

# Pedro Antonio Martínez Mediano

## Curriculum Vitae

Department of Computing  
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### Education

- Oct 14 – present **PhD: Machine Learning and Neuroscience**, *Imperial College*, London, UK.  
Pursuing PhD studies in the Computational Neurodynamics group under the supervision of Prof. Murray Shanahan.
- Sep 10 – Jun 14 **MSc in Physics**, *Universidad de Valencia*, Valencia, Spain, 9.5/10.  
Senior (4th) year at *Imperial College*, London, UK.  
Ranked top 1% of class.
- MEng thesis *Data-Efficient Reinforcement Learning for Autonomous Helicopters*, with Dr. Marc Deisenroth at Imperial College, London.
- BSc thesis *Complexity and Criticality in Spiking Neural Networks*, with Prof. Kim Christensen at Imperial College, London.
- Sep 08 – Jun 10 **Science and technology high school diploma**, *IES El Bohío*, Cartagena, Spain, 9.95/10.  
Graduated with First Honours, Extraordinary Award (top 0.1%).

### Research expertise

- Computational Neuroscience I am interested in how large populations of neurons are capable of displaying intelligent behaviour, i.e. performing sophisticated computations. I study how the dynamics of such populations affect and give rise to higher cognitive processes.
- Machine Learning I am fascinated by Bayesian statistics and how representations of uncertainty allow machines to show more intelligent behaviour. At the same time, I follow closely the latest developments in deep learning and neural networks.
- Complex systems I am interested in how large-scale complex phenomena emerge from simple local interactions between individuals (e.g. particles, organisms or cells).

### Experience

- Nov 15 – present **AI scientist**, *Emotech Ltd.*, London, UK.  
Member of the AI developer team building the personal robot Ollie.
- Jun 14 – Aug 14 **Robotics summer scholar**, *Carnegie Mellon Robotics Institute*, Pittsburgh, PA.  
Work with the LAIRLab group under the supervision of Prof. Drew Bagnell.  
Project title: *Towards an Intelligent Assistive System for Brain-Controlled Prosthetic Arms*.

- Nov 13 – Jan 14 **Student collaborator**, *Harvard University*, Cambridge, MA.  
 Work on the NOvA experiment with the Neutrino Physics group under the supervision of Prof. Gary Feldman.  
 Located on-site in Fermi National Laboratory (FermiLab) in Batavia, IL.  
 Main project: *Hadron Production in p+A Interactions in the NOvA Experiment*
- Jul 13 – Oct 13 **Machine learning software developer**, *Wolfram Research, Inc.*, Oxford, UK.  
 Work with Wolfram's Applied Research Group. Initial design and contributions to the Machine Learning library for Mathematica 10 (released Oct 14)
- Oct 12 – May 13 **Data mining practitioner**, *BION-line, SL.*, Valencia, Spain.  
 Part-time work as data analyst for start-up company BION-line. Work on data science and machine learning in the context of business and market analysis.
- Jun 12 – Sep 12 **Summer student**, *NEXT experiment*, Valencia, Spain.  
 Intermediate topics in experimental particle physics.
- Jun 11 – Sep 11 **Summer student**, *NEXT experiment*, Valencia, Spain.  
 Introduction to experimental particle physics.

## Honours and Awards

- Scholarship **Imperial College Computing Doctoral Teaching Scholarship.**
- Scholarship **Convergent Science Network (CSN) scholarship.**  
 For participation in Barcelona Cognition, Brain and Technology summer school, Sep 2014.
- Award **Premio Extraordinario de Bachillerato.**  
 Prize awarded to 0.1% of Spanish high school students based on a single paper-based test.
- Award **Silver medal in Spanish National Chemistry Olympiad.**  
 Branch of the International Chemistry Olympiad, 2010 edition.

## Teaching and supervision

- May 16 – Jun 16 Lectured 3-week course in *C/C++ Programming Tools*, Imperial College.
- Apr 16 – Jun 16 Instructor, *C Programming* course, Imperial College.
- Jan 16 – Apr 16 Tutor, Probabilistic Inference, Imperial College.
- Jan 16 Lectured short course in *C for Operating Systems*, Imperial College.
- Oct 15 – Dec 15 Teaching fellow, Computational Neurodynamics, Imperial College.
- Oct 15 – Dec 15 Tutor, Mathematical Methods, Imperial College.
- May 15 – Jun 15 Lectured 3-week course in *C/C++ Programming Tools*, Imperial College.
- Apr 15 – Jun 15 Instructor, *C Programming* course, Imperial College.
- Feb 14 – Oct 15 Supervisor, Imperial College MSc project. Title: *Metastability and integrated information in spiking neural networks.*
- Dec 14 – May 15 Co-supervisor, Imperial College MSc group project. Title: *Implementation of attentional bistability of the dragonfly visual neurons in an intelligent biomimetic flying agent.* Co-supervised in collaboration with Zafeirios Fountas and Murray Shanahan.
- Jan 15 – Apr 15 Teaching assistant, Introduction to C programming, Imperial College.

