



AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2019

Turno de acceso general

Nombre: RODRIGUEZ GARCIA, MIRIAM

Referencia: RYC2019-028006-I

Área Temática: Producción industrial, ingeniería civil e ingenierías para la sociedad

Correo Electrónico: miriamr@iim.csic.es

Título:

Model-based control of Antimicrobial Resistance (AMR) in the food industry

Resumen de la Memoria:

My research has focused on developing new process engineering approaches to model and control biosystems relevant in medicine and the food industry. My current goal is to model-based control of bacterial resistance to antimicrobials (AMR) in the food industry: a new and ambitious research line I have pioneered in my group and institute.

Nowadays, complex biological systems may be analysed with the help of engineering approaches thanks to newer, faster and more quantitative measuring devices. Mathematical descriptions of such systems are, however, the critical challenge. An essential feature of my work is the design of efficient methods and tools to derive mechanistic models with sufficient predictive capabilities for control and optimisation. The usual outcomes are models with a small number of equations and parameters described by non-linear partial differential equations to account for stochasticity or spatial heterogeneity.

Due to the multidisciplinary character of my research and the complexity of the systems under study, my trajectory has been structured around three main objectives:

- develop new methodologies for modelling, optimization and control of complex bioprocess subject to variability and uncertainty;
- adapt and validate those methodologies in different problems of interest either in medicine or the food industry;
- and to model-based control of antimicrobial (antibiotics and biocides) resistance in the food industry.

The first objective has been a constant during my career, but mostly during my PhD studies in applied mathematics in the process engineering group (CSIC).

My extended postdoctoral stay in the Systems Biology group (NUIM Ireland) was crucial for the second objective. Here I started building an international network of experts working in computational Synthetic and Systems Biology (UK); neuroscience (Ireland); and control engineering (Australia) among others.

My main research line in last year has been to develop and validate new process engineering methodologies to control AMR, a critical challenge for medicine and the food industry. This research line was firstly founded in 2015 with a 3-years JIN project to develop new useful predictive models of AMR in the food industry (Spanish national projects for non-tenure youth researchers in a call with a success rate of only 8%). This research continues nowadays within a second JIN project (Retos 2018), where the developed models are exploited for estimation and control of AMR.

Resumen del Currículum Vitae:

My main research line is the model-based control of bacterial resistance to antimicrobials in the food industry. This is a new and ambitious research line in my institution that I started in 2015 in the context of 2 JIN projects as PI (Proyectos nacionales de I+D+I para jóvenes investigadores sin Vinculación).

My main interest is the mechanistic modelling and control of systems represented by complex non-linear ordinary, stochastic and partial differential equations. The cases I have studied include processes in the food industry and medicine, with a particular interest in testing the theory with experimental data. These motivations have resulted in several theoretical and multidisciplinary contributions, the most recent ones in collaboration with experts in microbiology, neuroscience and food technology, among others.

My research career started after graduating in Chemistry when I joined the Process Engineering Group (Food Technology department in the Instituto de Investigaciones Marinas-CSIC). After discovering the potential of the mathematics I decided to start a PhD in applied mathematics under the supervision of Antonio A. Alonso and Eva Balsa-Canto. In 2008 I defended the thesis entitled "Identification and Real Time Optimisation in the Food Processing and Biotechnology Industries".

During the last year of the PhD, I decided to gain experience in the modeling of complex biological systems. Therefore I moved to Ireland to investigate systems biology with the professors Peter Wellstead and Richard Middleton where I confront the challenge of modelling the causes and treatments of Parkinson's Disease. During this long postdoc I was invited to and was involved in organising several international



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meetings. I also co-supervised 2 PhD theses.

After 5 years in Ireland, I was finally ready to begin cutting-edge research in process engineering. In 2013, after being on maternity leave for 8 months, I returned to my previous group in Spain to work on a national project for developing models able to predict food quality. This national research project offered me the opportunity to extend my approaches to account for variability and uncertainty.

In the course of this project, interrupted by another maternity break of 7 months, the idea around my current research line started to materialise. In 2015, the idea was funded with a 3-year JIN project about antimicrobial resistance in the very competitive call (8% success rate); financial help to prepare an ERC proposal (sent on 2016) and a Juan de la Cierva grant. In 2018, and thanks to the results of the JIN project, I capture funding to continue my research line in the context of another JIN project. In total, the funding sums up more than 460 mil euros, a significant achievement considering the current difficulties to get funding, especially for non-tenure researchers in CSIC.

My work has resulted in 29 JCR articles in relevant journals (27 in Q1 and in half of them acting as first author, corresponding or last), 4 book chapters and more than 25 conference proceedings. I have participated in 14 research projects (including 2 JIN, 2 Irish projects, and 1 European), and more than 60 conferences, including invited talks and tutorials. I am a project evaluator for ANEP-Spain (since 2018), and I am currently expert for the EFSA.



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Nombre: GAGO FERRERO, PABLO

Referencia: RYC2019-027913-I

Área Temática: Producción industrial, ingeniería civil e ingenierías para la sociedad

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Título:

Development and evaluation of innovative wastewater treatments

Resumen de la Memoria:

My research focused on the development and improvement of innovative water treatments as well as to find solutions to different environmental challenges related to contaminants using the last advances in analytical chemistry. I developed new strategies to evaluate the performance of water and soil treatments as well as contribute to the development of new technologies in this field. Also, I developed early warning methodology and new strategies for identification of previously unknown chemical risks. I carried out my PhD at the Institute of Environmental Assessment and Water Research (IDAEA-CSIC) after being awarded with a competitive JAE pre-doctoral grant.

