

Curriculum Vitae

Personal Information

Full name: Juan Ignacio Ortega Piwonka
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Spoken languages: Spanish, English

Work experience

- Jan 2023 – present: Assistant Professor – King Juan Carlos University. Madrid, Spain.
- Jun 2022 – Jan 2023: Laboratory Manager – University of Tarapacá. Arica, Chile.
 - Carried out software and hardware maintenance and management duties in the laboratory.
 - Edited and translated grant applications and articles to be published by the laboratory.
 - Worked in the parallel computing-based numerical study of a nonlinear dynamical model accounting for the magnetization of magnetic wires.
- Jul 2019 – Feb 2022: Postdoctoral Researcher – University of the Balearic Islands, Palma, Spain.
 - Project funded under H2020-EU.1.2.1 programme. Grant agreement ID: 828841.
 - Proposed and applied algorithms to model spiking neural networks and to analyze and visualize relevant data sets, as part of a European Union-funded project, aiming at the development of optoelectronic neuromorphic hardware.
 - Designed graphical user interfaces for the project website.
 - Worked in a theoretical model based on stochastic differential equations to describe the dynamics of a nano RTD-based circuit, as part of a collaboration between the Schools of Physics and Mathematics at the University. Tools applied include curve parametrization, branch continuation and numerical simulations.
- Jan 2018 – Feb 2019: Data Scientist – Fulcrum3D, Sydney, Australia.
 - Worked in the IEC international certification of the Fulcrum3D SODAR device. Techniques applied include linear, polynomial, power law and cyclic variable data interpolation and regression, data binning and data visualization.
 - Worked in a correction algorithm using Linear Algebra techniques to amend wind velocity data processed by a malfunctioning SODAR acoustic beam array.
 - Analyzed and studied flawed or suspicious SODAR filtering data from several sites.
- Mar 2013 – Dec 2017: Research assistant – UNSW, Sydney, Australia
 - Proposed a theoretical model based on stochastic differential equations to study the dynamics of optically trapped nanowires.
 - Analyzed data from an experiment involving optically trapped nanowires using statistical analysis and spectral techniques.
 - Proposed a theoretical model based on continuous time random walks to describe the dynamics of micro and nanoparticles in subdiffusive media.
- Feb 2012 – Jan 2013: Casual research assistant – University of Chile, Santiago, Chile.
 - Designed and mounted an experiment to study the dynamics of mechanically vibrated glass beads.
 - Took sequential images of the above experiment using high resolution cameras and analyzed them applying image filtering, object boundary detection and Hilbert transform-based techniques.
- Mar 2008 – Nov 2010: Casual research assistant – University of Chile, Santiago, Chile.
 - Designed and mounted an experiment to study the dynamics of fluidized bronze beads.
 - Took sequential images of the above experiment using high resolution cameras and analyzed them applying image filtering, object boundary detection and fast Fourier transform-based techniques.
 - Proposed a theoretical model based on stochastic nonlinear differential equations to describe the above experiment.

Education

- PhD in Mathematics – UNSW, Sydney, Australia, 2013–2017.
 - Thesis title: “Stochastic Models for optically trapped nanowires”.
- MSc in Physics – University of Chile, Santiago, Chile, 2008–2010.
 - Thesis title: “Subharmonic pattern formation in a fluidized shallow granular layer via a periodic air flow”.
 - Graduated with Maximum Distinction, the highest honour given by the University of Chile.
- BSc in Physics – University of Chile, Santiago, Chile, 2003–2007.
 - Graduated with Distinction.
 - Ranked 3rd out of 547 graduated students from the School of Engineering and Sciences.

Awards and Support

- Horizon 2020 European Commission 1.2.1. FET Open funding programme (renewal).
- UNSW Postgraduate Research Support Scheme for attendance to the 2017 MISG workshop.
- Becas Chile Scholarship, Government of Chile (2016).
- AustMS Student Support Scheme for attendance to the 2015 AustMS conference.
- CSIRO-ANZIAM Student Support Scheme for attendance to the 2014 ANZIAM conference.
- University International Postgraduate Award, UNSW, Sydney, Australia (2013).
- PhD Top Up Award, UNSW School of Mathematics and Statistics, Sydney, Australia (2013).
- Department of Physics Postgraduate Scholarship. University of Chile, Santiago, Chile (2009).

