerp, Belgium, July 2017, Workshop on Methods of Information Theory in Computational Neuroscience **Talk Title:** “Information Entropy Production and Large deviations of Maximum Entropy Processes from Spike Trains”

BERNSTEIN 2016. Berlin, Germany, September 2016, 12-th Annual Computational Neuroscience Meeting. Poster Presentation.

STATPHYS 2016. Paris, France, July 2016, Statistical physics methods in biology and computer science Poster Presentation.

APS 2016. Baltimore, USA, March 2016, American Physical Society, Maximum Entropy Models: A Promising Link Between Statistical Physics, Inference, and Biology **Talk Title:** “From Maximum Entropy Models to Non-Stationarity and Irreversibility”

NETT 2015. Barcelona, Spain, September 2015, International Conference on System Level Approaches to Neural Engineering. Poster Presentation.

BERNSTEIN 2015. Heidelberg, Germany, September 2015, 11-th Annual Computational Neuroscience Meeting. Poster Presentation.

MATHSTATNEURO 2015. Nice, France, September 2015, MathStatNeuro workshop.

UTRECHT 2015. Utrecht, Netherlands, September 2015, invited by Roberto Fernandez to Utrecht university.

ICMP 2015. Santiago, Chile, August 2015, Young Research Symposium **Talk Title:** “Spatio-temporal Linear Response of Spiking Neuronal Network Models” **PUC 2015.** Santiago, Chile, January 2015, Probability Seminar/Nucleo Minenio Oral Presentation (invited by Gregorio Moreno).

UAI 2015. Santiago, Chile, January 2015, UAI science faculty Seminar **Talk Title:** “Spiking Neuronal Networks and Gibbs distributions” (invited by Eric Goles).

CIMFAV 2014. Valparaíso, Chile, December 2014, CIMFAV Seminar **Talk Title:** “Can we hear the shape of a spatio-temporal potential?” (invited by Jean-François Jabir).

NICE 2014. NICE, France, October 2014, From Statistical Physics to Neuronal Network Dynamic Mini-Symposium (Organized after my Phd defense).

EPFL 2014. Lausanne, Switzerland, April 2014, Computational Neuroscience Seminar **Talk Title:** “Can we hear the shape of a spatio-temporal potential?” (invited by Wulfram Gerstner).

NICE 2014. Nice, France, Mars 2014, Séminaire de probabilités. **Talk Title:** “Exact computation of the maximum-entropy potential of spiking neural-network models”. (invited by Matthieu Lerasle).

LACONEU 2014. Valparaíso, Chile, January, 2014, Summer School Computational Neuroscience. Participation as a Tutor.

AMIENS 2013. Amiens, France, September 2013, Séminaire de probabilités et théorie ergodique. **Talk Title:** “Can we hear the shape of a spatio-temporal potential?”. (invited by Samuel Petite).

UTRECHT 2013. Utrecht, Netherlands, September 2013, Mathematics and Neu-

rosience: A dialogue. **Talk Title:** “Space-time correlations in spike trains and the neural code”. (invited by Roberto Fernandez).

BERNSTEIN 2013. Tübingen, Germany, September 2013, Ninth Annual Computational Neuroscience Meeting. Poster Presentation.

CNS 2013. Paris, France, July 2013, Twenty Second Annual Computational Neuroscience Meeting. Poster Presentation.

MTP 2013. Strasbourg, France, June 2013, 91th Encounter between Mathematicians and Theoretical Physicists.

GDR MEA 2012. Marseille, France, October, 2012. Encoding And Decoding of Neural Ensembles. Poster Presentation.

NEUROCOMP 2012. Bordeaux, France, October, 2012. The NeuroComp/KEOpS 2012 workshop. Poster Presentation.

SCNE 2012. Klosterneuburg, Austria , September 2012. Sensory Coding and Natural Environment. Poster Presentation.

AREADNE 2012. Santorini, Greece, July, 2012. Encoding And Decoding of Neural Ensembles. Poster Presentation.

