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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Biociencias y biotecnología
Nombre: FLORI, SERENA
Referencia: RYC2025-054620-I
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Título: ChloroMorPHEAT - chloroplast morphological and physiological dynamics under heat stress
Resumen de la Memoria:

Almost a quarter of the world's carbon is fixed in the ocean by diatoms. They form the basis of the marine food web and collectively, drive global biogeochemical cycles, influence planet's climate and contribute to the marine ecosystem health. Their survival is threatened not only by climate change but by rapid and extreme events of temperature rise in the oceans (marine heatwaves). Understanding how do these microscopic organisms will respond and how do they safeguard their capacity to survive, are questions that we have the urge to answer.

The ChloroMorPHEAT project will address the structural bases of thermal acclimation in non-model diatoms, answering to the main question: is there a link between thermal stress, photoprotection and ultrastructural plastid modification? Over the past decade, my work addressed fundamental questions through the application of the structural physiology approach. In-vivo physiological assessments will be coupled with imaging and structural 360° investigation, to gain information from protein complexes localization to cellular ultrastructural information. Bridging environmental clue with structural physiology approach I will investigate thermal stress from laboratory simulation up to natural scenario. My research will be mainly focused in the non-model, yet ecologically relevant diatom *Chaetoceros neogracilis* and translated into natural diatoms community. In particular, at a first step, I will elucidate how diatoms cope with increasing temperatures in the lab and if the chloroplast morphodynamic will follow those changes (AIM 1). Afterwards, by generating a comprehensive plastid protein atlas using the Cryo-ExM, I will identify the molecular key players underlying thermal stress responses (AIM 2). In a more long-term goal, my research line will focus on the transfer of the workflow developed in the lab to natural populations and in the field, thereby enabling the assessment of cell-to-cell variability within ecological contexts. In the specific, comparative functional/structural analysis across diverse genetic backgrounds will yield valuable insights. I therefore propose to investigate thermal stress responses in atypical species selected for their peculiar plastid numbers/position and species found in extreme environments (AIM 3).

Resumen del Currículum Vitae:

I am a marine scientist with solid experience in microalgae physiology and microscopy. My research integrates a multidisciplinary approach, with a central focus on chloroplast function and organization. Throughout my research career, I gained a better understanding on how this chimeric and fascinating organelle:

- Regulate and fine-tune photosynthetic performance
- Play a role for sensing the environmental cues
- Shape its architecture and dynamically adapt in response to environmental stress

Along my scientific career, I gained experience, independence and leadership in elucidating photoprotective mechanisms in microalgae. This intriguing phenomenon requires a variety of overlapping regulatory mechanisms that controls energy, electron, proton transport and induce changes in the molecular and structural features of the photosynthetic apparatus. I therefore started a journey into the fascinating world of microscopy to visualize and quantify those changes, becoming an expert in a number of different techniques like optical, fluorescence and electron microscopy, including the new innovative cryo-expansion microscopy.

Throughout my scientific journey, I have generated and fostered a broad network of international collaborations. These key interdisciplinary collaborations have resulted in high-impact publications in top international journals such as *Cell*, *Nature*, *Nature Communications* and *Current Biology*. I have authored over 13 peer-reviewed articles and 3 book chapters (53.8% in Q1) cited > 1500 times, currently gathering an h-index of 13 (source: google scholar). In 7 out of 16 of these articles I sign as first author, reflecting my leadership in directly participating and/or coordinating international projects. I indeed cultivate a collaborative, open-minded leadership style grounded in lifelong learning and curiosity.

Taking into account my scientific background, my experience in photophysiology, biophysics, biochemistry, imaging and structural techniques combined with my long-term interest in how microalgae protect from environmental stress, I believe I am an excellent candidate to lead my independent line of research.



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Área Temática: Biociencias y biotecnología
Nombre: SOLDADO MAGRANER, JOANA
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Título: Uncovering the computational foundations of higher-order cognition to advance medical neurotechnologies and AI systems

Resumen de la Memoria:

I am a researcher in the fields of computational neuroscience, neuroengineering and artificial intelligence (AI). My work aims at understanding how high-order cortical areas such as the prefrontal cortex (PFC) perform advanced cognitive computations. My goal is to leverage this knowledge to develop neurotechnologies for treating brain disorders and to design the next generation of generalised AI systems.

I hold a Diploma in Theoretical Physics from the University of Valencia and RWTH-Aachen in Germany, and a Msc in Neural Systems and Computation from ETH-Zurich. During my master's, I joined Prof. Fritjof Helmchen lab, at the Brain Research Institute in Zurich. My work focused on developing two-photon microscopy data analysis methods to study selective routing of sensory information across brain areas in mice during decision-making. This project resulted in a high-impact publication in the journal Nature (as third author). I obtained a PhD in Theoretical Neuroscience and Machine Learning from the Gatsby Computational Neuroscience Unit at University College London, supervised by Prof. Maneesh Sahani. My PhD work resulted in two publications. The first publication (as first and corresponding author, Science Advances), co-supervised by Prof. Valerio Mante at ETH Zurich, aimed to understand context-dependent decision-making computations in PFC and uncovered previously unknown circuit mechanisms underlying flexible sensorimotor transformations. The second publication (as second author, under review at PNAS), stemming from a collaboration with Stanford University and co-supervised by Prof. Krishna Shenoy, involved statistical analyses of widespread model selection procedures in neuroscience, demonstrating their pitfalls and raising awareness of these issues within the neuroscience community. I am currently a postdoctoral researcher at Carnegie Mellon University with Prof. Byron Yu and Prof. Matthew Smith, where I have established my line of independent research. I combine experiments in non-human-primates with theory to study PFC dynamics and computation using brain stimulation techniques and statistical modeling. I am also developing novel neurotechnologies for real-time neuromodulation. This work has resulted in four publications in the Journal of Neuroscience (as first and corresponding author), Trends in Cognitive Science (as first co-author) and Neurips (as second author) as well as a U.S. patent (as second author).

Throughout my career, I have contributed to ten scientific articles, including four as first author, in the fields of computational neuroscience, machine learning, neuroengineering, and neuroethics, collaborating with twelve institutions worldwide. I have presented my work at over ten conferences, often as an invited speaker, and organised workshops with academia and industry. I have supervised the research of five students, lectured regularly in graduate courses, reviewed for major journals and conferences, and engaged in outreach and open-science teaching through the TRoND-CaMinA initiative, which I co-direct.

Resumen del Currículum Vitae:

I am a researcher with a strong and sustained international trajectory. Throughout my academic career, I have trained at five prestigious institutions: RWTH Aachen, ETH Zurich, the Gatsby Computational Neuroscience Unit (UCL), Stanford University, and Carnegie Mellon University (CMU). I have built an extensive global network of collaborators and participated in congresses, workshops, and teaching initiatives across the world. I have led successful research projects supported by highly competitive grants and fellowships (including NIH and Simons Foundation awards to my advisors, and a Gatsby Foundation fellowship to myself), in collaboration with internationally recognized researchers. I have also secured competitive funding from both academia and industry to organize international workshops (Neurotech Consortium) and to lead training initiatives in Africa (TRoND-CaMinA), with partners such as the Allen Institute, the Simons Foundation, Google DeepMind, and Meta.

My work, recognized for its novelty and impact, has been published in leading scientific journals (e.g., Science Advances, Journal of Neuroscience, Trends in Cognitive Sciences, Journal of Neural Engineering) and presented at highly selective conferences (COSYNE, Neurips). I have been invited to speak at numerous workshops and lecture series (Oxford Neurotheory Forum, Cosyne, CapoCaccia, Janelia-HHMI Computation and Theory Lecture Series, BARCCSYN, Bernstein, NCCD, SfN). I have also organized three international workshops (at Cosyne and CapoCaccia).

I regularly review for top journals (Cell, Nature Neuroscience, Neuron) and major conferences (Cosyne, NeurIPS). I have taught at four graduate-level courses at CMU and the University of Pittsburgh (Neural Signal Processing, Introduction to Neural Engineering, Biosignal Acquisition and Analysis and Explanation in Cognitive Science and Neuroscience) and co-direct the TRoND-CaMinA training program, where I design curricula, coordinate instructors, and teach mathematical and computational methods. I have supervised five students at different academic stages and mentored them throughout their careers. In parallel, I have been deeply involved in outreach and education, leading initiatives to promote accessible, equitable, and open science in Africa. As a member of the IEEE Brain Neuroethics Committee, I have contributed to international efforts to support the responsible and ethically aligned development of neurotechnologies. I intend to continue collaborating with my extensive international network throughout my career.

In my future research as a Cajal Fellow, I aim to develop models that explain the complex dynamics of interactions across brain areas and to link these to computation in both health and disease. My long-term goal is to leverage this understanding to create novel neurotechnologies for treating neurological conditions and to inspire the next generation of generalized AI systems. I plan to expand my translational and industrial collaborations, pursue high-impact scientific work, and remain deeply engaged with ethical and open-science initiatives. I am confident that my leadership, interdisciplinary expertise, and strong international background will enable me to excel as an independent Cajal Fellow.



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Área Temática: Biociencias y biotecnología
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Título: Integrating physiology and remote sensing to better understand plant stress and mortality risk across spatial scales

Resumen de la Memoria:

The repeated episodes of mortality that I saw growing up in the forests of my hometown left a profound mark on me that made me decide to dedicate my life to understanding why trees die due to climate change. Since then, my goal has been to understand the fundamental biological processes behind tree mortality so that I could develop ways to monitor and predict where and when trees will die in the future. During my Masters, I integrated community ecology and species distribution models to study whether species experiencing the largest changes in climatic conditions during droughts were the most impacted ones. During that research I realized that not all species respond the same under similar conditions, which awoke my interest in pursuing a PhD in plant ecophysiology. However, pursuing a PhD in Spain was difficult at that time due to the ongoing economic crisis. I was also aware of the importance of broadening my research horizons by exposing myself to other research cultures abroad. Thus, I decided to pursue my PhD in the United States. During my PhD I became interested in plant water content upon finding that plant water content integrates the two main mechanisms causing plant death: loss of hydraulic function and limited carbohydrates to osmoregulate, retain water, and fuel metabolism. Thus, explaining the ability of plant water content to predict mortality risk. These findings brought a fresh point of view and much needed consensus in the long-standing debate of what mechanisms kill plants under drought through a new mortality framework in which my work had an important role. During my PhD, I also demonstrated that fungal networks formed by mutualistic partners among trees can spread carbon deficit and vulnerability to drought among hosts by excessively taking tree carbohydrates needed to osmoregulate. This study led to an R&D project to study these effects in natural conditions in which I was Co-PI. During my postdocs at UMN and UF (United States), I broadened my research and incorporated remote sensing tools to study plant water content and plant-pathogen interactions from leaf to landscape scales and developed what is now called spectral ecophysiology. This approach combines ecophysiology and spectral sensing to gain further mechanistic insights where classic ecophysiology alone is too limited. Currently, I am pursuing two projects based on spectral ecophysiology aimed at predicting plant ecophysiological status from remotely sensed spectral reflectance at scales that go from tissue to landscape. My aim is develop a new way to measure ecophysiology that allows me to map ecophysiology across spectral images so that I can study spatial ecophysiology and better understand the mechanisms that determine tree mortality and that arise from interactions across space.

Resumen del Currículum Vitae:

I am a plant ecophysiologicalist and my research addresses two main questions: how do plants -and their mutualistic partners- respond to stresses associated with climate change (e.g., drought and pathogens)? And how do such interactions and stresses scale from the individual to the landscape levels? To address these general questions, I combine ecophysiological and remote sensing approaches. I have authored 17 papers in ISI-indexed journals and 2 book chapters. I have an h-index of 13, 1015 citations, and a median 92nd citation percentile (WoS). In GS, I have an h-index of 13 and 1401 citations. I received \$27,250 through a total of 24 awards during my PhD. It is worth noting that I secured these amounts despite being an international researcher, which made me ineligible for many federal grants and awards in the United States. Among these awards are included the "Ecological Society of America Billings Award for best graduate student talk", the "IoE Award for outstanding work towards the Institute on Ecosystems mission", the "Mountain Climate Conference Exceptional Early Career Invited Speaker Award", the "Plant, Cell & Environment Outstanding Student Paper Award", and several outreach awards. Since the completion of my PhD in December 2018, I raised \$1,395,804 as a principal investigator (PI/Co-PI) and another 2,361,111 in the form of submitted grants are pending evaluation. Although postdoctoral fellows are not allowed to officially supervise in the United States, I mentored 41 students including 2 high school students, 24 undergraduate students, 10 graduate students, and 3 postdocs. These students came from diverse socio-economic and ethnic backgrounds both in the US and Spain. Since 2014, I have taught over 840 hours of BSc courses (University of Montana (UMT)). I have also evaluated a PhD thesis. I have organized and chaired international conferences such as the Gordon Research Seminar, to which I was invited as a keynote speaker during the previous edition. I have been an invited speaker at conferences and both online and in-person seminars at foreign institutions. As a recognized expert in my field, I am reviewer for 13 ISI journals including Global Change Biology and I am editor of the Tree Physiology journal. I have evaluated R&D projects for international agencies (Deutsche Forschungsgemeinschaft, Minnesota Invasive Terrestrial Plants and Pests Center). I am a Junior PI ERC Recruitment Program within the Severo Ochoa Program fellow at CREAM, where I am the principal investigator listed in 2 submitted R&D projects within the "La Caixa Junior Leader Incoming" and "ERC Consolidator Grant" funding schemes, and Co-PI of 2 projects from my previous institution. In these projects, I am conducting research on the responses of plants to climate change at a range of spatiotemporal scales and using approaches such as ecophysiological measurements, hyperspectral remote sensing, and spatial analyses to predict when and where plants will die from stress. I have also participated in transfer of knowledge activities by engineering a non-invasive plant water content sensor.



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Área Temática: Biociencias y biotecnología
Nombre: VERA GÓMEZ, ANDRÉS MANUEL
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Título: Towards a molecular understanding of DNA repair
Resumen de la Memoria:

My research focuses on understanding biological processes at the molecular scale using single-molecule biophysics. Throughout my career, I have consistently developed original research directions spanning method development, structural biology, and biotechnology. During my PhD, I independently conceived a novel AFM-SMFS approach for measuring protein-protein interactions. Published as corresponding author in *Angewandte Chemie*, this exemplifies early independence. I contributed to standardized smFRET protocols for reliable distance determination, a reference work with over 500 citations. Recently, I was involved in developing GETvNA, a new graphene-based single-molecule technique to study DNA and DNA-protein dynamics, published in *Nature Methods*. I played a pivotal role by directing the method toward dynamic structural biology applications, the paper's main contribution. This work shaped my vision for the research I now propose. In structural biology, I led an international multidisciplinary collaboration to study cellulosome structure. As sole corresponding author in *Structure*, I proposed that proline isomerases regulate cellulosome structural dynamics, a new mechanistic hypothesis explaining how these complexes achieve the structural plasticity critical for their efficiency. I also ventured beyond my core single-molecule expertise into biotechnology. Recognizing an opportunity from my Marie Curie project, I developed light-activated DNA-processing enzymes, published as corresponding author in *Nucleic Acids Research* and leading to a patent application.

My internationalization at LMU Munich has been transformative. With a Marie Skłodowska-Curie Fellowship, I joined one of the world's leading groups in single-molecule fluorescence and DNA nanotechnology and acquired cutting-edge expertise in these techniques. As Postdoc, I brought substantial value by establishing two independent research directions in cellulosome structure and biotechnology. Currently, as Junior Group Leader, I lead a research team of three PhD students working on DNA repair and enzyme engineering. I have secured seed funding from CeNS and over 240k € from a highly competitive DFG call as PI, where I proposed the innovative idea of mechanical regulation of DNA repair. Beyond my core research, I have built an international (Spain, Poland, Switzerland) network of collaborations spanning nanomechanics, theoretical approaches, and neurodegeneration.

With this track record, I am eager to return to Spain to establish an independent research program, bringing expertise that enables my proposed research. DNA repair prevents genome instability and disease, with implications for cancer and aging. Yet how repair proteins efficiently detect rare small lesions among billions of normal bases remains unsolved. To address this question, I will develop FRET-GETvNA, a new technique that integrates smFRET with GETvNA, enabling high-throughput structural characterization and real-time tracking of dynamics. I hypothesize that DNA lesions generate heterogeneous conformations that sensor proteins exploit for efficient detection, providing a unifying framework for DNA repair. I am excited to bring these cutting-edge techniques to strengthen the Spanish structural biology community, generating synergies within the biophysics ecosystem and training the next generation of researchers.

Resumen del Currículum Vitae:

My research integrates single-molecule biophysics with structural biology to reveal dynamic mechanisms of biomolecular machines, developing new methodologies when needed. This approach enables studying structural heterogeneity and dynamics invisible to traditional methods.

I have always been fascinated by understanding the physical principles that govern biological processes. After finishing my Bachelor studies in Biology, I transitioned into biophysics for my PhD in the Protein Nanomechanics lab at the Cajal Institute (Madrid). There, I developed a novel approach to measure protein-protein interactions using AFM-based single-molecule force spectroscopy, addressing the critical challenge of signal identification in the often noisy single-molecule data. This approach has been adapted to magnetic tweezers and is frequently cited in AFM-SMFS reviews. This work led to a collaboration with Luigs & Neumann GmbH to improve their AFM analysis software. I contributed to proposing the mechanical design of cellulosomes, a hypothesis that influenced Prof. Hermann Gaub, a founder of AFM-SMFS, and shaped his subsequent research. I also studied the mechanical properties of adhesion, mechanotransduction, and neurotoxic proteins.