Key Skills and experience

- Highly proficient in MATLAB, including DDE-BifTool, GUIDE and App Designer.
- Highly proficient in Python, including NumPy, Matplotlib, Pandas, Multiprocessing and Numba.
- Highly proficient in Ubuntu.
- Proficient in Mathematica, LaTeX and Lyx.
- Designed, mounted and carried out experiments relevant to Nonlinear Dynamics.
- Skilled in theoretical modelling of complex systems.
- Skilled in complex analysis of large data sets.
- Skilled in parallel computing.
- Experience in Engineering and Science undergraduate coursework teaching.

Teaching experience

- 2023–present: Assistant Professor, King Juan Carlos University. Madrid, Spain.
 - Spring 2023: 1st Year Physics (Biomedical Engineering. English coursework).
- 2015–2017: Casual tutor, UNSW, Sydney, Australia.
 - Spring 2017: Mathematics 1B (Algebra and Calculus).
 - Fall 2017: Mathematics 1A (Algebra and Calculus).
 - Spring 2016: Mathematics 1B (Algebra).
 - Fall 2016: Mathematics 1A (Algebra).
 - Spring 2015: Mathematics 1A (Calculus).
 - Fall 2015: Mathematics 1A (Algebra).
- 2016: Student Support Scheme tutor, UNSW, Sydney, Australia.
- 2013–2016: Maple Lab consultant, UNSW, Sydney, Australia.
- 2011–2012: Lecturer, Central University, Santiago, La Serena, Chile.
 - Summer 2012: Complements of Physics and Chemistry for 1st year Engineering students.
 - Fall 2011: Complements of Physics and Chemistry for 1st year Engineering students.
- 2011: Teaching assistant. Adolfo Ibáñez University, Santiago, Chile.
 - Spring 2011: Modern Physics.
 - Fall 2011: Differential Equations.
- Fall 2009: Teaching assistant, University of The Andes, Santiago, Chile.
 - Fall 2009: Electromagnetism.
- 2005–2010: Teaching assistant, University of Chile, Santiago, Chile.
 - Spring 2010: Mechanics.
 - Fall 2010: Electromagnetism.
 - Spring 2009: Thermodynamics.
 - Fall 2009: Electromagnetism.
 - Spring 2008: Contemporary Physics.
 - Fall 2008: Contemporary Physics.
 - Spring 2007: Dynamical Systems.

- Fall 2007: Electromagnetism.
- Spring 2006: Multivariable Calculus.
- Fall 2006: Multivariable Calculus.
- Spring 2005: Dynamical Systems.

