

CATALINA VICH LLOMPART

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ACADEMIC TRAINING

- **Assistant lecture.** Universitat de les Illes Balears (UIB) (september 2013 – currently)
- **PhD in applied mathematics** (dynamical systems) **and computational neuroscience** (2013-2016) at Universitat de les Illes Balears (UIB). Thesis title: “Inverse Methods to estimate synaptic conductances with emphasis on non-smooth dynamical systems”. Advisors: Antoni Guillamon and Rafel Prohens
Grade: Excellent Cum Laude.
- **Master in teacher training “Màster Universitari de Formació del Professorat”** (2012) at Universitat de Illes Balears.
Grade: 8.99/10
- **Master “Master in Advanced Mathematics and Mathematical Engineering”** (2011) at Universitat Politècnica de Catalunya (UPC), Facultat de Matemàtiques. An interuniversity master between the Universitat Politècnica de Catalunya (UPC) and the Universitat de Barcelona (UB) to obtain an specific formation in dynamical systems and neurosciences.
Grade: 9.07/10
- **Degree in Mathematics “Llicenciada en Matemàtiques”** (2005-2010) at Universitat de Illes Balears (UIB). This certificate was obtained with the National Award for Excellence in Academic Performance (Award to obtain the best expedient grade of the promotion).
Grade: 7.61/10
- **General Certificate of Education (GCE)**, modality of Natural Science – Human Biology (2005) at IES Lluçmajor, Mallorca.
Grade: 8.6/10

CURRENT RESEARCH TOPICS

- Modelling and simulation of the behaviour of a neuron through ordinary differential

equations and stochastic differential equations. More specific, I am working in the problem of Conductance's estimation. I am trying to estimate the conductances (which are coming from excitatory and inhibitory neurons) that a single neuron is receiving.

Work supervised by Prof. Antoni Guillamon (UPC) and Prof. Rafel J. Prohens (UIB).

- Existence of Canard orbits in slow-fast piecewise linear systems. One of the applications of these kind of systems which I am interested in is to model the bursting behaviour.
Work supervised by Prof. Rafel J. Prohens (UIB) and Prof. Antonio E. Teruel (UIB).
- Study of the conductances of neural networks combining periods of high activity and periods of silence. Effects caused from the synaptic plasticity.
Work with the collaboration of Prof. Antoni Guillamon (UPC) and Prof. Paolo Massobrio (NBT, DIBRIS).

PARTICIPATION IN FUNDED PROJECTS

- Member of the research project MCYT/FEDER number MTM2015-71509-C2-2-R. Principal Investigator: Prof. Antoni Guillamon I Grabolosa (UPC).
- Member of the research project MCYT/FEDER number MTM2014-54275. Principal Investigator: Prof. Rafel J. Prohens (UIB).
- Member of the educational innovation project *Versió prototip d'un Curs Zero Virtual de Matemàtiques*. Principal Investigator: Dr. Francesc A. Rosselló Llompart (UIB).
- Member of the research project MCYT/FEDER number MTM2011-22751. Principal Investigator: Prof. Rafel J. Prohens (UIB).

PUBLICATIONS OR SCIENTIFIC – TECHNICAL DOCUMENTS

- *Slow-fast n -dimensional piecewise linear differential systems*. R. Prohens, A. E. Teruel, C. Vich. Journal of Differential Equations. 260 (2) (2016), pp. 1865–1892, ISSN: 0022-0396
- *Dissecting estimation of conductances in subthreshold regimes*. C.Vich and A. Guillamon. Journal of Computational Neuroscience. 39(3) (2015), pp. 271–287, ISSN: 0929-5313
- *Tècnica del Jigsaw en l'educació secundària. Aplicació a les matemàtiques*. Master dissertation. Universitat de les Illes Balears (UIB), Juny 2012
- *Analytical and Numerical Methods for Estimating Conductances in Neuron*. Master dissertation. Universitat Politècnica de Catalunya (UPC), Juny 2011.