For my postdoc, I obtained a Marie Curie IF to strategically expand into single-molecule fluorescence and DNA nanotechnology. I joined Prof. Philip Tinnefeld's lab at LMU Munich, progressing to Junior Group Leader. During this fellowship, I created a research dissemination website. I contributed to two high-impact works: a multi-laboratory study establishing standardized smFRET protocols, and the development of GETvNA, a graphene-based method to study dynamic DNA and protein-DNA conformations.

As Junior Group Leader, I have developed several original research lines demonstrating my ability to tackle diverse scientific challenges. In structural biology, I led a multidisciplinary study on cellulosome structure. Beyond my core training, I developed a general approach to create light-activated DNA processing enzymes, a key advantage over Hot-start PCR methods. This innovation led to a patent application and attracted interest from biotech companies. My research has resulted in 17 publications, 4 as corresponding author, in journals including *Angewandte Chemie*, *Nucleic Acids Research*, *Nature Methods*, *PNAS*, *Nature Communications*, and *Structure*.

I have built and currently supervise a research team of 3 PhD students working on DNA repair and enzyme engineering. I have also supervised 2 master theses and 8 research internships. I have built an international network of collaborations spanning nanomechanics (Prof. Michael Nash, Basel), molecular dynamics simulations (Prof. Bartosz Rozyczki, Warsaw), structural biology (Dr. Douglas Laurents, Madrid), and neurodegenerative diseases (Dr. Javier Oroz, Madrid).

I have consistently secured competitive funding throughout my career: two undergraduate research fellowships, a doctoral fellowship from the Ramón Areces Foundation, a Marie Curie IF, and as group leader, independent funding from the Center of NanoScience and the Deutsche Forschungsgemeinschaft for DNA repair research.

I am excited to return to Spain and establish my fully independent research group, bringing single-molecule fluorescence expertise currently limited in Spain to strengthen the structural biology community.



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Área Temática: Biociencias y biotecnología
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Título: Bridging membrane biophysics and evolutionary biology to uncover the fundamental principles of membrane remodeling

Resumen de la Memoria:

My scientific career has focused on uncovering the physicochemical and molecular principles that govern membrane remodeling, a fundamental process underlying intracellular trafficking, organelle homeostasis, and cell division. Trained as a biophysicist, I integrate quantitative approaches, including in vitro reconstitution, advanced microscopy, force spectroscopy, and structural biology, with cell biology and, more recently, molecular evolution.

During my PhD at the Biofisika Institute (UPV/EHU), I discovered a dynamic constriction-driven mechanism that enables the endoplasmic reticulum (ER) to undergo active fission to maintain its morphological balance. This first-author work combined cellular, animal, and in vitro models with mathematical modelling, providing a new framework for understanding homeostasis of internal membranes, particularly at the ER.

As a postdoctoral researcher in Aurélien Roux's laboratory (University of Geneva), I expanded my expertise to the evolution of membrane-remodeling systems. In collaboration with Buzz Baum's group, I characterized ESCRT-III proteins from Asgard archaea, the closest living relatives of eukaryotes, showing that the basic principles of membrane remodeling predate eukaryogenesis. Building on this work, I uncovered a minimal amphipathic motif in the ESCRT-III subunit of Heimdallarchaeota, the Hofund motif, sufficient to induce membrane fission. These discoveries provide a new exciting experimental framework for understanding how complex molecular architectures emerge through the interplay of adaptive specialization and neutral evolution.

Building on these findings, my future research program aims to uncover the origins of the endomembrane system by reconstructing primordial remodeling machineries and defining how their biophysical properties enabled early compartmentalization prior to eukaryogenesis. I will integrate molecular evolution with membrane biophysics, structural and synthetic biology to: (1) build an evolutionary atlas of membrane-remodeling proteins and lipid pathways, (2) determine the mechanical properties of Asgard membranes, and (3) reconstitute ancient vesicular and non-vesicular trafficking systems. This interdisciplinary approach will establish the first mechanistic framework for how early membranes diversified and acquired dynamic function, while creating a quantitative, evolution-oriented research environment for training the next generation of scientists.

Resumen del Currículum Vitae:

My scientific career centres on understanding the physicochemical and molecular principles that govern membrane dynamics, integrating in vitro reconstitution, advanced microscopy, structural biology, and evolutionary approaches. During my PhD at the Biofisika Institute (UPV/EHU), I uncovered a dynamic constriction-driven mechanism that enables the endoplasmic reticulum to undergo active fission, providing a new conceptual framework for organelle homeostasis. This first-author work combined cellular, organismal, and biophysical assays with mathematical modelling. Since 2021, as a postdoctoral researcher and later EMBO Long-Term Fellow in Aurélien Roux's laboratory (University of Geneva), I have focused on the evolution of membrane-remodelling systems.

I have contributed to 11 peer-reviewed publications in leading journals including Nature, Nature Communications, Nature Structural & Molecular Biology, Science Advances, and PNAS. I have presented my research at major international conferences (EMBO, Biophysical Society, EBSA) and established collaborations with world-class groups, including those led by Pietro De Camilli, Robbie Loewith, Harry Low, Buzz Baum, and Marko Kaksonen.

My training includes international research stays at Utrecht University (EMBO Short-Term Fellowship) to learn cryo-electron tomography, and UT Southwestern Medical Center (Dallas, USA) to acquire advanced cell biology techniques. These experiences expanded my technical repertoire and reinforced my international network.

I currently supervise one PhD student and one Master student, and I have participated actively in university teaching at the Universities of Geneva and the Basque Country. My outreach and community engagement activities include coordinating science-education events (Madrid Science Week, Geneva Night of Science) and organizing scientific seminars and symposia as part of the University of Geneva Postdoc Association.

In addition to competitive fellowships (EMBO Long- Short-Term Fellowship), I have contributed to projects funded by the ERC Synergy grant R2-TENSION, regional Basque funding, and national Spanish grants from Ministerio de Economía y Competitividad. I have also collaborated with industry partners (PicoQuant) on development and testing of FLIM microscopy technologies.

Overall, my trajectory demonstrates a consistent commitment to innovation, interdisciplinarity, international collaboration, and scientific leadership. I aim to build an independent research program that addresses fundamental questions on the evolution and mechanobiology of cellular membranes.



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Área Temática: Biociencias y biotecnología
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Título: Study of mRNA processing, export and cytoplasmic regulation through an Integrative Structural Biology approach.

Resumen de la Memoria:

I have dedicated my career to the study of the structure, dynamics, and interactions of several biomacromolecules relevant for a variety of cellular functions. Initially trained in Nuclear Magnetic Resonance Spectroscopy (NMR), I soon developed a wider view for approaching different projects by the combination of several structural biology techniques with biochemical and cellular experiments to fully complement the results and to gain a deeper understanding of the different biological systems: integrative structural biology. This approach focuses on utilizing and combining the most suitable techniques for the study of each project; as a consequence, it expanded my knowledge not only in the NMR field but in other structural biology techniques (such as X-ray crystallography, small-angle scattering techniques, and recently cryogenic electron microscopy), together with biophysical tools for structural and interaction characterization.

RNA biology has always been my main interest, from RNA transcription to cytoplasmic regulation of messenger RNAs (mRNA); I find the cellular life of this versatile macromolecule fascinating. Its essential role in the transmission of genetic information in the cell (Central Dogma in Molecular Biology: DNA - RNA - proteins) and the capacity the molecule has to perform catalytic reactions and direct regulation mechanisms at different levels make this topic really interesting per se. However, RNA biology is also at the center of a variety of diseases, making research in this field not only intriguing and exciting but also displaying huge potential applicability to contribute to society and human well-being.

I started my career by performing basic research on the study of RNA binding proteins controlling the mRNA export to the cytoplasm and its translation regulation in yeast. Then, I moved to the study of RNA transcription regulation in bacteria. In addition to the research in the RNA field, I have worked on other topics outside my comfort zone, contributing to understanding the role of the human co-chaperone SGTA in controlling protein homeostasis. Recently, I have focused my research on the study of human splicing regulation. mRNA splicing is a fine-tuned and well-controlled process in the cell, in which only small portions of the sequence are linked together to form the correct template for protein translation. In higher eukaryotes, it has developed into a vast regulatory process that enhances protein variability through alternative splicing. My main focus in this field consists of understanding the molecular determinants that direct the regulation of alternative splicing.

Up to now, I have contributed to several works related to the study of essential alternative splicing regulators. For my future steps, the main focus of my line of research is the study of the molecular determinants that direct the different splicing programs. This involves understanding how the splicing events are selected and the way in which these alternative splicing factors modulate the function of the spliceosome. The identification and analysis of structural and regulatory features in alternative splicing have been deemed essential for the design and development of therapies in cases where the regulation fails, leading to the appearance of severe diseases.

Resumen del Currículum Vitae:

I initiated my career in research while finishing my studies, when I was granted a Junior Research Collaborative Fellowship from Spanish Science Ministry to work in the antibiotic-resistance surveillance group from Prof. Torres (University of La Rioja), which yielded my contribution to 3 scientific publications.

After my degree in chemistry at the University of La Rioja with the best transcript (2008), I moved to "Rocasolano" Physical Chemistry Institute (CSIC) in Madrid to conduct my Ph.D. studies. I was awarded a Research Assistant Contract fellowship from Community of Madrid to cover my contract for 4 years. The project consisted of the analysis of the structural determinants of ribonucleoprotein particle formation in yeasts by NMR and other biophysical techniques, which was the basis for my doctoral thesis supervised by Dr. Pérez-Cañadillas. In 2009, I obtained my advanced studies Diploma (similar to Master) in "Protein Structure and Function" from the University of Zaragoza. During my doctoral studies, I did two short stays at the Institute of Genomic, Biochemistry, and Molecular Biology (IGBMC) in Strasbourg, under the supervision of Prof. Séraphin, where I learned molecular biology experiments in yeast that complemented my structural results. These were funded by FEBS and the Instruct platform, and I was awarded the best short-stay prize from FEBS. I defended my thesis in 2013 and got my Ph.D. in biophysics from the Autonomous University of Madrid. During my doctoral studies, my contribution to the projects yielded 6 scientific publications (1 first and 2 co-first authorships).

Once completed my Ph.D., I started a research associate position at King's College London University in the Chemistry Department under the supervision of Prof. Isaacson. During the four years, I became an integral part of the group, for the project I was leading, and also for student support. I contributed to the publication of several works in the fields of protein homeostasis and RNA transcription regulation using the integrative structural biology approach (8 scientific papers, including 1 first authorship and 2 co-first authorships; and 1 review).

In 2017, I was awarded a Marie Skłodowska-Curie Individual Fellowship (H2020) to be performed at the Bavarian NMR Center in Munich within Prof. Sattler's group. Since then, I have contributed to several works focused on understanding the molecular mechanism directing alternative splicing regulation (4 scientific papers, 1 bibliographic review, and 1 book chapter). Currently, I am participating in an ERC Synergy grant, coordinating the work in Prof. Sattler's group. Moreover, I have also started a subgroup with two Ph.D. students focusing on the field of splicing regulation in early stages of spliceosomal assembly. In this context, I have published my first co-corresponding author paper, and I am currently applying for my own funding as principal investigator to the DFG and as part of a MSCA Doctoral Network application.

Throughout my international career, I have developed strong skills in project design and grant writing that prove my independence and capacity to fund my ideas. I have also demonstrated my leadership by successfully supervising students, lately, managing a small group of students in my independent research line. All this experience puts me in an ideal situation to start my own research group.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Biomedicina
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Título: Metabolic regulation of responses to T-cell therapies in cancer
Resumen de la Memoria:

I am a research fellow at Amsterdam UMC specialized in tumor immunometabolism. During my PhD, I described how genes involved in glycolysis are controlled by signalling cascades and transcription factors in tumor cells (4 original research articles as first-author, 2015-2020). This equipped me with robust knowledge on biochemistry and metabolic regulation, which I further applied to my postdoctoral stage. A crucial technique throughout my career is ¹³C fuel labelling, which I use to identify the fate of nutrients in cells and their metabolic dependencies. I setup a collaboration to learn this technique during my PhD. In 2021, I was recruited by Prof. Arnon Kater and Prof. Eric Eldering at Amsterdam UMC with a double aim: to identify and target the metabolic vulnerabilities of malignant B cells in chronic lymphocytic leukemia (CLL), and to study whether metabolic alterations are at the basis of tumor-induced T-cell dysfunction in this disease. By applying the knowledge and know-how acquired during my PhD and setting up new techniques such as extracellular flux analysis, I was able to show that glutamine is a targetable vulnerability in malignant CLL cells, especially in patients resistant to targeted therapies (Chen, Simon-Molas, Blood 2022; Montironi, iScience 2024, senior and corresponding author; and manuscript in preparation). On the T-cell side of the disease, I have led several projects and 3 PhD students, altogether showing that altered cholesterol homeostasis and intrinsic mitochondrial defects are at the basis of T-cell dysfunction in CLL (Gamal, Goedhart and Simon-Molas, Blood adv 2024, shared first author; Jacobs, Cell Molec Immunol 2025, senior and corresponding author). This is relevant from a translational point of view, as low responses to T cell-based therapies (chimeric antigen-receptor T cells (CAR-T), bispecific antibodies) in this disease are attributed to T-cell dysfunction. ¹³C fuelling studies I performed on healthy T cells have revealed the metabolic dependencies of effector T cells upon T-cell receptor/CD28 stimulation. However, the metabolic dependencies allowing for anti-tumor action of CAR-T cells or T cells upon bispecific antibodies are not known. Therefore, the research line I initiated aims at generating robust, fundamental knowledge on T-cell dependencies in the context of immunotherapy. In 2023 and 2024 I obtained two grants to fund the start of my career as independent researcher (Research grant by Cancer Center Amsterdam and Junior Research Grant by the European Hematology Association) and I have been nominated principal investigator at Amsterdam UMC in the call 2025. Given my unique expertise in tumor metabolism and immunometabolism, I will integrate these two disciplines to identify the role of metabolism in determining response to CAR-T and bispecific antibodies in specific tumors, and propose strategies to overcome it. Given the promising raise of immunotherapy options for cancer treatment, it is urgent to understand the metabolic variables leading to response or failure of these therapies.

Resumen del Currículum Vitae:

I obtained my Degree on Biomedical Sciences in 2013 and my Master's in Biomedicine-Cancer trajectory in 2014, both by the University of Barcelona. I secured a competitive grant from Generalitat de Catalunya (FI 2015) to perform my PhD in the group of Prof. Bartrons and Dr. Manzano (Faculty of Medicine, University of Barcelona). During my PhD, I published 5 original research articles (4 as first-author) and 2 reviews, and I secured a grant by Agustí Pedro i Pons Foundation to fund a research stay at CRUK Beatson under the supervision of Prof. Vousden. I obtained my PhD with excellent cum laude. In 2021, I joined the group of Profs. Kater and Eldering, leaders in chronic lymphocytic leukemia, as postdoctoral researcher funded by an ERC Consolidator Grant. During the postdoctoral period, I have co-supervised 3 PhD students (defense dates: 16/02/2024, 29/01/2026, and 2027) and I have published 7 original research articles (1 first author, 2 co-senior and corresponding author), 2 reviews as first-author and 1 methods book chapter as senior and corresponding author. A follow-up manuscript as first author and a manuscript as senior and corresponding author are in preparation. In 2023, I secured my first independent funding through a Research Grant by Cancer Center Amsterdam to explore the role of lipids in T cells and improve CAR-T cell function by modulating lipid metabolism. In 2024, I obtained a prestigious Junior Research Grant by the European Hematology Association to start a project on metabolic dependencies of T cells in the context of bispecific antibodies. I have been nominated Principal Investigator at Amsterdam UMC in the call 2025 (results release 01/2026) based on my publications output, the funding I secured (>300,000€) and by proving capable of leading PhD students with three co-directed thesis. I have presented my work at several international conferences, among which are of special relevance the talks selected from abstract at European Hematology Association congress 2024 and 2025, and being invited speaker at International Workshop on CLL 2025 and UK CLL forum 2026. I have developed international collaborations, among which I highlight Dr. Pinilla (Moffitt Cancer Center, USA), with whom I collaborated on a project about mitochondrial fitness of CLL T cells (Gamal, Goedhart and Simon-Molas, Blood adv 2024, shared first author), and Dr. Kabanova (Toscana Life Sciences Foundation, Italy) with whom we have studied the role of the pentose phosphate pathway in chronic lymphocytic leukemia (Del Prete, Hemasphere 2025). I have supervised numerous bachelor's and master's students, both wet-lab as well as literature thesis. I collaborate with pharmaceutical companies in my current projects, I frequently review papers for diverse journals and I have participated in the evaluation of Project Grants for Leukaemia UK 2025. I have also shared our findings in interviews and have participated in outreach activities throughout my career.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Biomedicina
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Título: Visual circuits tuning physiology and behavior in health and disease
Resumen de la Memoria:

My scientific career focuses on how light and visual circuits shape physiology and behavior. I have pursued this across Argentina, Mexico, and the United States, building a trajectory defined by original contributions, international mobility, and intellectual independence.