Publications

- B. Romeira, R. Adão, J. Nieder, Q. Al-taai, W. Zhang, R. Hadfield, E. Wasige, M. Hejda, A. Hurtado, E. Malysheva, V. Calzadilla, J. Lourenço, Da. Castro Alves, J. Figueiredo, I. Ortega-Piwonka, J. Javaloyes, S. Edwards, J. I. Davies, F. Horst, B. Offrein. *Neuromorphic Computing and Engineering* (in press) (2023). DOI: [10.1088/2634-4386/acdf17](https://doi.org/10.1088/2634-4386/acdf17)
- M. Hejda, E. Malysheva, D. Owen-Newns, Q. Raghil A. Al-Taai, W. Zhang, I. Ortega-Piwonka, J. Javaloyes, E. Wasige, V. Dolores-Calzadilla, J. Figueiredo, B. Romeira, A. Hurtado. *Nanophotonics* **12**(5), 857-867 (2022). DOI: [10.1515/nanoph-2022-0362](https://doi.org/10.1515/nanoph-2022-0362)
- I. Ortega-Piwonka, M. Hejda, J. Alanis, J. Lourenço, A. Hurtado, J. Figueiredo, B. Romeira, J. Javaloyes. *Optical Materials Express* **12**(7): 2679 – 2696, Feature Issue (2022). DOI: [10.1364/OME.451706](https://doi.org/10.1364/OME.451706)
- M. Hejda, J. A. Alanis, I. Ortega-Piwonka, J. Lourenço, J. Figueiredo, J. Javaloyes, B. Romeira, A. Hurtado. *Physical Review Applied* **17**(2), 024072 (2022). DOI: [10.1103/PhysRevApplied.17.024072](https://doi.org/10.1103/PhysRevApplied.17.024072)
- I. Ortega-Piwonka, A. Teruel, R. Prohens, C. Vich, J. Javaloyes. *Chaos* **31**(11), 113128 (2021). DOI: [10.1063/5.0062686](https://doi.org/10.1063/5.0062686)
- B. Romeira, J. B. Nieder, B. Jacob, R. M. R. Adão, F. Camarneiro, J. Arturo Alanis, M. Hejda, A. Hurtado, J. Lourenço, D. Castro Alves, J. M. L. Figueiredo, I. Ortega-Piwonka, J. Javaloyes. *Proc. Of SPIE* vol. 11804 (2021). DOI: [10.1117/12.2591852](https://doi.org/10.1117/12.2591852)
- I. Ortega-Piwonka, O. Piro, J. Figueiredo, B. Romeira, J. Javaloyes. *Physical Review Applied* **15**(3), 034017 (2021). DOI: [10.1103/PhysRevApplied.15.034017](https://doi.org/10.1103/PhysRevApplied.15.034017)
- I. Ortega Piwonka, C. N. Angstmann, B. I. Henry, P. J. Reece. *Chaos* **28**(4), 043101 (2018). DOI: [10.1063/1.5018443](https://doi.org/10.1063/1.5018443)
- C. N. Angstmann, B. I. Henry, I. Ortega Piwonka. *Computers & Mathematics with Applications* **73**(6): 1315 – 1324 (2017). DOI: [10.1016/j.camwa.2016.11.015](https://doi.org/10.1016/j.camwa.2016.11.015)
- W. J. Toe, I. Ortega Piwonka, C. N. Angstmann, Q. Gao, H. H. Tan, C. Jagadish, B. I. Henry, P. J. Reece. *Physical Review E* **93**(2), 022137 (2016). DOI: [10.1103/PhysRevE.93.022137](https://doi.org/10.1103/PhysRevE.93.022137)
- W. J. Toe, I. Ortega Piwonka, A. Andrés-Arroyo, Q. Gao, H. H. Tan, C. Jagadish, B. I. Henry, C. N. Angstmann, P. J. Reece. *Proc. Of SPIE* vol. 9164 (2014). DOI: [10.1117/12.2062673](https://doi.org/10.1117/12.2062673)
- M. G. Clerc, C. Falcón, M. A. García Ñustes, V. Odent, I. Ortega-Piwonka. *Chaos* **24**(2), 023133 (2014). DOI: [10.1063/1.4883650](https://doi.org/10.1063/1.4883650)
- J. Garay, I. Ortega Piwonka, M. G. Clerc, C. Falcón. *Physical Review E* **85**(3), 035201(R) (2012). DOI: [10.1103/PhysRevE.85.035201](https://doi.org/10.1103/PhysRevE.85.035201)
- I. Ortega Piwonka, M. G. Clerc, C. Falcón, N. Mujica. *Physical Review E* **81**(4), 046208 (2010). DOI: [10.1103/PhysRevE.81.046208](https://doi.org/10.1103/PhysRevE.81.046208)

Conferences and seminars

- Talk in the 2022 Mini Workshop on Computational Physics. University of Tarapacá. Arica, Chile.
- Online talk in the XVIII International Workshop on Instabilities and Nonequilibrium Structures. Valparaíso, Chile (2021).
- Online talk in the ChipAI Project 30M consortium meeting (2021).
- Online talk at the 2021 Dynamic Days Europe – XL conference. Nice, France.
- 2 Online poster presentations at the 2021 CLEO Europe conference.
- Online seminar at the Laboratory of Matter out of Equilibrium. University of Chile. Santiago, Chile (2021).
- Online seminar at the UIB Applied Mathematics Group. Palma, Spain (2021).
- Online seminar at the Institute of Applied Computing and Community Code (IAC3). Palma, Spain (2021).
- Online seminar at the Millennium Institute for Research in Optics. Concepción, Chile (2021).
- Online seminar at the Laboratory of Matter out of Equilibrium. University of Chile. Santiago, Chile (2021).
- Online talk in the ChipAI Project 18M consortium meeting (2020).
- Online talk in the ChipAI Project First Year Review Meeting (2020).
- Talk in the XVII International Workshop on Instabilities and Nonequilibrium Structures. Curauma, Chile (2019).
- Seminar at the 2019 Nonlinear Maps and their Applications (NOMA) Congress. Palma, Spain.
- Poster presentation at the V Workshop on Dynamical Systems and Brain-Inspired Information Processing. Konstanz, Germany (2019).
- Talk in the V Meeting of Emergent Researchers. Antofagasta, Chile (2018).
- Seminar at the Institute of Physics. Catholic University of Valparaíso. Curauma, Chile (2018).
- Talk in the XX Conference on Nonequilibrium Statistical Mechanics and Nonlinear Physics (Medyfinol). Santiago, Chile (2018).
- Seminar at the University of the Andes. Santiago, Chile (2018).
- Seminar at the University of Santiago. Santiago, Chile (2018)
- Talk in the XVI International Workshop on Instabilities and Nonequilibrium Structures. Valparaíso, Chile (2017).