During my PhD I focused on the evaluation of the removal of organic micropollutants during wastewater treatment, including conventional secondary treatments and innovative treatments (e.g. the use of the fungus *T. versicolor* or different advanced oxidation processes). Following completion of my PhD studies at CSIC, I moved to the University of Athens (2013) to conduct research on the integration of high resolution mass spectrometry (HRMS) and statistical analysis of data to develop and optimize smart methodologies for the assessment of the overall efficiency of water treatment using different technological approaches. During this first postdoctoral stage I published as a main author some papers that are considered reference in my field of expertise (in the 99% percentile of citations). In 2016, I moved to the Swedish University of Agricultural Sciences where I was able to quickly build a new line of research on non-target analysis applied to water treatment and I was the main supervisor of two master students and one PhD student. At the same time I carried out consultancy work related to drinking water treatment for the Livsmedelsverket (Swedish Food Agency) and wrote as official co-applicant projects awarded with a total budget 1,800,000, being the principal investigator in my working institution. In 2018 I moved to Spain with a Marie Curie fellowship to work on my project entitled Development of a smart workflow based on high resolution mass spectrometry for the assessment of the performance of wastewater treatment technologies (Smart-Workflow).

In the past six years, I evolved into an internationally recognized expert in micropollutants and water treatment. Despite a relatively short academic career to date (PhD obtained in July, 2013), I achieved an exceptionally strong track record in conducting interdisciplinary research on environmental chemistry, with the majority of my research papers published in the first journals of this field. Overall, my research has been published in 38 peer-reviewed papers (18 first authorships) and five book chapters, attracting more than >1,500 citations, with h-index 25. It is relevant the fact I have published articles as main author in high impact journals in all stages, including short stays, demonstrating my independence and scientific capacity. Given my scientific output, funding and fellowships obtained, as well as my experience leading a research line, I believe that I have the capacity to form an internationally recognized research programme in my field of expertise. If I were awarded the RyC grant, my intention is to join the Department of Groundwater and Hydrogeochemistry (IDAEA-CSIC), led by Prof. Ing. Jesus Carrera.

Resumen del Currículum Vitae:

Research Stays:

The researcher carried out his PhD at IDAEA-CSIC. Once finished, he moved to the University of Athens (Greece) to work as a Postdoc during 30 months. Later, he moved to the Swedish University of Agricultural Sciences (Sweden) to continue his research during 24 additional months. From May 2018 the researcher works at ICRA.

Also, the fellow performed a five-month stay at Ghent University (Belgium) during his pre-doctoral stage and a two-months stay at Eawag (Switzerland) during his first Postdoc.

Participation in R&D projects:

The fellow has actively participated in four national and five international projects. Apart from his Marie Curie and Beatriu de Pinós projects, he is official co-applicant and principal investigator at ICRA in two projects: DANTE (1,500,000) and LakePOPs (300,000), leading a work package in each of them. Also, he has applied as official co-principal investigator to the 2019 I+D+i Retos Investigación call.

Main grants awarded:

He obtained a competitive JAE Pre-Doctoral grant to carry out his PhD awarded by CSIC. During his postdoctoral period he obtained the highly competitive Marie Curie Individual fellowship (Call: H2020-MSCA-IF-2016). Also, he has been also awarded with the prestigious Beatriu de Pinós post-doctoral reintegration fellowship (BP-2018, 144,300).



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Publications:

Overall, his research has been published in 38 peer-reviewed papers (20 leading authorships), attracting more than 1500 citations (Scopus), with h-index 25. 36 out of the 38 papers are published in journals included in the Q1 of its corresponding area, many of them in the top 5% impact factor journals (e.g Water Research, Environmental Science and Technology). Apart from that he has been invited to participate in 5 peer-reviewed book chapters (2 first authorships).

Dissemination and conference organization:

The generated knowledge has been disseminated in 30 platform presentations (3 invited) and 31 posters in international conferences. The fellow has obtained two prizes.

He has also been part of the scientific and organizing committees of different prestigious international conferences and he has chaired five sessions and other scientific events.

His research has been also disseminated in press, radio and television in different countries. He has also personally signed articles in newspapers of national circulation.

Teaching:

The fellow has co-supervised three PhD (two still on-going) and the stay of a postdoctoral researcher. Also, he has supervised two master students as main supervisor and two more as co-supervisor, always publishing the results of those theses in prestigious journals. He has done official specific courses in Sweden on teaching in higher education (120 hours) and he gave invited lectures in Greece, Sweden Denmark and Italy.

Evaluation and revision of R&D projects and articles:

The fellow has been reviewer of a large number of scientific journals included in the SCI from Elsevier, Springer and ACS publications. Also, he has been external evaluator for the Nottingham Research and Anne McLaren Fellowship Schemes 2018/19.

Collaborations with industry and other institutions:

The researcher has actively collaborated with Bruker Daltonik GmbH on the improvement of the commercial applications. Also, he carried out consultancy work related to drinking water treatment for the Swedish Food Agency.



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Nombre: SOLLA CARRACELAS, M^a MERCEDES

Referencia: RYC2019-026604-I

Área Temática: Producción industrial, ingeniería civil e ingenierías para la sociedad

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Título:

Aplicación del georadar (GPR) para la evaluación de obras e infraestructuras

Resumen de la Memoria:

Dr. Mercedes Solla started her PhD studies in the Univ. of Vigo (2006) under the topic Application of Ground Penetrating Radar for the evaluation of ancient masonry arch bridges. Aiming to obtain her PhD with International Mention, she was a predoc research fellow at Infrastructure and Environment Institute (IEI) of Univ. of Edinburgh (3 mos.) focused on Numerical modelling of GPR data based on the photogrammetric and laser scanner surveys on bridges using FDTD models with GprMax. She obtained her PhD in 2010.

In 2011 she started to work in the R&D project Application of technologies for infrastructure management and inspection (SITEGI) CDTI. Within this framework, she extends her research interests on the application of GPR for the evaluation of civil engineering structures and infrastructures (bridges, tunnels and pavements).

In 2012 she was a postdoc research fellow (6 mos.) at the IEI (Univ. of Edinburgh) with the project FDTD modelling of the GPR signal to analyze damages in masonry structures and cracking in pavements.