During my PhD at the University of Buenos Aires, I developed a novel experimental model of optic neuritis, allowing me to characterize early inflammatory and neurodegenerative mechanisms and test therapeutic strategies. I coordinated multi-lab collaborations and trained researchers in advanced surgical techniques, resulting in first- and co-author publications. This stage provided a strong conceptual and technical foundation in translational neuroscience.

During a short PhD stay at UNAM, Mexico, I gained expertise in advanced imaging and achieved the first visualization of the retino-thalamic tract in rodents, generating a first-author and two collaborative publications. This experience strengthened my international profile and exposed me to multidisciplinary, multicultural research environments.

As a postdoc at Northwestern University, I developed two independent research lines: 1) identifying molecular programs that define retinal ganglion cell subtypes and link them to specific visual behaviors (first author, Nature Communications), and 2) establishing a novel long-term threat avoidance paradigm and mapping the retina-brain circuits involved using genetic tools, chemogenetics, and in vivo calcium imaging (first and corresponding author, second-round revision, Nature Communications). Both projects were fully conceived, designed, and executed by me, demonstrating independence and leadership.

I have authored 26 publications (10 first-author, 2 corresponding-author), book chapters, and have presented at international conferences. I have mentored 19 undergraduate and graduate students, organized seminars, and promoted diversity and inclusion through mentoring programs and science outreach.

My future research aims to define retina-brain circuits regulating physiology and behavior in health and disease, focusing on intrinsically photosensitive retinal ganglion cells (ipRGCs). These studies will investigate how ipRGC dysfunction contributes to neurodegenerative disease and explore strategies to restore their function to improve physiological and behavioral outcomes.

Resumen del Currículum Vitae:

My scientific career investigates how light impacts physiology and behavior, developing experimental models, genetic tools, and behavioral paradigms across Argentina, Mexico, and the United States.

During my PhD at the University of Buenos Aires, I developed a model of optic neuritis, characterizing early inflammatory and neurodegenerative mechanisms and identifying potential therapeutic strategies. I coordinated collaborations, trained researchers in surgical techniques, and contributed to multiple first- and co-author publications.

At UNAM, Mexico, I gained expertise in advanced imaging (DTI and fMRI), achieving the first visualization of the retino-thalamic tract in rodents. I designed a visual stimulation device for fMRI, trained host-lab researchers, and produced one first-author and two collaborative publications.

As a postdoc at Northwestern University, I lead two independent research lines: 1) defining molecular programs of retinal ganglion cell subtypes and their link to specific visual behaviors (first author, Nature Communications), and 2) developing a long-term threat avoidance paradigm, mapping retina-brain circuits using genetic tools, chemogenetics, and in vivo imaging (first and corresponding author, second-round revision, Nature Communications). Both projects were entirely designed and executed by me, generating international collaborations and multiple manuscripts in preparation.

I have published 26 articles (10 first-author, 2 corresponding-author), book chapters, and participated in seminars and international meetings. I have mentored 19 students, promoted diversity and inclusion, developed open-source analytical tools, and contributed to methods and datasets widely adopted in the field.

My career reflects scientific innovation, independence, leadership, internationalization, mentorship, and societal engagement. I have generated novel knowledge, developed widely applicable tools, trained students, and communicated science broadly, forming the foundation of an independent, internationally competitive research program bridging basic neuroscience and translational applications.



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Área Temática: Biomedicina
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Referencia: RYC2025-055041-I
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Título: Tackling challenges in regenerative medicine with cellular therapies, immunomodulation and translational models

Resumen de la Memoria:

I am a senior postdoctoral researcher at the University of Cambridge (United Kingdom, UK), with 13 years of international research experience in biomedical sciences between Spain, The Netherlands, Sweden and the UK. My research interest lies on advancing regenerative medicine strategies for people suffering from degenerative pathologies, with special focus on retinal and hepatic disease.

Regenerative medicine aims to restore damaged tissues by generating therapeutic cell types from either primary or pluripotent stem cells, and evaluating their identity, function, and performance through rigorous preclinical testing. In previous studies, my team and I developed a xeno-free, defined, safe, robust and scalable stem cell-based therapy for age-related macular degeneration (AMD) using human embryonic stem cell-derived retinal pigment epithelial cells (hESC-RPE). The derived cells were also comprehensively characterised functionally, immunologically and at a transcriptomic level; and, importantly, assessed in vivo in a relevant preclinical model (the large rabbit eye), demonstrated to recapitulate most hallmarks of human dry advanced AMD. Altogether, my work served as the foundation for the development of hESC-RPE differentiation and cryopreservation protocols that led to the generation of the cellular product CellThRPE1 in partnership with Novo Nordisk, ready for Phase I clinical trial in AMD patients in 2026.

However, a major barrier to successful translation of cellular therapies is immune rejection: autologous cells may reduce immunogenicity but are costly and impractical, while allogeneic grafts are more feasible yet prone to immune attack. Therefore, my subsequent line of work was focused on the assessment of immunogenicity and immunomodulation of human primary-derived cholangiocyte organoids (PCOs, previously demonstrated by our team as a potentially effective alternative cellular therapy for treatment of bile duct disorders). I showed that (i) autologous PCOs induce low-level immune response, (ii) allogeneic response is driven by human leukocyte antigen (HLA) matching, and (iii) if gene-edited to not express HLA genes, they exhibit a significantly reduced response in in vitro immune co-cultures and in humanised mouse models. Overall, these findings have important implications for the design and clinical translation of autologous and allogeneic organoid cell therapies.

Cellular therapies are unfortunately limited by poor engraftment and function, especially in advanced disease stages affecting multiple cell types. Therefore, my goal is to develop regenerative alternatives that promote self-repair to restore function. Since key cues governing endogenous regeneration remain largely unknown, I aim to establish human models that bridge molecular, cellular, and tissue biology to uncover mechanisms, cell compositions, and interactions driving organ regeneration. Focusing on the hepato-biliary system and using multi-scale human regenerative models (e.g. triad organoid co-cultures, perfused liver tissue slices, ex vivo liver organ perfusion), I aim to recapitulate disease physiology to map molecular signatures, metabolic states, cellular dynamics and niche interactions in health and disease. This will ultimately yield mechanistic insight to steer these systems toward regeneration and assess future therapeutic strategies.

Resumen del Currículum Vitae:

My scientific production includes an interdisciplinary track-record of 18 articles in well-respected scientific journals (plus one recently uploaded to bioRxiv, under review in Nature), multiple research awards/recognitions and 10 international conference proceedings. Notably, my research has been published in journals specific to my field (i.e., Cell Reports Medicine, Stem Cell Reports) as well as recognised journals of broad scientific interest, such as Nature Communications.

I have already obtained funding as a principal investigator to lead and develop my own projects (Research Grant from UKRI Medical Research Council, UK, £50,000-£57,000). Moreover, I conceptualised and designed two PhD thesis projects in two different institutions (Karolinska Institutet, University of Cambridge), of whom I am co-promoter. Importantly, I have demonstrated my ability to generate and execute research projects independently, as evidenced by CV.

Of interest, I have gained research experience in various countries and institutions including Spain, The Netherlands (NL), Sweden and United Kingdom (UK). As a result, I have developed an exceptional network of international collaborators at institutions such as Hubrecht Institute (NL), LUMC (NL), Karolinska Institute (Sweden), St Erik Eye Hospital (Sweden), EPFL (Switzerland), University of Cambridge (UK), University of Oxford (UK), King's College (UK) and Wellcome Sanger Institute (UK).

I supervised PhD students (thesis co-promoter) at Karolinska Institutet and University of Cambridge, in addition to visiting PhD Student from Brazil and a master student, both at University of Cambridge. Furthermore, I have supervised/tutored two modules of the Pathology course at University of Cambridge (academic course 2023-2024). Additionally, I have lectured 3rd year BSc students in Spain (University of Vic), at an EMBO practical course on Humanised Mice; and at a European Cooperation in Science and Technology (COST) workshop on CRISPR and organoids. Altogether, this earned me certification as an Associate Fellow of the Higher Education Academy by University of Cambridge (UK).

Notably, I co-led an article collection as guest-editor in IJMS (Retina Degeneration, Neuroprotection and Repair), and I reviewed in several scientific journals including Scientific Reports, JoVE, Communications Medicine. I also actively contributed to the dissemination of my research through a video abstract available on YouTube (BioLamina Rising Stars), with a lay talk at Pint of Science 2023 (UK) or a stand at Cambridge Science Festival 2023 (UK).



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Finally, my PhD work at Karolinska Institutet was the foundation of the differentiation and cryopreservation of human embryonic stem cell-derived retinal pigment epithelial cells (hESC-RPE) protocols that led to the generation of the cellular product CellThRPE1 in partnership with Novo Nordisk, ready for Phase I clinical trial in AMD patients in 2026; demonstrated by a co-inventor filed patent PCT/EP2019/066285, and the cryopreservation know-how sold to Novo Nordisk. Additionally, I am part-time employed at Avatrial Ltd as Scientific Director where I lead the organoid platform team of the company (2023-present), and where I transferred the organoid knowledge learnt during my postdoctoral training at University of Cambridge.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Biomedicina
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Título: Fluid Biomarkers in Neurodegenerative Diseases
Resumen de la Memoria:

With a background in biology and neuroscience, I obtained my PhD ('summa cum laude') in 2018 from the Universidad Miguel Hernández de Elche (thesis directors: Prof. Javier Sáez-Valero and Dr. María Salud García-Ayllón) for my studies on fluid biomarkers for the diagnosis and monitoring therapeutic interventions in the Alzheimer's Disease (AD) spectrum. This research led to five peer-reviewed publications, four of them as first-author in Q1 journals (e.g. Sogorb-Esteve et al, Mol Neurodegener 2016; Sogorb-Esteve et al, Mol Neurobiology 2018). During my PhD, I was awarded the Erasmus+ fellowship to work in the laboratory of Prof. Kaj Blennow at the University of Gothenburg, where I deepened my expertise in immunoassay development for biomarker analysis.

Between 2018 and 2025 I have worked as a postdoctoral researcher at the UK Dementia Research Institute (UK DRI) and the Dementia Research Centre (DRC) at University College London (UCL). In 2021, I was appointed a Race Against Dementia - Alzheimer's Research UK (RAD-ARUK) Research Fellow and UK DRI Emerging Leader. Between 2022 and 2025 I have gone through a successful promotion process at UCL going from Research Fellow to Senior Research Fellow (2023) and Principal Research Fellow (2025).

This postdoctoral path enabled me to expand my skillset into areas such as animal and human stem cell models to study fluid biomarkers monitoring microglial activation in AD. I also developed key leadership and lab management skills, led my own projects, and supported the establishment of Prof. De Strooper's research group at the UK DRI. In 2020, I joined Prof. Rohrer's group where I coordinated my own fluid biomarker team. I became the fluid biomarker coordinator of the GENetic Frontotemporal Dementia Initiative (GENFI), a multi-centre cohort study, where I contributed to several research publications (e.g. Sogorb-Esteve et al, J Alzheimers Dis 2021; van der Ende et al, Brain 2022; De Houwer et al, Brain 2025) and shifted my focus on AD to other neurodegenerative diseases such as frontotemporal dementia (FTD) or amyotrophic lateral sclerosis (ALS). From this stage, I expanded my expertise in proteomic techniques going from ultrasensitive immunoassays to mass spectrometry. I was based at the state-of-the-art UK DRI Biomarker Factory led by Prof. Henrik Zetterberg and became a strong collaborator in his laboratory at University of Gothenburg, establishing this site as my secondment institution. This collaboration led to multiple publications (e.g. Sogorb-Esteve et al, Alzheimers Res Ther 2022; Swift et al, J Neurol 2024; Sogorb-Esteve et al, Sci Transl Med 2025). Since 2022, my team focused on developing innovative methods to measure synaptic and endo-lysosomal markers in blood by isolating extracellular vesicles - establishing a unique methodological capability at UCL and shaping my independent research path. On September 2025, I was appointed as Principal Investigator and head of the Biomarkers, Biochemistry and Molecular Genetics Laboratory Platform at Fundación CIEN (Centro Alzheimer Fundación Reina Sofía, Spain) where I further develop my transdiagnostic research on the distinct effects that different neurodegenerative pathologies exert in fluid biomarker patterns and clinical manifestations and how these may be used for aiding differential dementia diagnosis.

Resumen del Currículum Vitae:

Scientific Productivity and Excellence

Since my first publication in 2015 I have already published 24 research articles in international peer-reviewed journals, including 9 articles as first author (3 shared) and 4 as senior (last/corresponding) author. Underlying the quality and relevance of my research work, most of my papers (22/24, 91.7%) have been published in the top quartile (Q1), of highest related journals in their respective scientific categories. I am also first and corresponding author of an article in high impact journals such as Science Translational Medicine (IF=14.7; Sogorb-Esteve et al, 2025) and Molecular Neurodegeneration (IF=17.5; Sogorb-Esteve et al, 2016), and co-authored articles in similar journals such as Brain (IF=11.7; Mirza et al, 2025). My current H-index is 13 with a total of 554 citations.

I have given over 30 oral presentations in this context. These include a total of 20 talks at international conferences such as the Alzheimer's Association International Conference (AAIC 2020, 2021, 2024), and the International Conference on Alzheimer's and Parkinson's Disease (AD/PD 2023). I was awarded the Junior Faculty Award at the AD/PD conference in 2023, where I was invited to share my work at an oral presentation. I have also received competitive travel fellowships of international conferences including Alzheimer's Research UK International Conference (ARUK, 5x), AAIC and AD/PD.

Leadership and Recognised Expertise

I am a regular reviewer for 7 neuroscience journals and have done over 30 reviews in the last 3 years. I am also an editor for Scientific Reports since 2024. I have reviewed grant applications in 3 United Kingdom National Grant Review Boards (Alzheimer's Research UK, Alzheimer's Society, Motorneuron Disease Society and Bio-Hermes). In 2021 I was appointed as a UK DRI Emerging leader, an award given to a select few researchers, in this role I was attending the executive meetings at the institution at the same level of the group Leaders, and I had access to internal funding calls only offered to the Group Leaders.

I have been co-investigator in a collaboration with Prevail Therapeutics to develop fluid biomarkers for clinical trials in frontotemporal dementia (FTD). I have led a collaboration with the pharmaceutical company Alector for the validation of a method to measure specific biomarkers in trials for FTD.

With respect to broader educational and divulgation activities, I am one of the three directors of the international UGOT/UCL/BBBRC Biomarkers for Neurodegenerative Diseases Course, which attracts PhD students from around the world. It has received excellent feedback from attendees for the schedule, speakers and the great organisation of the sessions and the overall course. Since 2023, the course has regularly received financial support from the Gates foundation.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Biomedicina
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Título: Metabolic diseases: from molecular mechanisms to translational approaches
Resumen de la Memoria:

Throughout my career, I have built a solid trajectory in the study of metabolic diseases, with a focus on the molecular and physiological mechanisms that regulate metabolic homeostasis and their disruption in conditions such as obesity, metabolic syndrome, type 2 diabetes, and metabolic-associated steatotic liver disease (MASLD). My research has evolved at the intersection of cell metabolism, organ crosstalk, and systemic metabolic dysfunction, exploring how alterations in these processes shape disease progression and therapeutic response. I have progressively established an independent line of research centered on understanding the metabolic pathways and inter-organ interactions that drive chronic metabolic diseases and their clinical complications. This includes identifying therapeutic targets, developing advanced preclinical models, and integrating human tissue cohorts to accelerate translation. My work aims to generate strategies that address the unmet needs of patients with early-stage disease and complex metabolic comorbidities, populations that are often underserved by current therapies. My training at internationally recognized institutions, including Lund University (Sweden), University of Navarra (Spain), and the University of Oxford (UK), has strengthened my expertise in molecular biology, functional genomics, and metabolic physiology. Through collaborations across Europe and interdisciplinary projects, I have applied approaches such as single-cell RNA sequencing, CRISPR-Cas9 gene editing, and genetic network analysis to uncover regulators of insulin expression, beta cell function, and liver metabolism. These contributions have strengthened a multidisciplinary research profile that combines mechanistic insights with translational objectives. In recent years, I have consolidated my emerging independence by securing competitive funding as Principal Investigator, presenting award-winning work at international meetings, and establishing collaborations across leading European centers. This progression reflects a coherent and ambitious trajectory toward building an integrative research program in metabolic diseases.

My current research line focuses on developing innovative therapeutic strategies for chronic metabolic diseases, primarily MASLD, metabolic syndrome, and type 2 diabetes, by dissecting the molecular processes driving disease progression and identifying metabolic pathways that can be targeted to restore homeostasis. I also investigate how systemic metabolic dysfunction shapes disease susceptibility in digestive organs, with the long-term aim of clarifying the metabolic conditions that increase cancer risk. By adopting a comprehensive, system-level perspective on metabolism, my work seeks to provide mechanistic clarity and translational solutions to some of the most prevalent metabolic disorders. In the near future, I aim to strengthen my scientific independence, expand my leadership capacity, and further establish myself as an emerging researcher in Europe dedicated to advancing the understanding and treatment of metabolic diseases.