LACONEU 2012. Valparaíso, Chile, January, 2012. Neural Coding and Natural Image Statistics.

Research Visitor **IPICYT 2024.** SLP Mexico, June 2024. Nonequilibrium Statistical Mechanics and Neuroscience. Invited by Cesar Maldonado, IPICYT.

IAS 2022. Amsterdam, December 2022. Perspectives and Challenges in High-Order Interactions in Complex Systems. Invited by Fernando Nobriega, Fellow of the Institute for Advanced Study (IAS) Amsterdam.

NICE 2022. NICE, FRANCE, July 2022, MAGMA Project with Biovision group at INRIA Sophia-Antipolis.

NICE 2021. NICE, FRANCE, September 2021, MAGMA Project with Biovision group at INRIA Sophia-Antipolis.

LONDON 2019. London, U.K., December 2019, P.I REDI170457 with Fernando Rosas to the Centre of psychedelics science at the Imperial College London.

NICE 2019. NICE, FRANCE, September 2019, MAGMA Project with Biovision group at INRIA Sophia-Antipolis.

LONDON 2018. London, U.K., February 2018, P.I REDI170457 with Fernando Rosas and Henrik Jensen to the Complexity group at the Imperial College London.

NEW YORK 2016. New York, USA, March 2016, invited by Marcelo Magnasco to Rockefeller University

UTRECHT 2015. Utrecht, Netherlands, September 2015, invited by Roberto Fernandez to Utrecht University.

GSSI 2013 L'Aquila, Italy, December 2013, Context-tree model selection with applications to neurosciences Invited by Errico Presutti to the Phd course given by Antonio Galves.

Computer Skills	<p><i>Scripting/Programming and Data Analysis</i> Python, MATLAB, R.</p> <p><i>Productivity Software.</i> L^AT_EX, Mathematica.</p>
Teaching	<p><i>Teaching Assistant (Undegraduate Level)</i> Pontificia Universidad Católica de Chile</p> <p><i>Discrete Mathematics, Mathematics, Numerical Analysis, Geometry, Electricity and Magnetism, Mathematical Problems, Mathematical Thought, Calculus III, Probability, Time Series, Data Mining, Graph Theory, Probability, Statistics (graduate Level), Stochastic Calculus (graduate Level) , August 2004 to December 2009.</i></p> <p><i>Analyse de Signaux (TP), École Polytechnique Universitaire de Nice Sophia Antipolis 2013-2014.</i></p> <p><i>Méthodes Mathématiques pour Physiciens (TD), Méthodes Mathématiques de la Mécanique Classique (TD), Université de Genève 2015-2016-2017.</i></p> <p><i>Modern Physics, Introduction to Mathematical Engineering, Universidad de Valparaíso, 2017-2018-2019-2020.</i></p> <p><i>Topics in Computational Neuroscience, PhD program on Biophysics and Computational Biology, Universidad de Valparaíso, 2017-2018-2019-2020.</i></p>
Posters since 2020	<p><i>Dynamical richness and statistical synergy are maximized in networks with small-world topology, Presented at CNS 2023 Cofre R., J.Palma, S. Orellana & Orio P.</i></p> <p><i>High-Order Functional Connectivity: A Data-driven Approach for Studying States of Consciousness Presented at ASSC 2023 By R.Herzog</i></p> <p><i>Multiscale responsiveness following microstimulation of the prefrontal cortex in wakefulness and anesthesia, Human Brain Project Summit, Marseille, France 2023</i></p> <p><i>Simulating the emergence of conscious and unconscious states at the whole-brain level Human Brain Project Summit, Marseille, France 2023.</i></p> <p><i>High-order interactions in aging explained through changes in the connectome in a whole brain model Advances in Theoretical and Computational Neuroscience Meeting, University of Nottingham.</i></p> <p><i>Whole-brain simulations of wakefulness, slow-wave sleep, and anesthetized states in the macaque monkey FENS 2022.</i></p> <p><i>Modeling the context-dependent effects of cholinergic neuromodulation on functional network topology FENS 2022.</i></p> <p><i>A mechanistic model of the neural entropy increase elicited by psychedelic drugs ASSC 2022</i></p> <p><i>High-order interactions in aging explained through changes in the connectome in a whole brain model OHBM 2022</i></p> <p><i>Whole-Brain Modelling Suggests Mechanisms Behind Pro-Segregation Effects of Cholinergic Neuromodulation SCHN 2021, 31th XVII Reunión Anual Sociedad Chilena de Neurociencia 2021</i></p>