After a period of postdoctoral research, in 2013 she won a position at the Defense University Center (CUD) of the Ministry of Defense. The R&D at the CUD is mainly aligned with the Strategy of Technology and Innovation for Defense (ETID) attached to the General Directorate of Armament and Material (DGAM). At the CUD, she created and led a group of 7 young PhD researchers to investigate under the topic Geomatic Engineering and Construction focusing on the use of geotechnologies for civil engineering evaluation and quality control in construction. Here, her research interests focused on the combination of GPR with other Nondestructive methods and in developing algorithms for automatic processing and pattern detection.

Since 2013 at present she has been participating in 10 research projects (2 H2020, 1 Interreg, 2 COST Actions, 1 international, 4 national) and 6 R&D contracts. She was Main Researcher of 2 contracts. Nowadays, she is MR in a RETOS project (MICINN) Life-cycle assessment of existing bridges structures using multiscale and multisource data (2019-21).

In 2014 she joined the COST Action TU1208 Civil Engineering Applications of Ground Penetrating Radar chairing Workgroup 4 Different Applications of GPR and other NDT Technologies in Civil Engineering. In 2015 she was a visiting researcher (1 mo.) at Transportation Department of the National Laboratory for Civil Engineering (Lisbon, Portugal). She developed a STSM entitled Nondestructive tests for railways and roads evaluation.

In 2018 she was a visiting researcher (2 mos.) at the Department of Civil Engineering of Univ. of Minho (Guimarães, Portugal), where she developed several laboratory tests and field works for the GPR evaluation of cracking in pavements.

In 2018 she joined the COST Action SAGA. Her research interests on this Action are aligned with the objectives of Workgroup 3 Data integration, visualisation & Parameterization, and more particularly on the use of forward signal modelling and the integration of GPR with other NDT data into GIS/BIM systems for construction management.

In 2019 she was a visiting researcher (3 mos.) at INESC (Univ. of Coimbra, Portugal), within the project Heritage-3DIM, focusing on the acquisition of GPR data at the Monastery of Batalha and integration into a BIM model.

Resumen del Currículum Vitae:

Dr. Mercedes Solla holds a MEng in Forest Engineering (2006) and a PhD in Environmental Engineering (2010) (International Mention, Honors and Extraordinary PhD Award). Since 2013 she has a position at the Defense University Center (CUD) of the Ministry of Defense (Professor PCUD3 2013-14, Assistant Professor (Ayudante Dr) 2014-16, Associated Professor (Contratada Dr) 2016-at present), based in the Spanish Naval Academy.

Her research interests focus on the application of Ground Penetrating Radar (GPR) for testing and evaluation of civil engineering infrastructures.

She holds 2 six-year research periods (sexenios) and she is accredited to be full-time professor (Prof. Titular de Universidad). Author of about 125 publications (49 JCR articles, 30 Q1), including 25 book chapters and 80 conference proceedings (h index= 16, Scopus). Editor of 1 international book. She has participated in 18 research projects and 36 R&D contracts. Inventor in 1 patent in exploitation (since 2012).

Leadership:

She has supervised 5 PhD theses and 13/22 Master/Degree final projects. She was Management Committee Member of COST Action TU1208, chairing Workgroup IV (2013-17). Nowadays, she is MC Member of COST Action SAGA, elected Policy Coordinator and Core Group Member (2018-22).

Main Researcher in a RETOS project of the National R&D Programme (MICINN) (2019-21).



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Coordinator of the 3rd Conf. of R&D on Defense and Security (DESEI+D15) and co-chair of the 10th Int. Workshop on Advanced GPR (IWAGPR19). Session Chair in Int. Confs. (IMEKO17, EGU19). Member of the Organization Committee of the V & VI Int. Symp. of University Teaching (CINDU17, 19).

Founder and editorial board member of the journal Ground Penetrating Radar. Associate editor of JCR journals: Remote Sensing and Advances in Materials Science and Engineering. Guest editor of 4 Special Issues in Remote Sensing and Ground Penetrating Radar.

Coordinator of the Int. Training School on NDT Techniques applied to Civil Engineering (Barcelona, 2016) and Organization Committee of the Erasmus Intensive Programme Summer School on Preventive Archaeology (2 editions: Ravenna, Italy, 2013, 14).

Head of the Quality Committee at CUD (2017-at present).

Mobility and Internationalization:

As postdoc researcher she has been with the Univ. of Edinburgh (2012, 6 mos.; resulting in 5 JCR articles), Nat. Lab. for Civil Engineering of Lisbon (2015, 1 mo.; 3 JCR), Univ. of Minho (2018, 2 mos.; 2 JCR) and Univ. of Coimbra (2019, 3 mos.; 1 JCR). She has been predoc research fellow at the Univ. of Edinburgh (2009, 3 mos.; 2 JCR).

Researcher in 2 H2020 projects, 1 Interreg, 2 COST Actions and 1 Portuguese project. Participation in the international projects Syrian Middle Euphrates (2009, Syria) and GPR Surveying in Al Jazirat Al Hamra (2011, Ras Al Khaimah). As MC member of the aforementioned COST Actions she participated in 13 general & workgroup meetings.

As a result of the international stays and participation in European Consortium, she shares article co-authorship with 60 foreign authors from 46 international institutions and holds contributions in 70 international conferences, with participation in the Scientific Committee of the most relevant on her topic: IWAGPR15, 17, 19; Int. Conf. on GPR12, 14; DESEI+D16, 17, 18, 19.

She is member of 3 Scientific Societies (TU1208 GPR Association, EGU, EAGE), reviewer in 20 JCR journals and reviewer of research projects for international agencies (Latvia, Italy).



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Nombre: TOURRET , DAMIEN

Referencia: RYC2019-028233-I

Área Temática: Producción industrial, ingeniería civil e ingenierías para la sociedad

Correo Electrónico: damien.touret@gmail.com

Título:

Microstructure formation, evolution, and behaviour in manufacturing of structural metallic alloys

Resumen de la Memoria:

As a Mechanical Engineering student, in 2005, I worked as assistant project manager at Faurecia (France) to coordinate the design, testing, simulation, and validation of automotive seat frames for Renault SA. In 2006, I joined the development team of EDF R&D finite element code (Code_Aster). There, I implemented numerical tools to stabilize simulations of fatigue crack propagation in a meshless XFEM framework.