Resumen del Currículum Vitae:

With nearly a decade of experience in biomedical research (H-index: 9), I have developed expertise in the physiology and cell biology of metabolic diseases, leading innovative projects and international collaborations focused on translational therapies. My international career began with an undergraduate stay at Oxford Brookes University and continued with a predoctoral stay at the University of Oxford under Nobel laureate Prof. Peter Ratcliffe. I completed my Ph.D. in 2018 with an international mention (FPU-funded), integrating clinical and epigenetic analyses with mechanistic animal models to investigate molecular drivers of metabolic diseases. This work included complex analyses of human cohorts, the development of a novel co-culture obesity model, several first-author publications, and a collaborative review with Prof. Trayhurn. I then pursued a postdoctoral fellowship at the Lund University Diabetes Centre, where I generated new hypotheses on the regulation of beta-cell function in type 2 diabetes. As Principal Investigator, I secured three independent grants, leading to a first-author article (Nat Commun. 2025), additional manuscripts in preparation, and multiple oral communications at EASD meetings, including the Early Career Academy Best Communication Prize. I subsequently joined the Centre for Genomic Regulation to study alternative splicing in pancreatic islets (Nat Metab 2023), contributing insights into how RNA processing shapes beta-cell identity and glucose homeostasis.

My transition to industry allowed me to apply this mechanistic expertise to preclinical programs at Kintsugi Therapeutics and later at CIMA² University of Navarra in collaboration with Moderna Therapeutics, contributing to the development of mRNA-based therapies for MASLD and acute pancreatitis (Clin Sci. 2024; J Transl Med. 2025). Since 2023, I hold the competitive Sara Borrell Fellowship (16th/46), advancing research on regulators of MASLD and hepatocellular carcinoma at CCUN. This work has resulted in first-author studies (J Physiol Biochem 2023; BBA-Mol Basis Dis 2024; J Exp Clin Cancer Res 2025), co-authored publications in leading journals, and expert opinion articles in Hepatology, Gut, and J Hepatol. I have contributed mechanistic insights into liver regeneration, PDAC and cholangiocarcinoma epigenetics, PRMT5 as a therapeutic target, and transcriptomic changes in MASLD and HCC. I am the corresponding author of a manuscript on epigenetics, metabolism, and liver cancer, and co-author of a second manuscript on epigenetics and immunotherapy, both under review.

Alongside my scientific output, I engage in active dissemination through press releases, a science blog, media outreach, and regional science events. I have taught as an Assistant Professor, mentored master's and undergraduate students, and served as an ad hoc reviewer for international journals and the Novo Nordisk Foundation. Building on my international trajectory, competitive funding, scientific contributions, and collaborative network, I am consolidating my profile as an emerging leader in biomedical research, committed to identifying biomarkers and therapeutic targets and advancing translational strategies for metabolic and digestive diseases.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Biomedicina
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Título: Bases celulares y moleculares para la reprogramación funcional de células T en cáncer
Resumen de la Memoria:

I began my research in immunology in Dr. Iñaki Alvarez's group at the Institute of Biotechnology and Biomedicine (IBB, Barcelona), where I conducted my undergraduate and master's research on central tolerance mechanisms eliminating self-reactive T cells (Eur J Immunol 2013; J Proteomics 2013). This early exposure laid the foundations for an independent scientific trajectory centered on mechanistic immunology and translational impact.

During my PhD in Dr. Hernandez's lab at the Institute for Regenerative Medicine and Biotherapy in Montpellier, funded by a French Ministry of Research fellowship, I designed and executed a research program investigating how autoreactive CD8 and CD4 T cells cooperate during diabetes induction. I discovered that antigen-dependent "triads" formed by APCs, CD8 and CD4 T cells sustain CD8 effector functions in the pancreas. This work resulted in three first-author papers, four co-authorships, and multiple presentations, demonstrating my ability to lead conceptual and experimental advances.

Motivated to extend these mechanistic insights to oncology, I joined Dr. Schietinger's lab at MSKCC (New York) in 2017, where I independently developed a research line revealing that tumor elimination requires triads between CD4, CD8 and dendritic cells within the tumor microenvironment (Cancer Cell 2024, first and corresponding author). Establishing myself as a scientific leader, I coordinated collaborations leading to high-impact publications (Nature 2022; J Exp Med 2022) and secured the Ludwig Center for Cancer Immunotherapy Postdoctoral Fellowship.

The potential of these findings to guide therapeutic innovation motivated my return to Barcelona, where I joined Dr. Ramon Alemany's group to apply mechanistic principles to viral-based immunotherapies. Since September 2022, I have driven a project developing oncolytic adenoviruses encoding tumor-specific antigens, demonstrating their ability to induce potent CD8 T cell responses (unpublished, manuscript in preparation). This experience enhanced my expertise in tumor immunology, viral-based cell therapy, and translational research, preparing me to lead my own independent program.

In July 2025, I joined Dr. Aura Muntasell's team at the Universitat Autònoma de Barcelona, assuming a senior postdoctoral leadership role within the TAR-NK-UAB project. I contribute to the development of off-the-shelf NK-cell therapies engineered to resist immunosuppression and aligned with an upcoming phase I clinical trial using CRISPR/Cas9-edited NK cells. I lead the development of SMAD4-deficient NK cells with enhanced cytotoxicity and infiltration and I am extending this strategy to CAR-T cells and TILs. These responsibilities reflect my ability to conceptualize, supervise, and coordinate complex experimental programs.

Across my career, I have built strong expertise in T cell biology, transgenic tumor models, genomics (RNA-seq, ATAC-seq), advanced flow cytometry, in vivo imaging, and CRISPR/Cas9 functional genetics. I have also developed leadership, mentoring, grant-writing, and lab-management skills. My progression across institutions and countries reflects a deliberate path toward independence, supported by a robust international network and a clear vision integrating mechanistic immunology with innovative immunotherapies.

Resumen del Currículum Vitae:

I am an immunologist with extensive expertise in T cell biology, focusing on T cell differentiation, dysfunction, and their roles in autoimmunity and cancer immunotherapy. Over the past 14 years, I have developed a strong scientific network while honing my leadership, collaborative, and technical skills. My research integrates advanced immunological techniques and innovative experimental approaches to address critical challenges in cancer and autoimmune diseases.

After earning a Bachelor's Degree in Biology at the Autonomous University of Barcelona, I completed a Master's degree in Advanced Immunology from the University of Barcelona, focusing on central tolerance processes occurring in the thymus. During this period I worked with Dr. Alvarez at IBB (Barcelona, Spain), where central tolerance processes occurring in the thymus. The primary outcome of this work was the publication of two manuscript, one as a first author in Journal of Proteomics (G. Espinosa-Carrasco et al., 2013).

I have decided to pursue my PhD under the guidance of Dr. Hernandez. at the University of Montpellier, France, where I investigated the cooperation of CD4 and CD8 T cells in the induction of autoimmune diabetes. The main objective of this study resulted in three first-author publications (Espinosa Carrasco G, et al, 2018 Front Immunol, and Espinosa-Carrasco G, et al, 2018, Front Immunol, Espinosa-Carrasco G, et al, 2015, PLoS One).

Additionally, I was fortunate to collaborate intensively in several projects involving T cells in different contexts (Coque E, et al, 2019, Proc Natl Acad Sci U S A; Luz-Crawford P, et al, 2018, Theranostics; Luz-Crawford P, et al, 2016, Ann Rheum Dis).

After my time in Dr. Hernandez lab, I joined Dr. Andrea Schietinger lab at the Memorial Sloan Kettering Cancer Center in New York, focusing my research on the role of CD4 T cell in the CD8 T cell mediated cancer cell elimination. My time in her lab resulted in 3 publications of high-impact journals (G. Espinosa-Carrasco, et al, 2024, Cancer Cell; Mojdeh Shakiba, et al, 2022, J Exp Med and Sofia V. Gearty, et al, Nature). In 2018, I was awarded with the prestigious Ludwig Center for Cancer Immunotherapy postdoctoral fellowship and had the privilege of presenting my findings at numerous national and international conferences. I was also actively involved in grant writing, mentoring and project design during this period.

Throughout my career, I have gained extensive experience in mentorship, supervising PhD students and technicians, managing multi-team projects, and contributing to grant writing and lab management.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025

My research vision focuses on understanding and harnessing T cell reprogramming to develop next-generation immunotherapies for solid tumors. My ultimate goal is to establish an independent research line and advance innovative immunotherapy strategies in Spain. I believe my expertise, accomplishments, and vision make me a strong candidate for the Ramón y Cajal program.



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Área Temática: Biomedicina
Nombre: TRENADO YUSTE, CAROLINA
Referencia: RYC2025-055742-I
Correo Electrónico: ctrenado@ing.uc3m.es
Título: Engineered microtissues to model breast cancer morphogenesis
Resumen de la Memoria:

My multidisciplinary research integrates microscale tissue engineering, theoretical frameworks, and mathematically-informed computational models to investigate mechanisms underlying development, cancer progression, and microbial dynamics.

I completed my undergraduate studies in mathematics at the Universidad de Salamanca, Spain, and pursued graduate studies in quantitative biology at the Universidad Carlos III de Madrid, where I focused on the dynamical organization and motion of living systems. My doctoral work emphasized theoretical and computational approaches to studying these systems, laying the foundation for an interdisciplinary research career.

During my postdoctoral training at Princeton University, I expanded my expertise to microbiology and cancer cell biology, aiming to uncover how multicellular systems assemble and disassemble their architecture. This interdisciplinary training, supported by over \$350,000 in competitive funding, as a New Jersey Cancer Research Fellow and later a Damon Runyon Quantitative Postdoctoral Fellow, demonstrates my ability to design and execute independent research spanning theory, computation, and experiment. My training uniquely positions me to address questions in cancer biology from all three perspectives.

Through postdoctoral collaborations with Professors Datta, Nelson, and Wingreen, my research has flourished. In partnership with Professors Datta and Wingreen, I studied interfacial morphodynamics in growing microbial colonies, resulting in a publication in PRX. Simultaneously, I collaborated with Professors Nelson and Rabinowitz on the effects of diet on breast tumor progression, a study now under revision at APL Bioengineering. This work has also produced publications in Developmental Cell and Soft Matter, a contributed chapter with the Royal Society of Chemistry, and reviews in Nature Reviews Physics and Current Opinion in Biomedical Engineering.

As I move toward independence, I have come to deeply value how experimental work enriches and sharpens theoretical research. My future research will integrate experiments and biophysically-motivated models to study the metastatic traits of triple-negative breast cancer (TNBC) cells as they escape primary tumors and navigate the tumor microenvironment (TME), advancing personalized medicine. Specifically, I aim to uncover the principles guiding non-random organ colonization of cancer cells and develop strategies to disrupt pre-metastatic niche formation. By combining organ-on-chip platforms with mathematically-informed models, I will investigate how TNBC cells adapt to organ-specific microenvironments and initiate metastasis.

This career-long commitment to integrating theory, computation, and experiment defines my scientific identity. My interdisciplinary approach not only drives innovation but provides a strong foundation for leading a competitive, internationally visible research program in Spain. The Ramón y Cajal grant will be critical for expanding my experimental training, completing my postdoctoral research, and launching an independent, interdisciplinary career at the intersection of cancer biology, and quantitative modeling.

Resumen del Currículum Vitae:

Throughout my research career, I have pursued ambitious scientific questions with creativity, rigor, and an interdisciplinary mindset. Trained as both a theorist and an experimentalist, I integrate mathematical modeling, computation, and tissue engineering to uncover fundamental mechanisms in development and disease.

I received my B.S. in Mathematics from the University of Salamanca (2015) and a M.Sc. in Industrial Mathematics from UC3M (2017). I completed my Ph.D. at UC3M (2017-2021) graduating with Summa Cum Laude, International Mention, and the Extraordinary Doctorate Award. My PhD training included three funded international research stays in top research institutions: the Fields Institute for Research in Mathematical Sciences, the Courant Institute of Mathematical Sciences at New York University, and the University of Colorado Boulder. Since 2021, I have been a postdoctoral researcher at Princeton University.

I have published 11 peer-reviewed papers (h-index 6), with 2 under review and 4 in preparation, including nine as first/co-first author (80% independent of my PhD advisors) and one as corresponding-author paper. My work appears in leading journals such as Physical Review X, Developmental Cell, Soft Matter, and PLOS Computational Biology. I have also co-authored invited reviews in Nature Reviews Physics and Current Opinion in Biomedical Engineering, and contributed to book chapters published by the Royal Society of Chemistry and Springer.

I have a strong record of securing competitive funding. During my PhD, I held the PIPF-UC3M fellowship, the Extraordinary Doctorate Award, and a mobility fellowship for a research stay at NYU. Afterward, I was awarded the Theoretical Quantitative Biology Fellowship (Gulbenkian Institute). At Princeton, I obtained the New Jersey Cancer Research Postdoctoral Fellowship (\$130K) and the highly selective Damon Runyon Quantitative Biology Fellowship (\$240K). My work has also been recognized through multiple honors, including Princeton's nomination to the 2024 and 2025 Blavatnik Regional Awards, the Martin & Beate Block Award (Aspen Center for Physics, 2023), an Outstanding Paper Award, presentation prizes at Princeton and Gordon Research Conferences, and competitive travel awards.

I have delivered 19 invited and contributed talks at international venues including Princeton University, EMBL, the Fields Institute, and the University of Pennsylvania, and have been pre-selected for invited job talks at Imperial College London, Stony Brook University, and NOVA. I am deeply committed to teaching and mentorship, with experience at Princeton University, MBL, and UC3M, consistently with excellent evaluations. I have mentored 7



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undergraduate students, 3 graduate students (this includes follow-up funded research projects (UNC Chapel Hill, UC Davis) of visiting scholars at Princeton), and 9 graduate/postdoctoral researchers at MBL.

Beyond research, I actively contribute to outreach and community building. I have organized student research meetings, co-organized a workshop at CUNY Graduate Center, and served as invited speaker for Princeton's Biological Sciences Society seminar series. I have participated in public engagement events such as Día de la Ciencia and coordinated initiatives promoting diversity and inclusion in STEM, including programs for Women in Science.



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Área Temática: Biomedicina
Nombre: GARMA, LEONARDO
Referencia: RYC2025-055110-I
Correo Electrónico: leonardo.garma@gmail.com
Título: Desarrollo de tecnologías bioelectrónicas, materiales y herramientas computacionales para el estudio traslacional de patologías

Resumen de la Memoria:

A lo largo de más de una década he desarrollado una trayectoria científica multidisciplinar centrada en el análisis computacional de datos biomédicos, con contribuciones relevantes en oncología, epigenética, neurociencia, bioelectrónica y bioinformática. Mi investigación se caracteriza por la integración de desarrollo tecnológico, aplicación traslacional y metodologías de análisis de datos en contextos clínicos y preclínicos.

He liderado contribuciones científicas en medicina de alta definición, donde coordino el procesamiento y análisis de datos clínicos, fisiológicos y moleculares (multi-ómicos) de un estudio multicéntrico pionero en pacientes con cáncer metastásico. Este proyecto, financiado por el Instituto de Salud Carlos III y desarrollado bajo una beca Marie Skłodowska-Curie, ha generado publicaciones, comunicaciones internacionales y actividades de divulgación, así como nuevas líneas colaborativas en exposómica.

En epigenética, he dirigido el desarrollo de modelos computacionales aplicables a las nuevas generaciones de arrays de metilación, resolviendo limitaciones metodológicas de los relojes epigenéticos e impulsando investigaciones posteriores en cáncer de mama y VIH. En neurociencia, he desempeñado un papel central en la caracterización transcriptómica de interneuronas del estriado humano mediante snRNA-seq y transcriptómica espacial, así como en estudios relacionados con la progresión del Parkinson, consolidando una línea de trabajo en análisis ómico avanzado del cerebro humano.

Paralelamente, he mantenido una activa línea de investigación en bioelectrónica y tecnologías accesibles para electrofisiología. Como autor de correspondencia he impulsado el diseño de plataformas basadas en grafeno y polímeros conductores, integrando hardware, análisis de señal y validación funcional. Estas herramientas, abiertas y de bajo coste, han generado colaboraciones internacionales y nuevas líneas aplicadas a toxicología sin uso de animales.

He complementado mi actividad científica con aportaciones docentes y pedagógicas, incluyendo artículos especializados en enseñanza, cursos internacionales y supervisión de estudiantes en varios niveles.

Mi trayectoria se sustenta en una sólida proyección internacional, con estancias prolongadas en instituciones de referencia como la Universidad of Michigan, ETH Zürich, el Instituto Italiano de Tecnología, el Instituto Karolinska y el Centro Nacional de Investigaciones Oncológicas. Estas experiencias han dado lugar a redes estables de colaboración y producción científica conjunta.

He demostrado independencia científica mediante la captación de más de 700.000 € en convocatorias competitivas, entre ellas dos MSCA Individual Fellowships y el prestigioso programa "César Nombela", que respalda mi consolidación como investigador independiente. Asimismo, he liderado equipos multidisciplinarios, coordinado proyectos europeos y supervisado investigadores en formación, participando activamente en iniciativas de mentoría y docencia especializada.

En conjunto, mi carrera refleja una combinación de liderazgo, capacidad de innovación, versatilidad temática e impacto traslacional, orientada al desarrollo de metodologías y tecnologías que avanzan la medicina de precisión y la biología integrada.