Abstract published in Societat Catalana de Matemàtiques, ISSN: 1696-8247 pp. 85

- *Estudi sobre el pont de Wien no lineal.*
Revista Enginy@eps núm. 2 any 2010 ISSN: 1889-4771

STAYS ABROAD

- Research state with Susanne Ditlevsen at the Research Group Statistics and Probability Theory (Department of Mathematical Science)
From 17-04-2016 to 22-04-2016 at University of Copenhagen (Denmark)
Topic: A strategy for non-linear estimation of synaptic conductance
- Research state with Susanne Ditlevsen at the Research Group Statistics and Probability Theory (Department of Mathematical Science)
From 22-09-2015 to 27-01-2016 at University of Copenhagen (Denmark)
Topic: Estimation of conductances using non-deterministic models.
- Research state with Dr. Paolo Massobrio (NBT, DIBRIS).
From 10-02-2014 to 14-02-2014 at University of Genova (Italy)
Topic: Effects of the synaptic conductances in the presence of short-term plasticity mechanisms.
- Exchange Student during the degree in the **University of Texas at Austin**
From August 2008 to January 2009.
- English summer school in **The Language centre of Ireland** at Dublin (Ireland)
August 2007

GRANTS OF UNIVERSITY CHARACTER

- Grant from Obra Social La Caixa to do an stay of research in Københavns Universitet
4th of May of 2016 in Mallorca.
- Grant from Fundació Agrupació Mútua to study the Master in Advanced Mathematics and Mathematical Engineering.
13th of October of 2010 in Barcelona.
- Exchange Program Grant “Conveni d’Intercanvi” to study a semester in the University of Texas at Austin (UT)
UIB – Servei de Relacions Internacionals.
From 14-08-2008 to 14-01-2009 at University of Texas at Austin.
- Grant “Beques d’idiomes” to attempt an English summer school. Given by the Ministeri d’Educació i Cultura (MEC).
Summer 2007 at The Language Centre of Ireland.

- Grant “Beques de caràcter general i mobilitat” to study the degree. Given by the Ministeri d’Educació i Cultura (MEC).
Academic courses: 2005/2006, 2006/2007, 2008/2009, 2009/2010 at Universitat de les Illes Balears.

AWARDS OF UNIVERSITY CHARACTER

- Recognition of outstanding student research paper quality and originality in the field of differential equations and dynamical systems. Paper title: *Slow-fast n-dimensional piecewise linear differential systems*
9th of July 2014 at the 10th AIMS Conference on Dynamical systems, Differential Equations and Applications,
The American Institute of Mathematical Sciences (AIMS).
- National Award for Excellence in Academic Performance. Award to obtain the best expedient of the promotion in the Mathematical Degree
July 2010 at Universitat de les Illes Balears (UIB).

PROFESSIONAL DEVELOPMENT

- Course in Coursera: Dynamical Modeling Methods for Systems Biology,
By Eric A. Sobie at Icahn School of Medicine at Mount Sinai
From 31-03-2014 to 05-06-2014
- Summer school: Advances Course in Computational Neuroscience (ACCN 2013) at Mathematical Research and Conference Centre (MRCC), Bedlewo (Polònia).
Completion of the research project “Effects of synaptic plasticity in UP/DOWN states networks” under the tutorship of Prof. Paolo Massobrio (NBT, DIBRIS), Università Degli Studi di Genova.
From 28-07-2013 to 24-08-2013
- Course in Coursera: Synapses, Neurons and Brains,
By Idan Segev at the Hebrew University of Jerusalem
From 31-03-2013 to 02-06-2013
- On-line course: Introduction to Biology - The Secret of Life,
By Eric S. Lander at the Massachusetts Institute of Technology
From 05-03-2013 to 05-06-2013

CONFERENCE CONTRIBUTIONS

- 10th European Conference on Mathematical and Theoretical Biology (ECMTB 2016)
From 11-07-2016 to 15-07-2016
Nottingham, United Kingdom
Certificate of participation. Talk: “Analytical strategies for the estimation of conductances”

Certificate of session chair: Neuroscience 1 - Networks

- 1st Eworkshop on Dynamical Systems in the Real Life
From 08-07-2016 to 09-07-2016
Castelló de la Plana, Spain
Certificate of participation – invited speaker. Talk: “Inverse methods to estimate synaptic conductances with emphasis on non-smooth dynamical systems”
- Second International Conference on Mathematical Neuroscience (ICMNS 2016)
From 05-06-2016 to 09-06-2016
Antibes – Juan Les Pins, France
Certificate of participation. Talk: “A strategy for non-linear estimation of synaptic conductances”
- Retreat at Kolle-Kolle by Københavns Universitet
From 19-04-2016 to 20-04-2016
Copenhagen, Denmark
Certificate of participation. Talk: “Nonlinear strategies to estimate synaptic conductances”
- Open problems in nonsmooth dynamics
From 01-02-2016 to 05-02-2016
Centre de Recerca Matemàtica (CRM), Catalunya
Certificate of participation. Talk: “Estimation of synaptic conductances in McKean neuron model”
- Computational Neosciences (CNS 2015), Main meeting
From 18-07-2015 to 23-07-2015
Prague – Czech Republic
Certificate of Poster Presentation: “Estimation of synaptic conductances: analytic strategies for subthreshold oscillations and for the McKean neuron model”
- Summer School on Foundations and Advances in Stochastic Filtering (FASF 2015)
From 22-06-2015 to 26-06-2015 at Centre Tecnològic Telecomunicacions Catalunya (CTTC), Castelldefels
Certificate of Attendance
- Barcelona Computational, Cognitive and Systems Neuroscience (BARCCSYN 2015)
From 18-06-2015 to 19-06-2015 at Centre de Recerca Matemàtica (CRM), Barcelona
Certificate of Poster Presentation: “Analytical strategies for the nonlinear estimation of conductances”
- Ddays (2014), Meeting of the thematic network DANCE
From 12-11-2014 to 14-11-2014 at Badajoz, Espanya
Local organizer
- Computational Neosciences (CNS 2014), Main meeting + Workshop
From 26-07-2014 to 31-07-2014