From 2006 to 2009, as a PhD student in Materials Science & Engineering at Mines ParisTech (France) I joined an international project coordinated by the European Space Agency (ESA), and developed volume-averaged models for concurrent phase transformations in metallic alloys. We applied the model to simulate gas atomization of Al-Ni powders, in order to optimize the final performance of Raney-Ni catalysts for hydrogen fuel cells.

My first postdoctoral experience (2010-2011), at the German Space Agency, was in the continuity of my PhD research, yet focusing on experiments (solidification of undercooled levitated metal droplets) to collect data for validation and calibration of the model developed during my PhD.

As a postdoctoral researcher in the Physics Department at Northeastern University (USA) (2011-2014), I developed computationally-efficient implementations of phase-field codes and introduced a model to upscale simulations of dendritic growth beyond phase-field capabilities. Being involved in several joint ESA-NASA international projects, my simulations were used to study growth instabilities observed in experiments onboard the International Space Station, and dynamical selection of key microstructural features (e.g. dendritic spacings and grain boundaries) during solidification.

As a Postdoctoral Director's Fellowship at Los Alamos National Laboratory (USA) (2014-2017), I pursued my developments in multiscale modeling of dendritic growth (then focusing on the effect of liquid flow on the selection of microstructures), while participating in the design and use of experimental setups to image microstructural kinetics of metals in situ, e.g. using x-ray radiography and tomography.

In June 2017, I joined IMDEA Materials Institute to lead the Modeling and Simulation of Materials Processing group. We investigate microstructural kinetics (e.g. solidification, grain coarsening, precipitation, etc.) by means of multiscale modeling and state-of-the-art experiments. We aim at developing structural materials with outstanding thermal, mechanical, and chemical properties by making the most of innovative manufacturing methods. Our goal is to address outstanding societal challenges, such as safety, energy efficiency, and sustainability. Our current activities revolve around alloy design and optimization of advanced manufacturing techniques for transportation applications (e.g. additive manufacturing of Ni-based superalloys for aero-engine components).

My research group currently counts three PhD students (one as secondary co-advisor) and two postdoctoral researchers. Our research is funded by two national grants from the Spanish Ministry of Science, Innovation, and Universities, one European grant from the European Commission (Marie Skłodowska-Curie Actions) and private industrial contracts.

Resumen del Currículum Vitae:

I obtained a MSc in Mechanical Engineering and a PhD in Materials Science & Engineering in France. I was a postdoctoral researcher at the German Space Center, at Northeastern University (USA), and at Los Alamos National Laboratory (USA). I study phase transformations in structural materials, in particular solidification and crystal growth in metals and alloys. I develop, implement, and use a modeling approaches across length/time scales (atomistics, phase-field, finite elements), and participate in the design and use of novel experimental devices for in situ imaging of microstructural kinetics in metals.

RESEARCH INTERESTS

- Linking materials processing, structures, and properties



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- Microstructure selection, growth, and evolution in structural materials
- Solidification processing (e.g. casting, welding, additive manufacturing)
- Computational modeling and simulation, using phase-field and multiscale approaches - In situ imaging of metals and alloys microstructure (e.g. X-ray radio-/tomography)

EDUCATION

2009: Ph.D., Materials Science and Engineering, Mines ParisTech (France)
2006: M.Sc., Mechanical Engineering, Institut National des Sciences Appliquées (France)
2004: Semester exchange fellowship, Cardiff University (UK)

RESEARCH EXPERIENCE

2017-present: IMDEA Materials Institute (Getafe, Spain)
2014-2017: Los Alamos National Laboratory, MST-6 (Los Alamos, USA)
2011-2014: Northeastern University, Department of Physics (Boston, USA)
2010-2011: German Aerospace Center, DLR-MP (Cologne, Germany)
2006-2009: Mines ParisTech, CEMEF (Sophia Antipolis, France)

AWARDS & HONOURS

2020: TMS MPMD Young Leader Professional Development Award
2019: Marie Skłodowska-Curie Individual Fellowship, European Commission
2015: Postdoctoral Director's Fellowship, Los Alamos National Laboratory
2014: Top Discoveries in Microgravity Award, American Astronautical Society
2010: Grant for Young European Materials Science and Engineering Scientists, German Federation of Materials Science Engineering
2010: Poster prize, Conference Materials Science & Engineering, Darmstadt, Germany
2006: Doctoral Fellowship, French Ministry of Education, Research & Technology

ONGOING PROJECTS (as PI)

2018-2020: Entorno Virtual de Diseño y Fabricación de Turbinas Aeronáuticas (ENVIDIA), Ministerio de Ciencia, Innovación y Universidades
2019-2021: Creating an Infrastructure for the Numerical Exploration of Metallurgical Alloys (CINEMA), European Commission
2019-2022: Bordes de Grano en microestructuras Hexagonales (HexaGB), Ministerio de Ciencia, Innovación y Universidades

PUBLICATIONS & CONFERENCES

Google Scholar Metrics (01/2020)

Citations > 800
h-index: 16

Written Contributions

Peer-reviewed publications: 39
Main author: 19
High impact (h5-index > 50): 19

Oral Contributions

Contributed talks: 20
Keynote & Plenary: 4
Invited talks: 7
Invited seminars: 11
Posters as presenter: 7
Posters as co-author: 7

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- Professional Societies: TMS (Solidification committee), MRS, SES, SOCIEMAT, SF2M
- Symposium Organizer: TMS 2018, SES 2018, TMS 2019, MRS Fall 2019, COMPSAFE 2020, MMM 2020
- Review Board: Metallurgical and Materials Transactions A
- Scientific Committee: International Conference on Advances in Solidification Processes (ICASP)
- Peer Reviewer: NASA, National Materials Science Agencies, and 30+ journals



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Nombre: MINCHOLE LAPUENTE, ANA

Referencia: RYC2019-027420-I

Área Temática: Producción industrial, ingeniería civil e ingenierías para la sociedad

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Título:

Integration of biomedical data analysis and biophysical modelling and simulation in the investigation of pathological conditions

Resumen de la Memoria:

My long-term career goal is to become an international leader to further advance the integration of biomedical data analysis and biophysical modelling and simulation of physiological processes in the investigation of pathological conditions such as diseases or under the effect of drugs.