Resumen del Currículum Vitae:

A lo largo de mi trayectoria he desarrollado un perfil altamente multidisciplinar que integra bioinformática, biología molecular, bioelectrónica y oncología traslacional. Desde 2024 soy MSCA Postdoctoral Fellow en el CNIO, donde lidero proyectos basados en análisis multi-modal aplicados al cáncer y al envejecimiento. Previamente trabajé como investigador en el CNIO (2023-2024), y como postdoc en el Karolinska Institutet (2020-2023) y en el Instituto Italiano de Tecnología (2017-2019), además de realizar estancias de investigación en la ETH Zürich, la Universidad de Michigan y la Universidad de Oulu, donde obtuve mi doctorado en Bioquímica tras una primera etapa como investigador (2010-2015). Poseo también un Máster en Ingeniería Biomédica (Universidad de Zaragoza) y una Licenciatura en Bioquímica (UCM).

Mi producción científica incluye 23 artículos, 14 contribuciones a congresos internacionales, más de 400 citaciones y un h-index de 10. He trabajado tanto en investigación experimental como computacional, con contribuciones relevantes en biología estructural, bioelectrónica y materiales, neurociencia molecular, cáncer y epigenética. Entre mis aportaciones destacan estudios en revistas de alto impacto como Nature Communications, Genome Medicine, ACS Applied Bio Materials, npj Parkinson's Disease, Lab on a Chip o PLOS One. Mis líneas actuales en el CNIO incluyen relojes epigenéticos específicos de tejido, análisis de cohortes multimodales en oncología y estudios integrados de microbioma, metilación y transcriptómica en cáncer metastásico (mama, pulmón, colon).

He presentado resultados en congresos de referencia como ASCO, ESMO, FENS e IBRO. Mi perfil combina liderazgo científico e independencia investigadora: soy beneficiario directo de dos MSCA Individual Fellowships (HDBRECA y PARKSEQ) y del competitivo programa "César Nombela", y he co-liderado proyectos financiados por agencias suecas y colaboraciones internacionales en bioelectrónica y biomedicina. En total, he asegurado más de 700.000 € en financiación competitiva como IP o co-IP.

He dirigido y co-dirigido trabajos fin de máster, participado como instructor en cursos especializados (EMBO, Universidad de Minho) y ejercido docencia universitaria durante mi doctorado. También he promovido iniciativas formativas como "CodeClinic@CABHC", y publicado dos artículos centrados en metodologías pedagógicas para la enseñanza de bioinformática.



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En conjunto, mi carrera refleja una sólida capacidad para integrar métodos computacionales avanzados con aplicaciones biomédicas, liderar equipos internacionales, desarrollar nuevas líneas de investigación y contribuir a la formación de jóvenes investigadores.



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Área Temática: Biomedicina
Nombre: STEFANAKIS, NIKOLAOS
Referencia: RYC2025-054794-I
Correo Electrónico: nikosistefanakis@gmail.com
Título: SYNAPTIC GLIA: DEVELOPMENT AND FUNCTIONS AT SYNAPSES
Resumen de la Memoria:

My interest in how diversity of form and function arises in the nervous system arose during my PhD studies where, in the lab of Professor Oliver Hobert at Columbia University, I used *C. elegans* to investigate how expression of pan-neuronal genes is achieved. Answering this question was key to understand how generic neuronal identity is established. My studies revealed a common organization principle for panneuronal gene expression, that of Modular and Redundant Regulation, in which distinct regulatory elements (modular), each bound by different transcription factors, drive expression in largely overlapping (redundant) subdomains of the nervous system. For my postdoctoral training, I became interested in studying the development and functions of glia, whose roles in the nervous system have been massively less studied in comparison to neurons. I joined the lab of Professor Shai Shaham at Rockefeller University and embarked on dissecting the development and functions of mesodermal *C. elegans* glia, called GLR. Through RNA-seq, I described the adult GLR transcriptome, raising the hypothesis that GLR glia merge astrocytic and endothelial characteristics, relegated to separate cell types in mammals. Using temporally controlled mutant analysis and CRISPR/Cas9 mutagenesis, I exposed a hierarchical gene regulatory network orchestrated by two transcription factors LET-381/FoxF and UNC-30/Pitx, required for GLR glia development, thereby uncovering mechanisms that may apply to mesodermal glia development in the mammalian brain. Finally, GLR glia inactivation in let-381/FoxF mutants resulted in motor behavior defects and salt hypersensitivity suggesting glial roles in neuronal activity.

My future program will build on findings from my postdoctoral research to investigate the mechanisms of glia morphogenesis, maturation and heterogeneity and glial roles at synapses. During nervous system development, synaptic glia, namely astrocytes and microglia, promote synapse formation thereby defining connectivity. In the adult CNS, these peri-synaptic glial cells actively maintain circuit integrity and influence synaptic activity by monitoring and responding to neuronal signals, in part by altering glial Ca²⁺ levels. Due to such crucial roles in synapse formation and function, glia impairment can be the cause of compromised circuit activity and related neuropathology. However, our understanding of the rules governing glia development and their functions at synaptic sites remain incomplete. As an independent investigator, I will use a multidisciplinary approach utilizing advanced methodology (single cell multi-omics, CRISPR/Cas9, live in vivo imaging) and leverage the advantages of *C. elegans* as a model system to: (Project 1) study morphogenesis and maintenance of synapse associated glia; (Project 2) identify mechanisms governing glia heterogeneity, maturation and plasticity; and (Project 3) uncover the mechanisms and effects of glial calcium signaling on synaptic activity. My studies will deepen our understanding of glial roles at synaptic sites, and shed light on mechanisms promoting synaptic and circuit pathology. Thereby, results of this project may provide new insights for the design of interventions to diagnose and treat major neurological disorders such as Alzheimer's.

Resumen del Currículum Vitae:

I obtained my Bachelor's Degree in Biology from the National Kapodistrian University of Athens in 2007. There, my dissertation project in the lab of professor Klea Lamnissou, resulted in one first author and one second author publication, describing the correlation of variants of the nitric oxide synthase and androgen receptor genes with progress of ADPKD disease and Spontaneous Recurrent Abortions respectively. I then moved to the Department of Biological Sciences at Columbia University in New York, where in 2015, I received my PhD in Biology with Distinction. My thesis project in the laboratory of Professor Oliver Hobert, resulted in a first author paper describing the regulatory logic of panneuronal gene expression in *C. elegans* and highlighting the fundamental differences between panneuronal and neuron-type specific expression programs (Neuron 2015). In addition, I published an Opinion article (Trends in Neurosciences 2010) and a second author paper in collaboration with Dr. Eduardo Leyva Díaz, a postdoc in the Hobert lab, where we identified a novel gene family involved in silencing of repetitive DNA (Genetics 2017). During my PhD studies I developed a deep interest in how diversity of form and function arises in the nervous system. Therefore, for my postdoctoral training I joined the lab of Professor Shai Shaham at The Rockefeller University in New York, where I used *C. elegans* as a model to study the development and functions of glia, whose roles in the nervous system have been massively less studied in comparison to neurons. Following genetics and genomics approaches I identified a transcription factor network required for fate specification and maintenance of mesodermal glia and characterized these glia's roles in *C. elegans*' motor behavior (EMBO Journal 2024). I also published a first and co-corresponding author paper, describing fate specification of a *C. elegans* endothelial cell (Development 2025). Finally, a paper in collaboration with the lab of Dr. Keil at Institute Curie (France), describing the role of deglutamylases in neuronal morphology and transport is currently in preparation.

Overall, I have published 7 peer-reviewed articles in international journals with a total of 448 citations (Google Scholar). I have presented my work in major international conferences, including the CHSL Conference on Glia in Health and Disease, the International Conference of Society for Developmental Biology and the International *C. elegans* Conference. During my postdoctoral studies I received the prestigious Leon Levy Fellowship in Neurosciences securing funding for my research. I have also received other honors and awards, such as obtaining my PhD with Distinction and my Bachelor's Degree with Commendation. As teaching and mentoring skills, I have been a teaching assistant for Introductory Biology and have mentored seven students of various levels in the lab. Finally, I am reviewer for the journals GENETICS and G3, I am serving in admissions committees and I have participated in outreach activities organized by the Rockefeller University. I believe that my training and academic record show that I am prepared for a future career as an independent investigator in the fields of development, genetics and neuroscience.



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Área Temática: Biomedicina
Nombre: SEGURA COVARRUBIAS, MA GUADALUPE
Referencia: RYC2025-054462-I
Correo Electrónico: pitasegura89@gmail.com
Título: Microenvironment-dependent gating of delta-type glutamate receptors (GluD1/GluD2) at excitatory synapses

Resumen de la Memoria:

I am a biophysicist specialising in the structure-function mechanism of ion channels, working at the interface of structural biology and electrophysiology. My research asks how ion channels sense their chemical and electrical microenvironment to control excitability in health and disease. During my MSc and PhD at IPICYT (Mexico), I focused on the calcium-activated chloride channel TMEM16A, combining mutagenesis and patch-clamp with structural approaches. As the first author, I described a proton-driven activation mechanism that explains how TMEM16A can open when intracellular calcium is limiting and intracellular pH is altered, and I contributed to collaborative work showing how calcium-FKBP12-calcineurin complexes and permeant anions tune its gating and in linking molecular mechanisms to epithelial secretion, smooth muscle contraction and sensory signalling.

Since 2021, as a postdoctoral researcher at Case Western Reserve University, I have applied this integrative strategy to kainate receptors. Working closely with cryo-EM colleagues, I have been a co-first author on studies that reveal how partial agonists drive alternative activation pathways in GluK2, why kainate receptors require unusually large conformational changes to desensitise and how heteromeric GluK2/GluK5 receptors differ from homomers in architecture, desensitisation and antagonist sensitivity. In these projects, I led the electrophysiological strategy, designed and tested key mutants and helped to merge structural and functional data into coherent mechanistic models with clear physiological and pathophysiological implications for glutamatergic transmission.

A key milestone in my trajectory has been a highly competitive American Heart Association Postdoctoral Fellowship (2023-2025), awarded to me as principal investigator for a project that I conceived and wrote independently. This fellowship has allowed me to define my own questions within the field of ionotropic glutamate receptors, manage resources and mentor junior researchers, consolidating my scientific independence. In parallel, I have taken on leadership roles, including co-organising the Cleveland Centre for Membrane & Structural Biology Symposium, serving as evaluator for the Arturo Rosenblueth Prize, recognising my expertise in ion channels, and engaging in outreach and mentoring activities for women and other underrepresented groups in STEM.

Building on this trajectory, my independent research line will focus on delta-type glutamate receptors (GluD1/GluD2), the least understood iGluR subfamily. I propose that GluD receptors integrate microenvironmental factors (ligands, ions, pH) and trans-synaptic partners (cerebellins, neurexins, metabotropic glutamate receptors) to switch between functional states and that human GRID1/GRID2 variants remodel these equilibria to alter neuronal excitability. I will combine structure-guided mutagenesis, patch-clamp recordings in heterologous systems and neurons, cryo-EM of stabilised intermediate states and super-resolution imaging of synaptic nanodomains to define microenvironment-dependent gating schemes for GluD receptors and link them to circuit-level functional and dysfunction.

Resumen del Currículum Vitae:

I am a Mexican biophysicist with training in ion channels structure-function, spanning protein biochemistry, X-ray crystallography, cryo-EM and patch-clamp electrophysiology. I obtained my MSc and PhD at IPICYT (San Luis Potosí, Mexico), where I worked on the structural biology of Xanthine Dehydrogenase from *Aspergillus nidulans* and, subsequently, on the calcium-activated chloride channel TMEM16A. As a first author, I identified a proton-driven activation mechanism. I helped delineate how calcium-FKBP12-calcineurin signalling and permeating anions regulate TMEM16A gating and anion selectivity, linking these mechanisms to epithelial secretion and excitability. This work resulted in several peer-reviewed publications, including a first-author paper in *Scientific Reports* and collaborative studies in *Journal of General Physiology*, *Cell Calcium* and a senior-author chapter in the *Handbook of Experimental Pharmacology*.

Since 2021, I have been a postdoctoral researcher at Case Western Reserve University (Cleveland, USA), in a highly collaborative environment at the interface of structural biology and membrane biophysics. My current work focuses on kainate receptors, where I am co-first author in high-impact studies combining cryo-EM and electrophysiology to uncover the structural basis of GluK2 activation by a partial agonist (*Nature Structural & Molecular Biology*), the mechanism of kainate receptors desensitisation (*Nature Communications*, accepted) and the architecture, desensitisation and inhibition of heteromeric GluK2/GluK5 receptors (under revision at *Science Advances*). Across these projects, I led the electrophysiological strategy, generated key mutants, and played a central role in integrating structural and functional data and in manuscript writing and revision.

In terms of competitive funding, I am the principal investigator of an American Heart Association Postdoctoral Fellowship (2023-2025) for an independent project in kainate receptor activation and desensitisation, the role of partial agonists and antagonists. Previously, I was supported by CONACYT fellowships for my MSc and PhD. I have undertaken long-term research stays in the USA and maintain active collaborations with groups in Europe, providing a strong basis to establish my own programme in Spain.

My experience extends beyond the bench. I have acted as a research consultant at CINVESTAV (Mexico), contributing to the design and scaling of processes for the production of recombinant antigens for preclinical vaccine studies. I co-organise the Cleveland Centre for Membrane & Structural Biology Symposium, including scientific programme design, speaker selection and session moderation, and I serve as evaluator for the Arturo Rosenblueth Prize. I have refurbished and optimised several patch-clamp rigs in my department and trained postdoctoral researchers, PhD students



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and undergraduates in advanced electrophysiology techniques. In parallel, I have been actively involved in outreach and mentoring activities aimed at encouraging girls, women and other underrepresented groups to pursue scientific careers.

Together, these achievements demonstrate a track record of high-quality research, competitive funding, technical and community leadership, and a well-defined independent line of research on glutamate receptors that I aim to develop through the Ramon y Cajal programme.



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Área Temática: Ciencias de la educación
Nombre: MARTÍNEZ ROMERO, MARÍA TERESA
Referencia: RYC2025-057183-I
Correo Electrónico: mariateresa.martinez13@um.es
Título: Educación Postural en el Contexto Escolar
Resumen de la Memoria:

My research career has focused on postural health, functional assessment, and back pain prevention in children and adolescents, with a strong emphasis on translating scientific evidence into educational and clinical practice. Since the beginning of my academic path, I have been committed to understanding how growth, maturation, sex, and physical activity influence spinal alignment, flexibility, and trunk muscle performance. This overarching line of research has been developed mainly through the ISQUIOS Programme, in collaboration with the regional Department of Education and the Aparato Locomotor y Deporte research group at the University of Murcia.

Across my trajectory, I have consolidated a multidisciplinary profile, integrating Sport Sciences, Physical Education, biomechanics, and public health. My work aims to identify early markers of postural alterations and musculoskeletal risk, develop reliable and field-based assessment tools, and design evidence-based strategies for health promotion during childhood and adolescence. This approach is reflected in my methodological versatility, employing cross-sectional, reliability and validity studies, normative data analysis, and systematic reviews with meta-analysis, using both frequentist and Bayesian frameworks.

A central outcome of my research is the development and validation of the Postural Fitness Protocol, a standardized battery for evaluating spinal morphology, hip flexibility, and trunk muscle endurance in school settings. This protocol has contributed new descriptive values for children and adolescents and has highlighted the influence of sex and biological maturation on postural and functional traits. My contributions have also provided normative flexibility profiles and movement-quality indicators in young athletes, particularly in female soccer players—an understudied population despite their growing participation and heightened injury risk.

Additionally, my research has offered strong evidence on the reliability of trunk endurance tests and on the prevalence and characteristics of back pain in school-aged children. These findings reinforce the need for early detection strategies and tailored preventive programs integrating postural education, functional mobility, and neuromuscular training. My studies on spinal morphotype in different sports (e.g., hockey, equestrian disciplines) have also expanded the understanding of sport-specific postural adaptations and their implications for injury risk.

Internationalisation has been a key component of my career. I have completed funded research stays in England, Italy and Spain, cementing collaborations with recognised experts and contributing to multidisciplinary and international research teams. These collaborations have enhanced the scientific relevance, methodological quality, and visibility of my work.

Overall, my research trajectory demonstrates a sustained commitment to improving back health and functional fitness in youth through rigorous scientific methods, open-access dissemination, and extensive knowledge transfer to educators, practitioners, and the wider community.

Resumen del Currículum Vitae:

Since 2014, I have developed my research career in postural health, postural education and functional assessment from childhood to adulthood. I began in the research group Raquis: Aparato Locomotor y Deporte, within the line “Postural Education in the School Context”, under the supervision of Prof. Sainz de Baranda. To deepen my expertise, I completed the Master’s Degree in Sport Performance and Health (UMH, 2015), finishing with the public defence of my thesis supervised by Prof. Vera García.

Afterwards, I obtained a competitive FPU predoctoral grant (FPU2015-05200), which allowed me to strengthen my research training and expand my international projection. I conducted a funded research stay at the University of Gloucestershire (UK, 2018), where I learned new screening tests and studied growth- and maturation-related changes. This stay initiated a close and ongoing collaboration with Prof. De Ste Croix, leading to several publications and invited seminars. In 2019, I was invited by Dr Izzo to deliver a week of seminars at the Università Degli Studi di Urbino (Italy).