Québec city, Quebec - Canada

Certificate of Posters Presentation: “Dissecting estimation of conductances in subthreshold regimes” and “Effects of short-term synaptic plasticity mechanisms on the dynamics of the network conductances”

- International Workshop on Neurodynamics (Ndy14)
From 14-07-2014 to 17-07-2014 at Centro Internacional de Encuentros Matemáticos (CIEM), Castro Urdiales
Certificate of participation. Talk: “Difficulties, challenges and solutions in the estimation of synaptic conductances”
- 10th AIMS Conference on Dynamical systems, Differential Equations and Applications
From 07-07-2014 to 11-07-2014 at Instituto de Ciencias Matemáticas (ICMAT), Madrid
Certificate of participation. Talk: “Slow-fast n-dimensional piecewise linear differential systems”
- Barcelona Computational and Systems Neuroscience (BARCSYN) 2014
From 16-06-2014 to 17-06-2014 at Centre de Recerca Matemàtica (CRM), Barcelona
Certificate of participation. Talk: “Data treatment in estimating synaptic conductances: wrong procedures and new proposals”
- Computational Neosciences (CNS 2013), Tutorial + Main meeting
From 13-07-2013 to 16-07-2013 at Université Paris Descartes, Paris
Certificate of Attendance
- Barcelona Computational and Systems Neuroscience (BARCSYN) 2013
From 13-06-2013 to 14-06-2013 at Centre de Recerca Matemàtica (CRM), Barcelona
Certificate of Poster Presentation. Poster: “Dissecting estimation of conductances in subthreshold regimes”
- Workshop on slow-fast dynamics: theory, numerics, application to life and earth sciences
From 03-06-2013 to 07-06-2013 at Centre de Recerca Matemàtica (CRM), Barcelona
Certificate of Attendance
- Seminar “Slow-fast dynamics in Piecewise Linear Differential Systems”.
30th of May of 2013, Palma de Mallorca at Universitat de les Illes Balears.
Certificate of Conference
- Seminar “The piecewise linear version of the famous Bonhoffer-van der Pol (BVP) equations”.
4th of July of 2012, Palma de Mallorca at Universitat de les Illes Balears.
Certificate of Conference
- Recent Trends in Nonlinear Sciences 2011 (RTNS 2011), winter school.

From 27-01-2013 to 01-02-2013 in Múrcia.
From 23-01-2012 to 27-01-2012 in Pamplona.
From 24-01-2011 to 28-01-2011 in Vilanova i la Geltrú (Barcelona).
Certificate of Attendance

- CEDYA 2011 “XXII Congrés d’Equacions Diferencials i Aplicacions, XII Congrés de Matemàtica Aplicada”
From 05-09-2011 to 09-09-2011 in Universitat de les Illes Balears.
Certificate of Collaboration
- JISD 2011 “Jornades d’Interacció entre Sistemes Dinàmics i EDPs
From 27-06-2011 to 1-07- 2011 in Barcelona.
Certificate of Attendance

WORK EXPERIENCE

- Assistant Lecturer at Universitat de les Illes Balears.
From 24-09-2012 (Current work)
- Academy School *Iniciatives Educatives de Balears, S.L.* in Son Ferriol at Mallorca.
I taught mathematics to High School Students (August, 2010)

ADDITIONAL TRAINING

- IELTS test (English certificate) with the British Council (2010).
- Certificate of the Intermediate 3 (English certificate) with The Language Centre of Ireland (2007).
- Programming skills with C++, Java and Matlab.
- C certificate of Catalan language (2005)
- Certificate of the degree Elementary Music, instrumental specialization in piano.
Conservatory of Music and Dance, Palma (2004)

LANGUAGES

- **Catalan language:** write, speak and read (native language)
- **Spanish language:** write, speak and read (native language)
- **English language:** write, speak and read