My scientific career has been aligned to this goal. During my PhD, I combined computational modelling and simulation and ECG signal analysis to provide a novel biomarker that later on has been reported to be an independent biomarker to predict sudden cardiac death in patients with chronic heart failure, and able to identify patients developing drug-induced ventricular arrhythmias. After a short postdoc experience in European preDiCt project in the Computer Science Department at Oxford University, I was awarded a Marie Curie Career Development fellowship that allowed me to gain expertise in Cardiac modelling and simulation and High-performance computing (HPC). Since then, I have further developed the computational infrastructure required for large HPC studies in vulnerability to arrhythmias under ischaemic conditions, and in the activation sequence to simulate the human QRS complex. Then, I led the development of a computational pipeline to obtain finite element models of personalized anatomies of torso, lungs and heart from patients based on magnetic resonance imaging (MRI), and perform personalized simulations of the electrical activity from cellular level up to ECG level. I have advanced and combined HPC simulation, software development in open source platforms, and machine learning techniques to personalize multiscale models to simulate the ECG.

As part of these investigations, I have already worked on the personalisation of anatomical models from control and disease subjects, quantifying the impact of ventricular anatomy and heart orientation on the ECG. Besides, and as part of my ongoing work in machine learning, ECG-based distinct phenotypes were identified from hypertrophic cardiomyopathy (HCM) patients, posing interesting questions about what is the morphological substrate that leads to this function. Therefore, to investigate the mechanistic link between cardiac morphology and ECG, we conducted HPC simulations informed by MRI.

More recently, I have moved to the University of Zaragoza, to the Mechanical Engineering Department within the EU-funded project PRIMAGE. I plan to use my expertise in integrating genetic data and computational modelling and simulation in the understanding of tumour growth.

I have the knowledge, tools and network to now lead my own research programme, with the vision of a better risk stratification, clinical diagnosis and disease prognosis enabled by the integrative use of imaging and biomedical data through personalized computational models.

Resumen del Currículum Vitae:

Ana Mincholé graduated in Physics from the University of Zaragoza, Spain in 2002. She also obtained an MSc with the highest grade (distinction) in the program Nanoscale Physics and Engineering from Chalmers University of Technology, Gothenburg, Sweden. She then started a PhD in Biomedical Engineering at the Communication Technology Group in the University of Zaragoza, supervised by Prof. Pablo Laguna. Her PhD Thesis (awarded cum laude and) focused on the analysis of the electrocardiographic signal and the development of novel biomarkers for stratification of arrhythmic risk.

After her PhD and a short postdoc experience in European-funded preDiCt project at University of Oxford, she was awarded a Marie Curie Intra-European fellowship for Career Development and joined Prof. Blanca Rodriguez group in the Department of Computer Science at the University of Oxford. After that fellowship she continued working at the University of Oxford and she currently holds the position of Senior Research Associate.

Her research interests include the combination of computational modeling and simulation of cardiac electrophysiology, biomedical signal analysis and machine learning techniques to provide selective ECG biomarkers able to predict arrhythmic risk either drug-induced or due to pathological conditions.

She actively participates in International Conferences (>30 publications in proceedings). She has co-authored 27 scientific Journal papers (12 as first author), and 2 patents (in which she is the first inventor). Additionally, she has been supervisor of 5 PhD at the University of



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Oxford, and 6 MSc students (5 at the University of Oxford and 1 at the University of Zaragoza). She has been involved, with different roles, in the writing of national and international projects and grant proposals.

She has been an invited speaker in several scientific meetings such as Cloud and High Performance Computing in Biomedicine held at University College London (UCL), UK, conferences as International Society for Computerized Electrocardiology (ISCE) 2019 in Ventura, USA, and symposiums as STAFF 2018 in Saint Petersburg. She has been invited as lecturer in the Giambiagi Winter School in the University of Buenos Aires, Argentina, and key public engagement events such as the Cheltenham Science Festival.

She has also participated in dissemination activities as panellist in a webinar or in an IMAX event at the London Science Museum with the movie *The Virtual Human* where part of her work was shown. She also has teaching experience at the Telecommunication Engineering Degree.



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Nombre: FERNANDEZ VILLAVERDE, ALEJANDRO
Referencia: RYC2019-027537-I
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Título:

System identification and analysis of biological models. Applications in bioprocess engineering and biomedicine

Resumen de la Memoria:

Predoctoral stage:

I graduated in Industrial Engineering from the University of Vigo, specializing in Control Engineering. I started my professional career in the industry, working as an engineer in several companies. After obtaining a FPI scholarship I returned to academia to pursue a PhD. I took doctorate courses in Systems and Control engineering at the UNED and Complutense universities, completed research stays at the MIT and the University of Groningen, and received a PhD (doctor europeus) from the University of Vigo in 2009.

Postdoctoral stage:

From 2009 to 2015 I worked as a postdoc at the Bioprocess Engineering Group (IIM-CSIC) in identification and optimization of biosystems. I completed two short stays at Stanford on these topics, which led to 6 publications, including a paper in PNAS. I developed several methods published in Q1 journals and implemented as software tools (MIDER, MEIGO, CeSS, BioPreDyn-bench) that have been intensively used in the biological modelling community. My results contributed to establishing a framework for reverse engineering in the biological sciences. I co-wrote a review on the topic (J Royal Soc Interface) that has more than 100 cites. Throughout this period I was hired by two large European projects of the FP6 and FP7 programmes, and took part in two Spanish DPI projects. I was also involved in teaching at the University of Vigo as a part-time adjunct professor (bachelor and master degrees).