- Worked in a DST Group research project in the 2017 Mathematics in Industry Study Group (MISG) Workshop. Adelaide, Australia.
- Talk in the 53rd Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) Conference. Adelaide, Australia (2017).
- Talk in the 52nd Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) Conference. Canberra, Australia (2016).
- Talk in the XV International Workshop on Instabilities and Nonequilibrium Structures. Valparaíso, Chile (2015).
- Talk in the 3rd Chilean Graduate Student Conference. Melbourne, Australia (2015).
- Talk in the 59th Australian Mathematical Society (AustMS) Conference. Adelaide, Australia (2015).
- Talk in the UNSW 2015 School Postgraduate Conference. Sydney, Australia.
- Talk in the UNSW 2014 School Postgraduate Conference. Sydney, Australia.
- Talk in the 50th Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) Conference. Rotorua, New Zealand (2014).
- Poster in the XVII Conference on Nonequilibrium Statistical Mechanics and Nonlinear Physics (Medyfinol). Santiago, Chile (2012).
- Talk in the XVIII Symposium of the Chilean society of Physics (SOCHIFI). La Serena, Chile (2012).
- Talk in the XVII Symposium of the Chilean society of Physics (SOCHIFI). Pucón, Chile (2010).
- Seminar at the Laboratory of Matter out of Equilibrium. University of Chile. Santiago, Chile (2009)
- Poster presentation and talk in the XII International Workshop on Instabilities and Nonequilibrium Structures. Viña Del Mar, Chile (2009).
- Poster in the 2009 Southern Workshop on Granular Materials. Viña Del Mar, Chile.

Membership

- University of the Balearic Islands Nonlinear Waves Group (<https://onl.uib.eu/>)
- Australian Mathematical Society (AustMS) (www.austms.org.au)
- Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) (www.anziam.org.au)
- Nonlinear Physics group, Chile (marcelclerc@gmail.com)
- Sydney Dynamics Group (www.maths.usyd.edu.au/SDG)

Referees

- Prof. Julien Javaloyes, PhD, University of the Balearic Islands (julien.javaloyes@uib.es)
- Prof. Oreste Piro, PhD, University of the Balearic Islands (oreste.piro@uib.es)
- Prof. Antonio Teruel, PhD, University of the Balearic Islands (antonio.teruel@uib.es)
- Prof. Rafel Prohens, PhD, University of the Balearic Islands (rafel.prohens@uib.es)
- Dr. Colin Bonner, PhD, Fulcrum 3D Pty Ltd (c.bonner@fulcrum3d.com)
- Dr. Michael Poole, PhD, Epuron Pty Ltd (m.poole@epuron.com.au)
- Prof. Bruce I. Henry, PhD, University of New South Wales (b.henry@unsw.edu.au)
- Dr. Christopher N. Angstmann, PhD, University of New South Wales (c.angstmann@unsw.edu.au)
- Prof. Marcel Clerc, PhD, University of Chile (marcelclerc@gmail.com)
- Prof. Claudio Falcón, PhD, University of Chile (cfalcon@cec.uchile.cl)

Teaching Referees

- Prof. Jonathan Kress, PhD, University of New South Wales (j.kress@unsw.edu.au).
- Dr. Catheryn Gray, PhD, University of New South Wales (catheryn.gray@unsw.edu.au).
- Prof. Felipe Barra, PhD, University of Chile (fbarra@dfi.uchile.cl).