In 2021, I defended my doctoral thesis entirely in English, receiving the qualification Excellent Cum Laude, International Mention and the Extraordinary Doctoral Award. After the viva, Prof. Susana Aznar invited me to undertake a postdoctoral stay at the University of Castilla-La Mancha to further investigate healthy lifestyle promotion in children and adolescents. Subsequently, I was awarded a prestigious Margarita Salas postdoctoral contract, which enabled a two-year stay in Toledo. There, I broadened my teaching experience at undergraduate, master’s and doctoral levels, and enhanced my leadership and mentoring skills by supporting several doctoral students.

I have participated in the national PACOyPACA project, collaborating with leading research groups in Spain (PROFITH, FENIX, AFIPS) and internationally (CIAFEL in Portugal, IPEN network in California, and the Active Living Laboratory in New Zealand). In 2025, I completed another research stay at the University of Gloucestershire to further strengthen these research links.

My scientific output includes 37 publications, of which 26 in peer-reviewed journals, as well as 6 book chapters. I have contributed to 7 national and international R&D projects, delivered 5 invited lectures, and presented more than 50 communications at major conferences.

Regarding knowledge transfer, I have contributed to the Science and Technology Week organised by Fundación Séneca and delivered training sessions for Sports, Health and Education Departments at the regional level. I also collaborated as coordinator, teacher and researcher in the “ISQUIOS Postural Hygiene Educational Programme”.

My applied experience includes research contracts with FC Barcelona, FC Cartagena and Cespa Servicios Urbanos de Murcia, focused on injury assessment, prevention and rehabilitation, and on training technical staff.

I developed the Postural Fitness Protocol, aimed at identifying individuals at risk of back pain and designing tailored preventive and rehabilitative strategies. In 2022, I received two awards for my research trajectory. To date, I have supervised 8 bachelor’s theses, 6 master’s theses, and 5 doctoral dissertations.



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Área Temática: Ciencias físicas
Nombre: POWELL, JADE
Referencia: RYC2025-056896-I
Correo Electrónico: dr.jade.powell@gmail.com
Título: Gravitational waves from core-collapse supernovae
Resumen de la Memoria:

My research areas are simulations of core-collapse supernovae, the explosive death of massive stars, and gravitational waves. I have made a significant impact with my 34 short author list publications, 17 of which I am the leading author. I have made critical contributions to supernova modelling. I have performed large scale simulations of the explosions of different progenitor stars in 3D, using the relativistic hydrodynamics code CoCoNut. My simulations have been up to 5 seconds long, allowing me to capture the full gravitational-wave signal, and make better predictions for the detection prospects of core-collapse supernova gravitational waves. I have enabled the science of others by making my gravitational-wave signals publicly available. My simulations have improved our understanding of observed black holes and neutron stars, which are born in core-collapse supernovae. I have performed the first 3D supernova simulations of the explosion of very massive stars that undergo pulsational pair instability mass loss. These explosions are essential for understanding black holes, as when stars lose mass due to the pulses, it changes the final mass of the black holes born in the explosion. This can result in bumps and gaps in the mass distribution of black holes observed through gravitational waves. I have simulated the smallest neutron stars ever produced in 3D core-collapse supernova simulations, to understand the smallest neutron star observed by radio astronomers. I recently submitted a letter that shows that even with recent tighter constraints on the allowed nuclear equation of state, that the is still significant uncertainty on which stars will become neutron stars and which will collapse to black holes.

I have multiple publications of about the explosion of progenitor stars with a variety of different magnetic field strengths and rotation rates. This has enabled us to better understand the impact of magnetic fields and rotation on the gravitational-wave emission from core-collapse supernovae. This is important because strong magnetic fields and rotation can change the mechanism that powers the explosion, and significantly increases the amplitude of the gravitational-wave emission. I have used my simulation results to show how we can determine the explosion mechanism of a star from the detection of a core-collapse supernova gravitational-wave signal, one of the biggest open questions in core-collapse supernova theory. My new gravitational-wave signals have enabled LIGO, and other smaller groups, to test their gravitational-wave searches for these types of signals. I have also produced the only low frequency gravitational-wave signals from the explosion of stars that include magnetic fields.

I am also heavily involved in gravitational-wave data analysis. I have published multiple papers about classifying transient gravitational-wave detector noise into different types to help find their origin and eliminate them. I have been part of the gravitational-wave rapid response team, and have sent out several rapid alerts to astronomers for newly discovered gravitational-wave signals. I am involved in the searches for gravitational-wave bursts, the search the whole sky, and also target specific sources that have been observed electromagnetically.

Resumen del Currículum Vitae:

I am an internationally recognized expert in hydrodynamical simulations of core-collapse supernovae, the explosive death of massive stars, and I have published significant works on core-collapse supernova simulations that predict their explosion properties, remnant properties and gravitational-wave emission. I have 34 short author list publications, 17 of which I am the leading author. I have extensive experience in gravitational-wave data analysis, and I have been a member of the LIGO Scientific Collaboration for 12 years.

My membership of the LIGO Scientific Collaboration has led to a high level of citations, over 120,000 and a high h-index of 100 (Google Scholar). This is due to the highly impactful science we do as a collaboration, including the Nobel Prize winning first discovery of gravitational waves. I qualify for authorship on those publications because I make a significant contribution to LIGO service work and discovery papers. I am currently the chair of the LIGO gravitational-wave burst working group, which is an elected leadership position, and I am also on the LIGO management team. As well as my management roles, I have contributed to LIGO papers by providing gravitational waveforms from my simulations, reviewing analysis codes and paper results, and directly contributing to the paper text. I have shared some of the most prestigious prizes in astronomy for my contribution to the first gravitational-wave detection. This includes the Princess of Asturias Award for Technical and Scientific Research, the Gruber Cosmology Prize, and a \$2000 USD share of the Special Breakthrough Prize in Fundamental Physics. I also shared Swinburne University's Vice-Chancellor's Research Excellence Award in 2018 for gravitational-wave discovery.

I have been awarded several competitive grants for my career stage. I have a Discovery Early Career Research Award (DECRA) titled, "Exploding massive stars and their implications for gravitational waves", awarded in 2021. I was a Chief Investigator of the ARC Centre of Excellence for Gravitational Wave Discovery from 2022 to 2024. I have been awarded 15 grants for millions of CPU hours through Australian supercomputer time allocation schemes. I was an international partner on the European Cooperation in Science & Technology (Cost) Action grant CA17137, "A Network for Gravitational Waves, Geophysics and Machine Learning", that was awarded in 2018.

I supervised one postdoc from 2022 to 2024 who has now started a research position in India. I am the supervisor of a PhD student who started in March 2024. I have supervised two Australian honours students, similar to a European masters degree, and five summer student research projects. I have supervised research projects for three other PhD students that have led to high impact publications.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Ciencias físicas
Nombre: PEREIRA LOPEZ, JESUS
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Título: Study of nuclear structure in proton rich nuclei
Resumen de la Memoria:

The observation of similar behaviour of protons and neutrons under the nuclear force led to the definition of isospin to account for the apparent charge independence and charge symmetry of the nuclear interaction. Since then, this so-called isospin symmetry was widely used in the theoretical description of the nuclear structure. Manifestation of this isospin symmetry can be found in mirror nuclei, whose level schemes are remarkably similar. Energy differences between mirror analog states in mirror nuclei arise from isospin-non-conserving interactions, such as the Coulomb interaction, and can show the effect of isospin-symmetry-breaking terms of the nuclear interaction.

A large body of work has built up in recent years examining the energy differences between analog states in mirror nuclei. These studies have shown that electromagnetic effects within the shell model alone cannot explain the observed differences, suggesting that other effective isospin-non-conserving (INC) interactions are missing from the current models. In particular, it has been shown that the INC interaction required in the $f7/2$ shell to reproduce experimental data has a very strong dependence with the coupled angular momentum J , for which there is no convincing explanation yet. This suggests a nuclear structure origin and points to a significant missing component in the current models. A comprehensive study of this effect is important to develop nuclear models that successfully account for this phenomenon and are able to reproduce experimental observations.

This application outlines a research program devoted to investigate the nuclear structure of proton-rich nuclei and the rich diversity of exotic features they present, such as isospin-symmetry-breaking effects, spin-aligned np pairing, shape evolution and shape coexistence, all worthy of study to further extend our knowledge of the nuclear force. The main objective is to further our understanding of the isospin-symmetry-breaking components of the nuclear force and investigate its effect in the nuclear structure of $N \sim Z$ nuclei. At the same time, these studies allow to address secondary objectives and shed light on other issues of contemporary significance such as the relevance of $T=0$ spin-aligned np pairing, the evolution of collectivity in $N=Z$ nuclei and shape coexistence. These objectives are in line with current collaborative efforts in the nuclear physics community, and while years of research have provided comprehensive information on isospin-symmetry-breaking for $A < 70$ and ^{88}O nuclei, this project targets a mass and isospin region where the lack of data is noticeable, seeking to push the boundaries of our current knowledge and provide a stringent test to state of the art theoretical models. This research line also plans to tackle a significant gap in the knowledge that exists on $E0$ transition strengths, leading a campaign of measurements that will provide valuable insight into shape coexistence in the same mass region.

Resumen del Currículum Vitae:

Throughout my career, I have developed significant experience setting up and running experiments in major radioactive beam facilities across the world (GANIL, CERN-ISOLDE, GSI, TRIUMF, Notre Dame University, Jyväskylä, RIKEN, Argonne, FRIB and RAON), involving complex setups with plastic scintillators, HPGe arrays, gas-filled spectrometers, MWPC, Si detectors and neutron detectors. My leading role is demonstrated by the support of my peers to defend several beamtime proposals at international accelerator laboratories, 5 of which were accepted in the face of stiff competition. In addition, I have acquired significant expertise in development of nuclear instrumentation, including Si detectors, γ -ray detectors, β -counters and neutron detectors.

I completed my PhD, jointly supervised by the Universidade de Santiago (Spain) and the LPC-Caen (France), studying shell evolution far from stability. In particular, the vanishing of magic number $N=20$ and the emergence of new subshell gaps was investigated by extracting the single-particle strength of states in ^{17}C via one-neutron transfer reactions, finding clear evidence for the absence of $N=14$ subshell gap, while the location of significant $d3/2$ single particle strength in two unbound resonances confirmed the existence of a $N=16$ gap.

I continued my career as Postdoctoral Research Associate, first at the University of Tennessee (US), where I focused on the development and characterization of the HAGRID array of LaBr₃ scintillators. Later, at the University of York (UK) I was responsible of several in-beam spectroscopy experiments carried out at Jyväskylä Accelerator Lab aimed to probe isospin symmetry and $T=0$ np pairing correlations. These experimental efforts led to the first spectroscopic study of ^{94}Ag : the heaviest odd-odd $N=Z$ nuclei for which excited states have been observed, allowing a major step forward in our understanding of isospin-symmetry-breaking interactions. During this time, I also had the opportunity to assist 4 undergraduate and 4 graduate students.

From June 2021, first as Postdoctoral Researcher and currently as Senior Researcher at the Center for Exotic Nuclear Studies (CENS) in the Institute for Basic Science (Korea), I led an independent research program aimed to probe the nuclear structure of proton rich nuclei: I am the main spokesperson of five accepted proposals at international radioactive beam facilities and I secured visiting fellowships in GANIL and Jyväskylä in 2023 and 2024 respectively. One of the most notable output from this work is the complete spectroscopy of ^{78}Y and the first observation of excited states in ^{78}Zr . These results were possible by pioneering the recoil- β - γ -tagging technique and represent the heaviest isobaric triplet for which Triplet Energy Differences have been extracted to date. At the same time, I have also devoted considerable efforts to nuclear instrumentation for the new Korean accelerator RAON: the development of STARK Si telescope and LaPANE neutron detector array (both successfully commissioned in 2024, where I played a major role), the design and fabrication of a position-sensitive β -tagging detector and my ongoing contributions towards the development of ATOM-X Active Target. These efforts culminated in the first in-beam spectroscopy experiment carried out at RAON, that I successfully led in November 2025.



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Título: Cosmología de precisión en la era Euclid: modelado, inferencia avanzada y nuevas ventanas al Universo oscuro

Resumen de la Memoria:

Guadalupe Cañas Herrera is a cosmologist specialising in dark energy, dark matter and Bayesian statistical methods. Her research focuses on constraining the fundamental cosmological model through four interconnected avenues: (1) verification and forecasting for major cosmological experiments, chiefly ESA's Euclid mission; (2) development of advanced statistical and machine-learning pipelines; (3) exploration of physics beyond Λ CDM using astrophysical datasets and novel observables; and (4) strong contributions to open-science software, training, and dissemination. A central figure in Euclid since 2018, she has led major forecasting efforts, evaluated instrument readiness, and co-developed the mission's flagship inference pipeline CLOE, for which she received the Euclid STAR Prize. Her first-author Euclid work delivered the first full multi-probe Bayesian forecasts including Stage-IV systematics, demonstrating Euclid's ability to meet its dark-energy goals. She has validated key elements of the Science Ground Segment and was appointed Euclid's first Cosmological Data-Release Coordinator for extensions beyond Λ CDM—one of the consortium's most demanding scientific roles. She is also a Euclid "Builder", a distinction awarded to only ~50 of 3400 members. She has pioneered machine-learning techniques for cosmological inference, including simulation-based inference for non-Gaussian posteriors and neural-network model selection with SHAP interpretability. She leads the modernisation of Euclid's likelihood framework into the open-science ecosystem cloe-org, now involving over 140 contributors and forming the core of future Euclid analyses. Her independent research spans early-Universe physics, inflation, modified gravity, neutrino cosmology, and multi-messenger probes. She has produced influential results on inflaton sound-speed reconstruction, modified-gravity forecasts, and gravitational-wave-galaxy cross-correlations, establishing new directions for Stage-IV and next-generation surveys. Cañas has published 134 scientific articles (~2000 citations, $h = 17$) and delivered over 60 invited talks. As ESA Euclid spokesperson, she has given 50+ media interviews and reached millions through public outreach. She is strongly committed to Open Science, maintaining widely used software such as euclidlib and leading the first fully public development of a European cosmology pipeline. Her career is fully international (Netherlands, Spain, Germany, UK, USA, France, Italy, Canada), with extensive collaborations and roles in major committees. She has secured over €900k in competitive funding, including a prestigious NWO Veni grant, EuroHPC allocations (>30M CPU hours), and multiple mobility and visitor grants. She has supervised and mentored PhD and MSc students across Europe and actively evaluates proposals for NASA, ESA, and UKRI. Her research programme ORACLE will develop next-generation inference tools, non-linear primordial-physics modelling, and gravitational-wave cross-correlation strategies. By integrating machine learning, theoretical modelling, and multi-probe cosmology, ORACLE aims to deliver the methodology required to detect the first robust signatures of physics beyond Λ CDM in the Stage-IV era.

Resumen del Currículum Vitae:

Guadalupe Cañas Herrera is a cosmologist whose research focuses on uncovering the nature of dark matter, dark energy, and the physics of the early Universe. She works at the interface between theory, computation, and observation, developing Bayesian and machine-learning frameworks to extract precise cosmological information from next-generation surveys. Guadalupe graduated with honours in Fundamental Physics from the University of Cantabria, completed an Erasmus year at Utrecht University, and carried out competitive research stays at DESY (Germany) and Brown University (USA). She obtained a cum laude MSc at Leiden University through the LION Fellowship and earned a PhD in Cosmology supported by the highly selective De Sitter Fellowship. Her doctoral work developed new Bayesian tools for model-extension cosmology and large-scale structure inference. Since 2018, Guadalupe has played a central role in ESA's Euclid mission. She became the youngest researcher to obtain Euclid Builder status for creating CLOE, the mission's first unified likelihood pipeline. She received the Euclid STAR Prize, led the cosmology section of the Euclid Mission Overview, and first-authored the mission's flagship forecasts demonstrating Euclid's capability to constrain dark energy and modified gravity with unprecedented precision. In 2022, she was awarded the ESA Research Fellowship in Space Science (2% success rate), becoming the first fundamental-cosmology fellow at ESA in 15 years. She contributed to Euclid's launch and early operations and served as ESA's Euclid spokesperson, giving over 50 international media interviews. She was also selected by both Euclid and ARAKIHS to lead cross-mission scientific synergies for dark-matter research. Since 2025, Guadalupe has been Senior Research Fellow at the Royal Observatory Edinburgh, expanding her expertise into weak gravitational lensing and PSF calibration, and strengthening collaborations with leading European instrumentation and cosmology groups. In parallel, she is establishing her own research line as PI of the NWO Talent Programme Veni grant (12% success rate), beginning in 2026 at Leiden Observatory. Her programme develops next-generation, differentiable inference architectures combining machine learning and mission-scale validation. Central to this work is cloe-org, Euclid's new open-science likelihood ecosystem built with JAX, which she co-owns and coordinates with ~140 contributors. Her independent research includes gravitational-wave-galaxy cross-correlations, inflationary physics, modified gravity, and simulation-based inference. She is (co-)PI of EuroHPC and RES computational grants totalling over 30 million CPU hours. Guadalupe has published 134 articles (55 peer-reviewed), with ~2,100 citations and an h -index of 17 (+7 in the past year). She has delivered more than 70 invited presentations worldwide, accumulated 500+ teaching hours, supervised 2 PhD and 5 MSc students, and mentored 8 early-career researchers. She regularly reviews grants for UKRI, NASA, and ESA, and referees for high impact journals. Leadership is a defining aspect of her career. She co-led the Euclid Theory Likelihood Working Package (2022–2024) and, since 2024, coordinates Euclid's 2026 Key Project on cosmological extensions, supervising over 100 researchers across 18 institutions. She has achieved ~€900k in research funding.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

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Título: Null Physics for Quantum Information in Quantum Gravity
Resumen de la Memoria:

My research explores a simple but profound idea: spacetime is not just a stage where physics unfolds -- its geometry is an active medium that stores, processes, and transmits information. The goal is to uncover the microscopic constituents of gravity, the "spacetime qubits" that determine how the universe evolves.