Senior stage:

In 2015 I obtained an I2C grant from the Xunta de Galicia with the proposal Computational tools for improving predictions of dynamic models in systems biology. From 2015 to 2016 I worked as the principal investigator (PI) of this project at the universities of Minho and Oxford. The main outcome of the project, a new method implemented as the STRIKE-GOLDD toolbox, has been widely adopted by the systems biology and bioprocess engineering communities. In June 2016 I returned to CSIC with a Fuera de Convenio (FC2) contract, a position granted to senior researchers with proven international leadership. I currently work in the CanPathPro project (EU H2020), which develops a computational platform for cancer pathway modelling. I also collaborate with the University of Vigo in the supervision of BEng and MSc students.

Current research interests and mid-term scientific aims:

My research interests are in the development of general purpose computational methods, which can maximize the usefulness of dynamic models in biotechnological applications from biomedicine to food technology. A key goal is to clarify and exploit the relationships between the systemic properties of identifiability, observability, and controllability. The combination of those analyses with cutting-edge optimization techniques, including multi-objective strategies, can lead to advanced approaches for identification and control of biosystems and bioprocesses. I am also interested in applying these techniques for the optimal design of bioprocesses, with the goal of improving their overall productivity and quality. A particularly promising area of research is the study and exploitation of synergistic interactions between microbiome communities.

Resumen del Currículum Vitae:

- Electrical Engineer with a European Doctorate (cum laude) in Systems and Control Engineering, completed as an FPI fellow at the University of Vigo in 2009.
- More than ten years of postdoctoral research experience. Hired as a postdoctoral fellow in CSIC in 3 large European projects of the FP6, FP7, and H2020 programmes. Participated in a total of 14 research projects.
- Principal investigator (PI) of the project Computational tools for improving predictions of dynamic models in systems biology in 2015-2016, funded by the Xunta de Galicia.
- Currently a Fuera de Convenio (FC2) postdoctoral research associate at CSIC, a position granted to senior researchers with a record of international leadership.
- Industry experience as electrical engineer for several companies. Frequent collaborations with industrial companies in the context of research projects.
- Extensive international experience, gained through collaborations in European projects as well as from research stays at the universities of Oxford, Minho, Stanford, Groningen, and Massachusetts Institute of Technology (MIT), which resulted in 10 publications.



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- Author of 52 peer-reviewed papers, 31 of them in JCR-indexed journals and 21 in conference proceedings. First author of 20 of the 31 JCR papers, and corresponding author of 14. Most articles published in high impact journals: 19 papers in journals from the first quartile (Q1), 14 of which as first author (74%); 9 papers in journals from the first decile (D1), 7 of which as first author (78%).
- Citation metrics: cited 1156 times, with an i-10 index of 28 and H-index of 19, according to Google Scholar (Scopus: 669, 20, and 14, respectively; Web of Science: 593, 17, and 14). The citation trend exhibits a sustained increase, with overall citation counts doubling roughly every three years.
- Main developer of freely available research software tools: MIDER, PREMIER, STRIKEGOLDD, and the BioPreDyn-bench collection. All these resources have been widely adopted by the biological modelling community. The publication of the MIDER toolbox has been cited 84/57/50 times (Google Scholar/Scopus/WoS) in five years, and the original STRIKE-GOLDD paper has already reached 72/39/36 cites in three years. Also involved in the development of other software tools (MEIGO, VisId, and SELDOM) with comparable citation numbers.
- Academic Editor of two Q1 journals, PLOS One and Complexity. Lead guest editor of a special issue of the latter.
- Highly active in evaluation and refereeing activities: grant evaluator for 5 international calls from Poland, Luxembourg, Chile, and Romania; reviewer of more than 70 papers for 25 journals, including the leading ones in the field, as well as for 23 international conferences; served in 7 conference programme committees; 3 PhD thesis committees.
- Organisational experience: served in 2 organizing committees of international conferences; curator in the 8th international DREAM challenge.
- Speaker in 16 international conferences, in two of them as invited / plenary speaker.
- Teaching experience as university lecturer at undergraduate (B.Eng.) and graduate (M.Sc.) levels. Supervisor of B.Eng. and M.Eng. theses (trabajo fin de grado , TFG, trabajo fin de master , TFM). Lecturer at several specialized international courses.
- Positive evaluation (acreditado) by ANECA for contratado doctor professor positions.



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Turno de acceso general

Nombre: MARTINEZ FERRER, PEDRO JOSE

Referencia: RYC2019-027592-I

Área Temática: Producción industrial, ingeniería civil e ingenierías para la sociedad

Correo Electrónico: ipedrojm@gmail.com

Título:

Research, development and application of high-performance computing algorithms to engineering problems

Resumen de la Memoria:

My scientific trajectory encompasses several disciplines, from applied mathematics to mechanics, oil & gas, naval and aeronautical engineering as well as computer science. My main research line can be summarised as the research, development and application of high-performance computing algorithms to engineering problems and has been consolidated through several positions at different institutions across Europe, i.e. SINTEF Energi AS (Norway, 2010), Institut PPRIME (France, 2010-2013), Manchester Metropolitan University (United Kingdom, 2014-2016) and the Barcelona Supercomputing Centre (Spain, 2017-2019), which have yield a total of 17 peer-reviewed articles (16 of them Q1), 10 international conference proceedings and 10 seminars and invited talks via 9 competitive international and national research projects.

Among my most relevant achievements, it is important to note various remarkable scientific contributions to the study of compressibility effects in various engineering fields. Furthermore, I have developed two computational fluid dynamics software frameworks, namely CREAMS and wsiFoam, which today constitute excellent examples of technology and knowledge transfer. These tools are actively used today by several international research groups in the context of 4 EPSRC Computational Collaborative Projects (CCPs) worth over £1,365,000.

I have written several grant proposals including three la Caixa postdoctoral fellowships, a Concours de chercheurs du CNRS, a Marie Curie s individual fellowship and H2020 Research Innovation Action (RIA) calls, having been awarded the European Commission's Seal of Excellence. Moreover, I have been awarded several competitive grants for HPC resources in France (GENCI-IDRIS) and Spain (RES), being the team leader of the two most recent ones. I am also a project investigator (PI) of the Spanish MINECO project I-CHEST (117,867) and I have led the work package Applications of the H2020 European DEEP-EST Project (15,873,341), where I managed a team of six European multidisciplinary partners and prepared project reviews and deliverables for the European Commission.