Oct 14 – Dec 14 Teaching assistant, Computational Neurodynamics, Imperial College.

### Invited talks and seminars

- Apr 2016 *BrainStudio Tutorial*, Groningen Cognitive Modelling Spring School, University of Groningen.
- Mar 2016 *Modelling Cortical Oscillations with BrainStudio*, Bristol Neural Dynamics Forum, University of Bristol.
- Jan 2016 *Local Information Dynamics in Metastable Coupled Oscillators*, Complexity and Networks seminar, Imperial College.
- Dec 2015 *Oscillator Models as a Testbed for Empirical Measures of Consciousness*, Department of Psychology and Clinical Neurosciences, University of Cambridge.
- Nov 2015 *Simulating Brains with Pendulums*, ACM Student Seminar, Imperial College.
- Nov 2015 *Integrated Information and Metastability in Systems of Coupled Oscillators*, Sackler Center for the Study of Consciousness, University of Sussex.

### Workshop organization

- Oct 14 - Sep 15 Chair of the Imperial College Computing Student Workshop (ICCSW'15).
- March 2015 Reviewer for IJCAI 15.
- July 2015 Reviewer for JONS.
- Summer 2014 Member of the review and editor boards for the CMU RISS Working Papers journal.
- July 2012 Assistant organizer for the Theoretical Physics Students League summer school, in University of Valencia, Spain.

### Outreach

- March 2015 *AI and conscious machines*, interview at Imperial Radio.
- Sep 12 – Jun 13 Organizer of the colloquium series *Physics at the pub*, in collaboration with the Applied Physics and Electromagnetism department at University of Valencia.
- February 2013 *What is actually a Physics degree?*, talk at high school Mislata, in Valencia, Spain.
- April 2012 *What is actually a Physics degree?*, talk at high school Mislata, in Valencia, Spain.

### Leadership and managerial skills

- Sep15 – present Vice-chair of Imperial College ACM Student Chapter.
- Sep 11 – Jun 13 Coordinator of University of Valencia Physics Department Student Council.
- Sep 11 – Jun 12 5-STAR Leadership Course at Coworking, Valencia, Spain.
- Sep 12 – May 13 Leadership and Emotional Intelligence course at La Akademia, Valencia, Spain.

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## Publications

### Conference publications

- **P. Mediano** and M. Shanahan, *An unexpected discrepancy in a well-known problem: Kraskov estimators applied to spiking neural networks*. Proceedings of the European Conference in Artificial Life, July 2015.

### Technical reports

- **P. Mediano** and R. Schroeter, *Hadron Production in  $p+A$  Interactions in the NOvA Experiment*. Technical report, January 2014.

### Theses

- **P. Mediano**, *Data-Efficient Reinforcement Learning for Autonomous Helicopters*. MEng thesis, Imperial College London, 2014. Supervisor: Marc Deisenroth.

### Abstracts and posters

- **P. Mediano**, M. Schartner, A. Barrett, A. Seth and M. Shanahan, *Evaluation of Statistical Estimates of Integrated Information Measures on Simulated Data*. In ASSC 2016.
- M. Schartner, **P. Mediano**, A. Seth, A. Barrett, *Modelling the relation between consciousness and signal complexity with interacting oscillators*. In ASSC 2016.
- Z. Fountas, **P. Mediano**, D. Bhowmik, *Brain Studio: A practical high-performance tool to design and simulate spiking neural networks*. In SFN 2016.
- H. van Rijn, P. Mostert, **P. Mediano**, Z. Fountas, *The dopamine paradox in interval timing: how one neurotransmitter can both reset as well as modulate the clock*. In SFN 2016.
- **P. Mediano** and M. Deisenroth, *Data-Efficient Reinforcement Learning for Autonomous Helicopters*. In CRISM Bayesian Nonparametrics Masterclass, April 2016.