A central insight is that lightlike (null) hypersurfaces -- such as the paths light follows or the horizon of a black hole -- are the natural carriers of gravitational information. Their geometry acts as a causal membrane that organizes what any observer can see or influence. Over the last years, I developed a framework called Carrollian physics, which provides the mathematical language for describing these lightlike structures. This approach has become a cornerstone for "flat-space holography," an emerging program that seeks to understand quantum gravity without relying on the negative curvature spaces used in traditional holography.

A major part of this work has been to clarify how symmetries behave when gravity has boundaries. Horizons, null surfaces, and finite regions all come with additional degrees of freedom -- edge modes -- that must be included for the theory to make sense. I contributed to building the corner proposal, which shows that these boundary modes form universal algebraic structures across gravity and gauge theories. This leads naturally to quantum null geometry: a formulation in which geometric quantities such as area, expansion, and boost charge become genuine quantum operators, tied directly to entropy and information flow.

This research connects many traditionally separate ideas: hydrodynamics, holography, asymptotic symmetries, quantum information, and the geometry of null surfaces. The result is a coherent picture where gravitational dynamics, symmetries, and information theory reflect the same underlying structure.

My long-term vision is to establish a full quantum-informational description of spacetime. By combining gravitational phase space with the tools of operator algebras -- modular flow, relative entropy, entanglement -- I aim to develop a framework in which quantum observables on null surfaces have clear statistical and operational meaning. This will make it possible to derive new entropy laws, quantify quantum fluctuations of geometry, and identify monotonic quantities controlling the flow of information in dynamical spacetimes.

This programme goes beyond incremental extensions of holography: it constructs a bulk description valid at finite distances and applicable in flat, de Sitter, and anti-de Sitter settings alike. It offers a bridge from deep conceptual questions -- such as the quantum origin of time -- to observational physics, from gravitational waves to potential tabletop signatures of quantum geometry.

Ultimately, the aim is a unified theory in which geometry, quantum information, and gravitational dynamics emerge as complementary faces of the same physics, revealing the quantum fabric of the universe through the structure of its null hypersurfaces.

Resumen del Currículum Vitae:

My academic path has taken me across several leading research environments in Europe and North America. I completed my studies in Italy and France, earning top distinctions at each stage, culminating in a PhD at École Polytechnique. Afterward, I spent three years as a postdoctoral researcher at the Université Libre de Bruxelles before moving to the Perimeter Institute for Theoretical Physics, where I am currently a postdoctoral scholar.

Throughout this trajectory, I have built an internationally connected profile. I am an active member of major research collaborations, including the Simons Collaboration on Celestial Holography, the QuRIOS initiative on quantum gravity phenomenology, the International Society for Quantum Gravity, and Europe COST and Chilean Fondecyt networks spanning Europe, Asia, and South America. These collaborations give me the opportunity to contribute to coordinated efforts in quantum gravity, while also keeping close ties with experiments and phenomenology.

I have received several distinctions for my work and research proposals, including a Marina Solvay Fellowship, a Simons-funded contract extension for exceptional research contributions, and top evaluations in European competitive programs (Seal of Excellence and highest-grade scores for Horizon Europe MSCA/ERC call submissions). I also hold national-level teaching and research qualifications in both France and Italy, obtained by unanimous vote.

Teaching and mentoring are important components of my career. I have taught or lectured at international schools, universities, and workshops across Europe and South America, covering topics from holography to asymptotic symmetries. I have served as a teaching assistant for advanced graduate courses in gravity, QFT, and group theory, and I regularly mentor students: master's students, PhD students, and Perimeter Scholars International participants. I have also sat on multiple thesis committees across Europe.

Scientific communication and community building are central to my activities. I have delivered over a hundred invited talks and seminars at universities and institutes worldwide -- Caltech, Stanford, Berkeley, Toronto, ENS, Nordita, IAS Princeton, Harvard, and many others. I organize and co-found international events, including the multi-year "Quantum Information in Quantum Gravity" conference series and major workshops at the Perimeter Institute. I have chaired seminar programs with large invited-speaker rosters and have coordinated cross-institutional meetings.



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I also contribute extensively to peer review, evaluating manuscripts for top journals such as Physical Review Letters and D, Nature Communications, Nuclear Physics B, JHEP, SciPost, EPJC, and others. Additionally, I act as reviewer for national science agencies, including FONDECYT in Chile.

Beyond academic work, I participate actively in outreach: public interviews, institutional visits, science communication events, and contributions to international delegations visiting the Perimeter Institute. I also take part in media initiatives, including a forthcoming documentary on the institute.

Taken together, my career combines international mobility, strong community involvement, sustained teaching and supervision, and active service to the scientific community -- complementing my research program with a broad record of academic engagement and leadership



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Título: Geometry
Resumen de la Memoria:

My research is centered on the classification of algebraic varieties, guided by the deeply connected frameworks of the Minimal Model Program (MMP) and K-stability. The primary aim is to understand the structure and moduli of special, yet fundamental, classes of varieties that emerge from these theories.

A central focus lies on Fano varieties - those with ample anti-canonical bundle, or from the point of view of differential geometry, those with positive curvature - which serve as one of the three basic building blocks in the MMP. I study their birational geometry, singularities and the structure of their (GIT/K-moduli)moduli spaces. This naturally extends to the study of Mori dream spaces, a wider class of varieties that share the good birationally controlled behavior of Toric varieties. These have many nice properties regarding their cones of divisors, which translates into an optimal behaviour with respect to the MMP. On the other hand, they also frequently present pathologies which tend to be rather mysterious.

The algebraic-geometric perspective is deeply intertwined with complex differential geometry through the study of Kähler-Einstein metrics (KE-metrics), and the precise bridge is given by the foundational Yau-Tian-Donaldson Conjecture. A key thread of my work involves exploring the algebraic side of this conjecture, using K-stability as the precise algebraic criterion to determine which Fano varieties (necessarily with Kawamata Log Terminal singularities) admit these canonical metrics. This creates a powerful bridge, where the existence of a KE metric has profound implications for the algebro-geometric classification and stability of the variety.

Finally, to navigate the birational maps between different outputs of the MMP, my research engages with the Sarkisov Program. This algorithmic theory, which decomposes birational maps into elementary "links," is essential for understanding birational rigidity, relations between different Mori fiber spaces, and the overall geography of varieties within a birational equivalence class.

In summary, my work seeks a unified understanding of Fano varieties (or varieties of Fano type) by combining the two perspectives of birational geometry and K-stability.

Resumen del Currículum Vitae:

I have a total of eight publications in International Journals for mathematics and three preprints which are all submitted to Q1 Journals, including the Journal of the European Mathematical Society (JEMS) and Algebraic Geometry.

My publications feature in top tier journals such as J. Reine Angew. Math. (also known as the Crelle's Journal), the Journal of the London Mathematical Society, the Forum Math. Sigma, the European Mathematical Society - Surveys in Mathematical Sciences or the Ann. Mat. Pura Appl., all Q1 journals.

My Google scholar citations are increasing every year with a total of 43 citation. 2 in 2022, 9 in 2023, 11 in 2024 and 18 in 2025. My h-index is 4.

I presented my work in several international conferences and seminars since I began my PhD in 2017. These include conferences in 2024: (Oberwolfach - Germany, Warsaw - Poland, Cambridge - UK, Paris - France, Wakkanai - Japan, Cetraro - Italy, Warwick - UK)

2025: (IMPA - Brazil, Luminy - France, Pohang - South Korea, Krakow - Poland, Honolulu - US, Gokova - Turkey, California - US)

as well as longer research visits to several institutions such as The University of Cambridge (UK), University of Toulouse (France), University of Montpellier (France), The Simons Foundation (US), the Johannes Kepler University (Austria) ...

I have regularly been responsible for delivering exercise classes to Bachelor or Master students and I was also the full responsible to a course (Complex Analysis) at Loughborough University. I will also lecture a course on Algebraic Geometry next semester at the University of Basel. I have had exceedingly good feedback from the students.

I have supervised a Master's Thesis in Algebraic Geometry while I was a PhD student at Loughborough University. The student is now pursuing his own PhD at the University of Reading, UK.

I served as a referee for several international Journals such as J. Lond. Math. Soc., Eur. J. Math., New York J. Math., EMS Surv. Math. Sci., Glasgow Math. J. and I am often asked by prestigious journals to give short opinions on the quality of submissions.

I enjoy speaking different languages: Portuguese, English, Spanish, French, Italian and German which I do with different degrees of fluency.



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Área Temática: Ciencias matemáticas
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Título: Cubical small-cancellation theory and Artin groups
Resumen de la Memoria:

Geometric group theory studies the relation between spaces and their symmetries, which is encoded through algebraic structures called groups. As a field, it merges together three of the pillars of mathematics: geometry, topology, and algebra. It is a fast growing field that is also truly interdisciplinary interacting with much of pure mathematics (including topology, geometry, dynamics, and probability), and also with other fields such as cryptography, topological robotics, and biology.

I work in geometric group theory and geometric topology. My research concerns hyperbolic and non-positively curved groups and spaces, non-positively curved cube complexes, notions of asphericity and dimension for groups, and the geometric topology of curves and surfaces.

Three of my main goals are:

▣ Using cubical small-cancellation theory to tackle problems about Artin groups and related classes, and to investigate the structure of cubulated groups in general. For instance, I have used this framework to reprove the $K(\pi, 1)$ conjecture in a purely topological way for certain classes of Artin groups, and in joint work with in progress Martin, we have used these tools to show that many Artin groups are cubulated. In a different direction, in joint work with Jankiewicz and Wise, we have proven that simple cubulated groups can only arise from actions on direct products.

▣ Understanding the structure of aspherical 2-complexes and aspherical spaces arising from quotients of cubulated groups. The study of these objects relates to an intriguing algebraic property called the Cohen-Lyndon property, and has applications to coherence. My work in this direction has resolved (jointly with Duda) a question of Lyndon and Wall and (jointly with Wilton) a conjecture of Wilton which also partially resolves a conjecture of Wise.

▣ Elucidating the connection between geometric and topological properties of curves on surfaces. For instance, by finding a quantitative relation between shortest geodesics and their intersection numbers. My joint work with Neumann-Coto in this direction significantly advances the state of the art in this area.

Resumen del Currículum Vitae:

I completed my BSc in Mathematics, graduating with distinction, at UNAM (the highest ranking university in Mexico) in 2018, my MSc at McGill University in 2020, and my PhD at Cambridge in 2023, funded by a Cambridge Trust scholarship. Currently I hold the Denman Baynes Research Fellowship at Clare College, Cambridge a highly selective postdoctoral award established in 1918 and granted every 4 years to a PhD student in STEM.

I have established a strong track record of impactful and original research, both independently and in collaborations; my record is evidenced by 10 preprints and publications, and by invitations to present my work at more than 30 international conferences and seminars in the space of the last two years, including at some of the most prestigious events in the field, such as the 60th edition of the Cornell Topology Festival and the 12th Young Geometric Group Theory conference. In November 2025, I was a keynote speaker at the London Mathematical Society Global Meeting in Mumbai, where I was also invited to participate in a Women in Math discussion panel. Notably, my PhD work was recognised with the Vicent Caselles mathematical research award from the Royal Spanish Mathematical Society and the BBVA Foundation.

I have demonstrated a potential for leadership in the research community, and shown a commitment to the advancement of the field by co-organising several academic events: the summer school Homological aspects of groups and their classifying spaces which took place at the SwissMAP research station in Switzerland, the conference Hyperbolicity and generalisations, which took place in Harbin, China, and the 1st and 2nd editions of the Geometric group theory without boundaries summer school, which took place online during the pandemic. I have several years of experience in the organisation of institutional research seminars, both as a PhD student and postdoc at Cambridge, and as a Masters student at McGill University.

Concerning communication and outreach, I participated both as a volunteer and as a co-organiser in the Maths Festivals organised by the Maths Institute of the National Autonomous University of Mexico (UNAM). While an undergrad student, I participated in four of these events in two different cities in Mexico, where she helped train volunteers and designed new activities. During this period, I also won two awards for my expository scientific writing, awarded by the Universo.Math online magazine and the Fondo de Cultura Económica (a government-funded international publishing house).



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Título: Advancing statistical methodologies for the analysis of complex real-world datasets
Resumen de la Memoria:

My research career integrates Bayesian statistics, compositional data analysis, and the modelling of multiple environmental exposures. I have built a solid track record in methodological development and interdisciplinary application, with 26 JCR-indexed publications (10 in Q1 and 8 in D1) and relevant authorship in 13 of them. My contributions span from foundational advances in Bayesian hierarchical, hidden and spatial models to methodological innovations addressing individual heterogeneity, integrated databases, survivorship bias, and the joint analysis of complex exposures.

My early work focused on developing new Bayesian methodologies for capture-recapture and survival models, establishing the basis of my statistical line during my PhD and subsequent postdoctoral stages. Through research stays in Sweden and the UK (including two years at the University of Edinburgh, school of Mathematics) I strengthened my methodological expertise and international profile. During this period, I developed novel models for large-scale heterogeneous data, contributed efficient likelihood formulations for integrated datasets, and created new algorithms for high-dimensional survival models. These contributions led to publications in leading journals (Biometrics, Annals of Applied Statistics, JABES), conference awards, and the consolidation of long-term international collaborations.

In parallel, my applied work in environmental epidemiology expanded my research agenda toward the statistical modelling of multiple exposures and microbiota data. As a postdoctoral researcher as statistician at FISABIO, I have led the statistical components of studies evaluating the effects of environmental contaminants on thyroid function, neurodevelopment and sexual maturation, as well as Bayesian spatial models for urban health and marine biodiversity. These works motivated my current focus on the joint modelling of gut and vaginal microbiota and mixtures of environmental contaminants, areas where analytical challenges align naturally with my methodological expertise. I also collaborate with Ancilia Biosciences (USA) to translate microbiome research into clinical applications, reinforcing the transfer potential of my work.

I have demonstrated leadership and independence through a competitive regional project as PI, the supervision of PhD and MSc students, and coordination roles within national and international networks. I have delivered 64 conference communications (36 as first author, including invited talks), received three national awards, participated in European projects, and contributed to organizing international scientific events.

Overall, my research trajectory reflects a coherent and evolving line centred on the development of advanced Bayesian models for complex, high-dimensional and compositional data, with strong application to environmental epidemiology and microbiome research. My goal for the RyC stage is to expand this line by creating new statistical methodology for the joint analysis of microbiota and multiple exposures, contributing both methodological innovation and high-impact interdisciplinary applications.

Resumen del Currículum Vitae:

I completed my PhD under a highly competitive FPI fellowship at the School of Mathematics of the University of Valencia. My doctoral training included five international research stays in UK and Sweden (9 months in total), which allowed me to establish international collaborations and build a solid research profile in advanced statistical methodology. From 2020 to 2022, I worked as a biostatistician at FISABIO (Environment and Health Area), where I provided methodological leadership in the application of advanced statistical models to real-world public health problems. I was subsequently awarded two competitive postdoctoral fellowships: Margarita Salas (2022–2024) and Sara Borrell (2024–2027), reflecting the consistency and quality of my research trajectory. During my Margarita Salas fellowship, developed at the school of Mathematics in University of Edinburgh (UK), I worked within an internationally leading environment in statistics and data science, strengthening my research on efficient model fitting, hierarchical models, individual heterogeneity and compositional data analysis. This period was key in consolidating my scientific independence and international projection. My current Sara Borrell fellowship, based at FISABIO, focuses on developing novel methodological approaches for compositional data analysis applied to environmental and health research. To date, I have published 26 JCR-indexed articles (two accepted), with a relevant authorship position (1st, 2nd or corresponding) in 13, as well as 10 dissemination articles and 4 book chapters. Several of these works involve methodological advances in statistical modeling for complex data, with a clear potential for transfer to other scientific contexts. I have also published in applied journals in ecology and epidemiology, contributing advanced Bayesian, spatial and hierarchical modeling approaches to interdisciplinary problems. My research is supported by a strong international network, including collaborations with researchers from the University of Edinburgh, Lancaster University, University of Kent, Uppsala University and the University of St Andrews, as well as national institutions such as the University of Valencia, the Polytechnic University of Valencia and the University of the Basque Country. In terms of leadership, I currently co-supervise two PhD students and I have supervised four Master's dissertations and one undergraduate thesis, spanning institutions in Spain and the UK. I have participated in six national research projects (one as PI) and two international projects, and I currently lead a research group within the Valencia node of the National Biostatistics Network. I have delivered 64 conference contributions, including invited talks, and received three awards at national statistical conferences. I am also actively involved in knowledge transfer and evaluation activities, serving as a member of the Basque Government fellowship evaluation committee and acting as co-leader of public-private R&D collaboration with a biotechnology company (Ancilia) on metagenomic NGS analysis of vaginal microbiota, a project currently advancing toward patent development. My work is guided by a strong commitment to open science, with my code publicly available, and by regular outreach and dissemination activities.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Ciencias matemáticas
Nombre: CUECA TEN, MIGUEL
Referencia: RYC2025-054681-I
Correo Electrónico: kemalvaeso@hotmail.com
Título: Higher symplectic geometry: From classical to quantum aspects
Resumen de la Memoria:

My academic path has been shaped by extensive international mobility. I completed my undergraduate studies at the University of Valencia in Spain (2009–2014), after which I moved to Brazil to pursue my PhD at IMPA under the supervision of Henrique Bursztyn (2014–2019). I then continued my research in Germany, holding a postdoctoral position at the University of Göttingen (2019–2024) within Chenchang Zhu's Higher Structures group. Currently, I am based in Belgium as an FWO Special Research Associate (postdoctoral researcher) at KU Leuven, where I work with Marco Zambon's Poisson Geometry group.