Finally, I would like to emphasise that I have established several independent collaborations with national and international research groups (UC3M, UPM, BSC, UoM, Institut PPRIME) throughout my scientific career. My future research line will continue to expand around computer engineering and I am pretty confident that my accredited multidisciplinary experience, which today allows me to work on several lines of research in an independent manner and in collaboration with international research groups, will guarantee my success in leading future research projects.

Resumen del Currículum Vitae:

EDUCATION

2015 - 2017 Postgraduate Certificate in Academic Practice, MMU, United Kingdom
2010 - 2013 PhD in Energetics, Thermodynamics, Combustion, ENSMA, France
2009 - 2010 MRes in Research and Development in Mechanics, ENSMA, France
2008 - 2010 MSc in Aeronautical Engineering, ENSMA, France
2010 Master s Thesis Internship, NTNU, Norway
2004 - 2010 MSc in Aeronautical Engineering, UPM, Spain
2007 CVA Summer School for Junior Aerospace Engineers, HHN, Germany

WORK EXPERIENCE

04/2017 - 12/2019 Researcher in High Performance Computing, BSC, Spain
06/2017 - 12/2019 Visiting Research Fellow, MMU, United Kingdom
11/2015 - 03/2017 Athena SWAN Postdoctoral Representative, MMU, United Kingdom
09/2014 - 09/2016 Associate Lecturer in Mathematics, MMU, United Kingdom
11/2013 - 03/2017 Associate Researcher in Marine, Naval and Ocean Engineering, MMU, United Kingdom
11/2010 - 10/2013 PhD Researcher in Energetics, Thermodynamics, Combustion, Institut PPRIME, France
09/2012 - 08/2013 Associate lecturer in Thermodynamics, IUT, France
04/2010 - 09/2010 Junior engineer in Oil & Gas, SINTEF, Norway
06/2009 - 09/2009 Junior engineer in Aeronautics, ENSMA, France



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Turno de acceso general

PUBLICATIONS (SCOPUS STATISTICS)

h-index: 9

24 publications: 17 peer-reviewed articles (16 Q1)

194 citations by 146 documents

TEACHING EXPERIENCE

Lectures and tutorials in Numeracy, MMU, United Kingdom

Thermodynamics laboratory sessions, IUT, France

Mentor of first-year undergraduate students, UPM, Spain

Co-supervision of Sandra Macia's PhD thesis, BSC, Spain

Co-supervision of Rimsha Aziz's PhD thesis, UoM, United Kingdom

Co-supervision of Anthony Techer's PhD thesis, ENSMA, France

Co-supervision of Romain Buttay's PhD thesis, ENSMA, France

DISSEMINATION ACTIVITY

17 peer-reviewed journal articles

10 peer-reviewed international conference proceedings

9 seminars and 1 poster

Social media management and promotion of knowledge-transfer events between private companies and postgraduate students

TECHNOLOGY & KNOWLEDGE TRANSFER

CREAMS CFD code for supersonic turbulent combustion

wsifFoam CFD framework for multi-physics problems of naval and ocean engineering

CERTIFICATES

Academic Fellow, HEA, United Kingdom

Profesor Ayudante Doctor, ANECA, Spain

GALAXIE CNU-60 & 62, MESR, France

PROJECTS

RES FI-2019-1-0046, Spain (0.4M hours)

MINECO TRA2017-89139-C2-2-R, Spain (117 867)

RES FI-2017-3-0041, Spain (2M hours)

GENCI-IDRIS 2013-x20132a0912, France (3.2M hours)

Member of a RIA H2020-ICT-2018-2 project (14.0/15.0, not funded, in reserve list)

Marie Curie's H2020-MSCA-IF-2017 (88%, not funded)

Concours de chercheurs n° 10/03 du CNRS 2016, France (not funded, finalist)

ICT-754304 (15 873 341)

EP/M022382/1 (£483 159)

EP/N008847/1 (£446 013)

EP/K037889/1 (£323 344)

EP/J012866/1 (£436 113)

HONOURS & AWARDS

2017 European Commission Seal of Excellence

2010 Region Poitou-Charentes Erasmus scholarship (2750)

2009 UPM's mobility scholarship (1500)

2009 Universia scholarship (3000)

2008 Caja Madrid's scholarship (6000)

2008 Community of Madrid's scholarship in excellence (4500)



MINISTERIO
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MANAGEMENT & LEADERSHIP

Project investigator of a MINECO project
Project leader of two RES projects
Work package leader of a H2020 European project
Software repository leader of a collaborative EPSRC
Member of the Athena SWAN team for gender imbalance at MMU
Member of the Equality Commission at BSC



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Turno de acceso general

Nombre: ALVAREZ GONZALEZ, DANIEL
Referencia: RYC2019-028566-I
Área Temática: Producción industrial, ingeniería civil e ingenierías para la sociedad
Correo Electrónico: dalvgon@gmail.com

Título:

Implementación y validación de métodos automáticos de ayuda al diagnóstico de enfermedades respiratorias durante el sueño mediante la aplicación de técnicas de procesado de señales biomédicas y machine learning

Resumen de la Memoria:

Traectoria. Daniel Álvarez González, es Doctor Ingeniero de Telecomunicación por la Universidad de Valladolid desde 2011, obteniendo el Premio Extraordinario de Doctorado y el Premio a la Mejor Tesis Doctoral del Colegio Oficial de Ingenieros de Telecomunicación. Actualmente, desarrolla su actividad investigadora en el Hospital Universitario Río Hortega de Valladolid, tras disfrutar de un contrato post-doctoral Juan de la Cierva. Es investigador del CIBER de Bioingeniería, Biomateriales y Nanomedicina (CIBER-BBN), del Grupo de Ingeniería Biomédica (GIB) y de la Unidad de Investigación Consolidada 060 de Castilla y León.