High-order interdependencies and the functional balance of segregation-integration in the aging brain Annual Computational Neuroscience Meeting CNS2020

Inhibitory gain allows transitions between integrated and segregated states: a neuromodulatory analysis from whole-brain models Annual Computational Neuroscience Meeting CNS2020

Whole-Brain Modelling Suggest Mechanisms Behind Pro-Segregation Effects of Cholinergic Neuromodulation Annual Computational Neuroscience Meeting CNS2020

Reviewer activities	Regular reviewer for the journals: <i>Nature Communications</i> , <i>Journal of Statistical Mechanics: Theory and Experiment (IOP)</i> , <i>PLOS Computational Biology</i> , <i>Neuroscience (Elsevier)</i> , <i>Journal of Mathematical Neuroscience</i> , <i>Neural Processing Letters (Springer)</i> , <i>Entropy</i> , <i>IEEE Transactions on Cognitive and Developmental Systems</i> , <i>Network Neuroscience (MIT Press)</i> .
Referee	Referee <i>Ciencia de frontera 2019 CONACYT MEXICO</i> , <i>Fondecyt Iniciacion 2021</i>
PhD programs	Collaborator of the PhD program on <i>Biophysics and Computational Biology and Applied Informatics</i> at the University of Valparaíso.
PhD Jury	Carlos Coronel, <i>Biophysics and Computational Biology</i> at the University of Valparaíso
HdR Jury	Matteo Di Volo, <i>University of Lyon 1</i> .
CST Comité de suivi de thèse	Ivan Mindlin: PhD student at the Sorbonne University (ED3C Cerveau - Cognition - Comportement), under the direction of Jacobo Sitt, ICM Paris. Clement Picard: PhD student at the Paris-Saclay University (École doctorale Biosigne), under the direction of Valerie Ego-Stern, NeusoPsi Saclay. Louise Martineau: PhD student at IRMA Strasbourg University (École doctorale Mathématiques, Sciences de l'information et de l'ingénieur), under the direction of Ségolen Geffray et Christophe Pouzat.
Undergraduate students	<i>Engineering professional internship</i> Ignacio Ampuero, Ariadne Sandoval, Alonso Lagos, Ivan Mansilla (University of Valparaíso, Chile).
Graduate students	<i>Master thesis co-advisor</i> Pablo Castro Master Computational Neurosciences and Neuroengineering-Université Paris-Saclay <i>Master thesis co-advisor</i> Chloé Duprat Master Computational Neurosciences and Neuroengineering-Université Paris-Saclay <i>Master thesis co-advisor</i> Fatemeh Sadat Master Computational Neurosciences and Neuroengineering-Université Paris-Saclay <i>PhD co-advisor</i> Marilyn Gatica PhD in Biophysics and Computational Biology, UV and Biomedicine at UPV. Joint Advisor with Patricio Orio UV Chile, and Jesus Cortes UPV Spain. (Now Postdoc at Nottingham University under the direction of Marcus Kaiser) <i>PhD advisor</i> Rubén Herzog PhD in Biophysics and Computational Biology, UV. (Now Postdoc at ICM Paris, under the direction of Thomas Andrillon) <i>Master thesis co-advisor</i> Alexis Beck Master in Informatics, Université de Geneve

Languages

Spanish. *Native language.*

English. *Fluent spoken and written.*

French. *Fluent spoken and written.*

Italian. *Fluent spoken and written.*

German. *Working knowledge.*