Aportaciones científico-técnicas. Su línea de investigación principal (2005 Act.) se centra en la ayuda al diagnóstico del Síndrome de Apnea-Hipopnea del Sueño mediante el procesado automático de señales biomédicas y machine learning. Es autor de 43 artículos en revistas indexadas en el JCR, así como de 3 capítulos de libro, 64 comunicaciones en congresos internacionales y 94 en congresos nacionales. Respecto a la transferencia de resultados, destaca su participación en 9 contratos de I+D con entidades públicas y privadas, así como la obtención de 2 patentes en EE.UU. y 2 registros de la propiedad industrial en España. Fruto de esta intensa actividad científica ha obtenido un total de 33 premios y reconocimientos a la innovación y calidad de la investigación.

Movilidad e internacionalización. El Dr. Álvarez ha desarrollado un total de 2 estancias de investigación post-doctoral en sendos centros de referencia internacional: Charité Universitätsmedizin Berlin (Alemania), de perfil clínico, y University of Twente (Holanda), de perfil técnico. En total, es posible identificar la colaboración con 9 grupos internacionales con producción científica conjunta. El Dr. Álvarez es actualmente coordinador en el Hospital Universitario Río Hortega de Valladolid de 2 estudios multicéntricos internacionales y ha participado como investigador en 1 proyecto financiado por la Unión Europea. Además, las 2 patentes están siendo explotadas por la empresa SERENIUM INC. (USA). Es importante destacar su reconocimiento internacional mediante la realización de 2 ponencias internacionales invitadas (2019). Además, es revisor de proyectos de investigación de la Swiss National Science Foundation.

Liderazgo. Actualmente es Study Coordinator de 2 estudios internacionales multicéntricos (NOVELTY, ADVENT-HF) e Investigador Principal de 1 proyecto nacional de la Sociedad Española del Sueño. Ha dirigido 3 Tesis doctorales, 2 Proyectos Fin de Carrera y 2 Trabajos Fin de Grado, tanto de perfil técnico como clínico. El Dr. Álvarez ha financiado su actividad investigadora mediante la obtención de 16 becas y ayudas públicas en concurrencia competitiva, entre las que destaca el contrato post-doctoral Juan de la Cierva. Ha participado como conferenciante plenario invitado en un total de 6 conferencias (2 internacionales), todas ellas en los últimos 3 años, lo que muestra la madurez de su investigación y consolidación dentro de la comunidad científica. En el campo de la gestión de la investigación, ha participado como investigador independiente en 14 comités científicos internacionales, es revisor de 15 revistas indexadas en el JCR y revisor de proyectos de la Sociedad Española de Neumología y Cirugía Torácica y de la Swiss National Science Foundation.

Resumen del Currículum Vitae:

Daniel Álvarez González, es Doctor Ingeniero de Telecomunicación por la Universidad de Valladolid (UVA) desde 2011, obteniendo el Premio Extraordinario de Doctorado y el Premio a la Mejor Tesis Doctoral del Colegio Oficial de Ingenieros de Telecomunicación (COIT). Actualmente, es investigador en el Servicio de Neumología del Hospital Universitario Río Hortega de Valladolid, donde recientemente ha finalizado un contrato post-doctoral Juan de la Cierva. Es investigador del CIBER de Bioingeniería, Biomateriales y Nanomedicina (2019), de la Unidad Multidisciplinar de Sueño de Alta Complejidad del Hospital Universitario Río Hortega (2019), de la Unidad de Investigación Consolidada UIC-060 de Castilla y León (2018) y miembro del Grupo de Ingeniería Biomédica (GIB) desde su fundación (2004). Ha financiado su investigación mediante 16 becas y ayudas públicas competitivas.

Inició la línea de investigación de ayuda al diagnóstico del Síndrome de Apnea-Hipopnea del Sueño en 2005, centrada en el procesado de registros biomédicos. En esta línea es autor de 43 artículos en revistas indexadas en el JCR, 3 capítulos de libro, 64 comunicaciones en congresos internacionales y 94 en congresos nacionales. Es significativa la obtención de 33 premios y reconocimientos a la innovación y calidad de la investigación. Ha participado de manera continuada en diferentes proyectos de investigación competitivos. Concretamente, es investigador principal (IP) en un proyecto financiado en 2019 por la Sociedad Española del Sueño, así como Study Coordinator en el Hospital Universitario Río Hortega de 2 estudios multicéntricos internacionales (NOVELTY, ADVENT-HF). Además, ha sido investigador colaborador en 1 proyecto europeo, 20 proyectos nacionales y en 26 proyectos de ámbito autonómico.

Respecto a la transferencia de resultados, es significativa la participación en 9 contratos de I+D+i con empresas y administraciones públicas, así como la obtención de 2 patentes en EE.UU. y 2 registros de la propiedad industrial en España.

Respecto a la proyección internacional, destaca la estrecha colaboración con el Prof. Thomas Penzel (Charité Universitätsmedizin Berlín). Prueba de ello es la estancia de investigación post-doctoral realizada en 2011. Mantiene una productiva línea de investigación con el Dr. David Gozal (University of Missouri School of Medicine) y con el Biomedical Signals and Systems (BSS) group (University of Twente,



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Holanda), donde realizó una estancia de investigación en 2017. Ha realizado 13 ponencias invitadas (3 internacionales). En el campo de la gestión de la investigación, ha dirigido 3 Tesis Doctorales, así como 2 Proyectos Fin de Carrera y 2 Trabajos Fin de Grado en la UVa. Ha participado en 14 Comités Científicos internacionales, es revisor de 12 revistas indexadas en el JCR y pertenece a 5 sociedades científicas y colegios profesionales.

Respecto a la realización de tareas docentes, el Dr. Álvarez es profesor del Máster en Big Data Science de la UVa desde el curso 2016/17, donde también impartió docencia durante la realización de su Tesis Doctoral (2008/09-2011/12), así como profesor del Máster de Big Data de la UNED desde 2019. Además, ha participado como investigador colaborador en un total de 11 Proyectos de Innovación Docente. Obtuvo la acreditación positiva en las figuras de Profesor Contratado Doctor y Profesor de Universidad Privada en 2012.