My work sits at the crossroads of differential geometry and mathematical physics, using supergeometric and simplicial methods as central languages to both conceptualize and solve structural problems in Poisson, symplectic and higher Lie theory. A recurring viewpoint in my papers is to encode classical geometric objects (Lie algebroids, Courant algebroids, Dirac structures...) as differential graded manifolds (dg-manifolds) and then study their global counterparts, i.e. higher Lie groupoids. This approach allows me to investigate questions such as Morita invariance, homological tools to treat deformations or cohomological problems. A major focus of my work is the study of (shifted) symplectic structures in the graded setting and how these transfer to higher Lie groupoids.

The main goal of this project is to explore various quantization procedures for m -shifted symplectic Lie n -groupoids and related Q -manifolds, with the aim of understanding how these different approaches compare and interact. More concretely, the project will develop along three complementary lines:

- (1) the geometric quantization of shifted symplectic structures;
- (2) the deformation quantization through the operadic E_n -algebra framework; and
- (3) the development of the AKSZ sigma model formalism into concrete, meaningful computations.

Resumen del Currículum Vitae:

The main goal of this project is to explore various quantization procedures for m -shifted symplectic Lie n -groupoids and related Q -manifolds, with the aim of understanding how these different approaches compare and interact. More concretely, the project will develop along three complementary lines:

- (1) the geometric quantization of shifted symplectic structures;
- (2) the deformation quantization through the operadic E_n -algebra framework; and
- (3) the development of the AKSZ sigma model formalism into concrete, meaningful computations.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Ciencias matemáticas
Nombre: BOCCHI, EDOARDO
Referencia: RYC2025-055808-I
Correo Electrónico: bocchi.edoardo@gmail.com
Título: Análisis teórica de problemas en mecánica de fluidos
Resumen de la Memoria:

My research career focuses on the mathematical analysis of partial differential equations arising in fluid mechanics, with particular attention to free-surface problems and fluid-structure interactions. I have worked on different physical settings, such as shallow-water models, fluids in porous media, rotating geophysical fluids and wind-bridge models, combining rigorous modelling with theoretical analysis.

During my PhD, I studied the interaction between water waves and floating structures. I established the first local well-posedness results for axisymmetric floating structures in shallow water and addressing the challenge due to the surface discontinuity at the vertical side-walls. I also derived a nonlinear integro-differential equation describing the return-to-equilibrium of a heaving buoy, providing a rigorous generalization of the classical Cummins equation used in naval engineering. In parallel, I worked on the dynamics of compressible rotating fluids, analyzing anisotropy and stratification effects and studying the fast-rotation singular limit that leads to a quasi-geostrophic target dynamics with damping due to boundary layers. Afterwards, I further contributed to the mathematical modeling of wave-energy converters developing and analyzing the first nonlinear shallow-water model for oscillating water column devices, including its numerical simulation and the study of a refined model with time-dependent air pressure. I also worked on the dynamics of viscous fluids in porous media, deriving thin-film approximations of the one-phase Muskat problem and proving their rigorous justification together with the stabilization of unstable configurations due to capillarity.

More recently, I have studied interactions between immersed solid and incompressible viscous fluids, motivated by applications to suspension bridges. I established existence and uniqueness of asymmetric equilibrium configurations in 2D and extended the analysis to a 3D model where the deck is modeled as a 1D elastic beam. In a related line, I worked on the contact problem for Darcy flows in Hele-Shaw cells, obtaining global-in-time a priori estimates for perturbations of the stationary state.

The research I plan to develop during the grant builds naturally on these results but aims to advance the mathematical understanding of interaction problems in more complex and realistic settings. First, I will study Darcy droplets and the contact problem for the two-phase Muskat model, aiming to obtain global well-posedness without restrictions on contact angles and to understand stabilization phenomena in unstable regimes. Second, I will investigate quasi-collisions of particles in viscous fluids, developing a variational framework that justifies lubrication asymptotics in multi-contact configurations, with applications to sedimentation near rough surfaces and multi-particle interactions. Third, I will analyze the dynamics of multiple floating structures, such as buoy farms, and take initial steps toward a mathematical model for floating wind turbines, which consists in a multi-dynamics problem where the solid interacts simultaneously with water and air.

Resumen del Currículum Vitae:

I am an applied mathematician with a research interest in the theoretical analysis of partial differential equations arising in fluid mechanics. In September 2016, I graduated from the Università degli Studi di Milano with a master thesis on the water waves problem. In September 2019, I earned my PhD in Applied Mathematics from the Université de Bordeaux in France. Under the supervision of David Lannes and Christophe Prange, my thesis addressed waves-structure interactions and rotating fluids.

Since March 2022, I have been a postdoctoral fellow at the Department of Mathematics of Politecnico di Milano in Italy under the supervision of Filippo Gazzola. Over the last two years, I have been funded by the European Union through the Horizon Europe programme as an MSCA Postdoctoral Fellowship with the project THANAFSI, which focuses on the theoretical analysis of fluid-structure interaction problems. Previously, from October 2019 to February 2022, I was a postdoctoral fellow at the Instituto de Matemáticas de Sevilla, where I worked within the ERC Starting Grant FLUID-INTERFACE project led by Francisco Gancedo on the analysis of moving incompressible fluid interfaces.

My research has led to nine peer-reviewed publications in high-level international journals, including Indiana University Mathematics Journal, Annales de l'Institut Henri Poincaré, and SIAM Journal on Mathematical Analysis, as well as one preprint. I have disseminated my work at numerous international conferences, workshops, and seminars across Europe and one in South America, often as an invited speaker. I have also done several research stays at different mathematical institutes in Europe, which have allowed me to expand my research network, mostly distributed across Italy, Spain and France.

Throughout my early-stage career, I have been involved in several funded research projects. I was the beneficiary of the two-year MSCA Postdoctoral Fellow grant and the coordinator of a one-year Italian national project. Moreover, I participated in four Italian national projects, one Spanish national project, one regional Andalusian project, and one ERC project. I have also co-organized five workshops, one research group seminar, one PhD seminar and one PhD working group. I hold the habilitation for the French junior professor *Maître de Conférences* in both Mathematics and Applied Mathematics sections.

In addition to research, I am committed to teaching. During my PhD and postdoctoral positions, I have led lectures and exercise classes covering several topics in mathematical analysis, including differential calculus, integral calculus, and differential equations. My teaching activities have been adapted to diverse audiences: I have taught at different levels, from the first to the third year of Bachelor studies, and in various scientific degree programs, including Mathematics-Computer Science, Biology, Chemistry, and Engineering. I have also co-supervised one research internship and one master's thesis.

I have actively engaged in outreach and communication activities, including seminars for high school students and a participation in the European Researchers' Night. Thanks to my international background, besides Italian, my mother tongue, I am fluent in English, Spanish, and French.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Ciencias sociales
Nombre: SAMPEDRO MARTINEZ DE ESTIVARIZ, JON
Referencia: RYC2025-054827-I
Correo Electrónico: sampedro.jon@gmail.com
Título: Evaluación Socioambiental
Resumen de la Memoria:

I am an environmental economist with a transdisciplinary research trajectory dedicated to understanding human-Earth system interdependencies and how these evolve under key socioeconomic and biophysical drivers. My work applies integrated assessment modelling, energy-society-environment system analysis, and quantitative methods to evaluate global and regional sustainability strategies. This holistic perspective enables the examination of how climate, energy, air pollution, health, inequality, and broader social dynamics interact across alternative future pathways.

I am currently an Ikerbasque Research Fellow at the Basque Centre for Climate Change (BC3), a highly competitive position supporting outstanding independent researchers. Previously, I was awarded a Marie Skłodowska-Curie Fellowship at BC3, where I served as PI of an independent project focused on the health co-benefits of transitioning toward sustainable pathways. I have served as co-PI of the EU-funded HORIZON project IAM COMPACT, which provides policy-relevant assessments of post-2030 decarbonization pathways. I have also contributed to several cross-regional research projects funded by various agencies, particularly the European Commission. Recently, I co-led Work Package 3 in the DIAMOND project (HORIZON), coordinating the "Update & Upgrade" of six next-generation integrated assessment models.

Throughout my career, I have built a strong international network spanning research institutes, government agencies, and global organisations, including the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), the World Health Organization (WHO), and the Spanish Ministry for the Ecological Transition and Demographic Challenge (MITECO). I am a member of the WHO Global Air Pollution and Health Technical Advisory Group, where I provide guidance on the links between air pollution, sustainability, and health outcomes, and I serve on the steering committee of the Global GCAM User Committee (GGUC), contributing to the strategic development and governance of the GCAM model. My research has contributed to scientific and policy debates on sustainability and human well-being. Collaborations with institutions such as WHO and MITECO have enabled me to participate in key policy reports, including the WHO's Air Quality, Energy and Health Science and Policy Summaries and Spain's National Energy and Climate Plan (NECP) and Long-Term Strategy (LTS).

Dissemination is a central component of my work. I regularly present at international scientific conferences and engage with national and regional media to ensure that research findings are accessible beyond academic audiences. I am also involved in educational initiatives, sharing insights on sustainability with high-school and university students as well as early-career researchers.

Looking ahead, my research line aims to develop a next-generation integrated modelling framework that incorporates equity, human health, and well-being into climate and sustainability policy assessments across multiple scales. Through innovative methods and active stakeholder engagement, my work aims to strengthen the science-policy interface and ensure that sustainability strategies are socially relevant, equitable, and actionable in real-world decision-making.

Resumen del Currículum Vitae:

My scientific track record includes 32 peer-reviewed research articles and one book chapter, with 28 publications indexed in SCOPUS, 92% of which appear in first-quartile (Q1) journals. More than half of my publications (54%) rank among the top 25% most cited worldwide. Reflecting a broad international collaboration network, 73% of my articles are co-authored with researchers based in other countries, and 8% involve partnerships with both academic and corporate institutions. I have accrued 906 citations in SCOPUS (h-index 13) and 1,163 citations in Google Scholar (h-index 16; i10-index 23), and my Field-Weighted Citation Impact (FWCI) of 2.75 demonstrates strong global visibility and influence.

My research has been published in high-impact journals such as Nature Energy or The Lancet Planetary Health. My outputs include methodological developments in integrated assessment modelling and global scenario analysis, all openly accessible through GitHub and Zenodo. I regularly serve as a reviewer for leading journals, including those in the Nature and The Lancet groups, or Geoscientific Model Development, reflecting recognition of my expertise within the scientific community.

Beyond academic publishing, I contribute actively to national and international policy-oriented assessments. I recently participated in the development of the WHO's Air Quality, Energy and Health Science and Policy Summaries, which synthesise current evidence to support decision-makers working at the intersection of air quality, health, energy access, and climate change. I also contributed to the Lancet Countdown Europe report, providing expert review of several health- and inequality-related indicators.

Since 2018, I have been involved in national policy processes in Spain, collaborating with the Ministry for the Ecological Transition and Demographic Challenge on the quantitative assessment of the National Energy and Climate Plan (NECP) and the Long-Term Strategy (LTS), and coordinating analyses of air-pollution-related health co-benefits. This work has informed central components of Spain's energy transition and has been acknowledged by senior governmental authorities, including the Spanish Prime Minister. At the regional level, I contributed to the assessment "The Energy Transition of the Basque Country Towards a Sustainable Model" for the Basque Ombudsman, which examined the socioeconomic implications of the Basque energy transition.



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Overall, my CV reflects a strong and internationally recognised scientific trajectory, characterised by high-impact publications, methodological innovation, and active engagement with policymaking processes.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Ciencias y tecnologías de materiales
Nombre: LOSADA GARCIA, NOELIA
Referencia: RYC2025-054418-I
Correo Electrónico: noelia.losada.garcia@gmail.com
Título: Del Conocimiento a la Aplicación: Innovación y Liderazgo en Materiales Híbridos para la Sostenibilidad Ambiental

Resumen de la Memoria:

Noelia Losada García es investigadora postdoctoral en el BioSystems & Integrative Sciences Institute (BioISI, Lisboa, Portugal), en el laboratorio de Materiales Bioactivos y Multifuncionales desde enero de 2023. Su trayectoria se centra en nanomateriales híbridos sostenibles y biocatálisis, desarrollando agentes multifuncionales para aplicaciones ambientales, sanitarias y de remediación. Tras completar su Doctorado en Química Aplicada (UAM-CSIC, 2022, Summa Cum Laude), ha consolidado una línea científica independiente basada en nanoarquitecturas enzima-grafeno y recubrimientos multifuncionales, combinando catálisis, biotecnología y ciencia de materiales.

Ha liderado proyectos competitivos internacionales, incluyendo la MSCA Postdoctoral Fellowship (2023-2026) y un proyecto exploratorio FCT (2025-2026), coordinando planificación experimental, supervisión de personal y gestión de recursos. Su investigación integra transferencia tecnológica, con patentes internacionales aplicadas en colaboración público-privada (Samsung Electronics, DECAMED), destacando un agente biohíbrido de cobre biocida aplicado en mascarillas y superficies, reconocido con el 3.º premio a la Mejor Invención (OEPM 2023) y difundido a nivel internacional.

Comprometida con la divulgación científica y la ciencia abierta, ha participado como keynote speaker y miembro de comités científicos en conferencias internacionales (ICBEB-YS 2023, MIC-STAND 2024, EUROMIC COST Action), asegurando la transferencia de conocimiento a la academia, industria y sociedad. Sus trabajos se publican en acceso abierto y cumplen con los principios FAIR para la gestión de datos, promoviendo transparencia y reutilización.

Su trayectoria refleja independencia científica consolidada, liderazgo y capacidad de consolidar una línea de investigación de alto impacto, orientada a soluciones sostenibles mediante nanotecnología, biocatálisis y materiales híbridos funcionales, posicionándola como investigadora principal competitiva a nivel europeo.

Resumen del Currículum Vitae:

Noelia Losada García, Postdoctoral Researcher en BioISI (Lisboa, Portugal) desde enero de 2023, posee Grado en Ingeniería Química (UMA, 2017), Máster en Ingeniería Química (UAM-URJC, 2019) y Doctorado en Química Aplicada (UAM-CSIC, 2022, Summa Cum Laude).

Su experiencia abarca nanomateriales híbridos sostenibles, biocatálisis, catálisis y aplicaciones ambientales y sanitarias. Ha publicado más de 24 artículos internacionales, un capítulo de libro y ha generado dos patentes internacionales, incluyendo un agente biohíbrido de cobre biocida licenciado por Samsung y premiado con el 3.º premio a la Mejor Invención (OEPM 2023). Este trabajo se tradujo en el proyecto EPIS: new materials for masks and virucidal treatments (PTI-Health CSIC, 2021-2022), validando materiales virucidas en mascarillas y superficies, con repercusión mediática internacional.

Ha liderado proyectos competitivos internacionales: MSCA Postdoctoral Fellowship (2023-2026), proyecto exploratorio FCT (2025-2026) y BioISI Project 2024, coordinando planificación experimental, supervisión de personal y gestión de recursos. Ha participado en siete proyectos nacionales e internacionales y colaborado con empresas (Samsung Electronics, DECAMED).

Su movilidad internacional incluye estancias en Maynooth University (Irlanda, 2022), ENDURES B.V. (Países Bajos, 2023-2024) y BAM (Alemania, 2025), fortaleciendo redes y colaboraciones europeas, generando publicaciones conjuntas y proyectos cooperativos.

Ha desarrollado metodologías pioneras de síntesis sostenible de nanopartículas metálicas mediante procesos enzimáticos (Cu, Pd, Au), recubrimientos multifuncionales y protocolos de caracterización catalítica y fotocatalítica, aplicables a degradación de contaminantes y transformación de CO₂. Comprometida con la divulgación científica, ha participado en más de 15 conferencias y workshops internacionales, incluyendo MIC-STAND 2024, ICBEB-YS 2023 (keynote y comité científico) y EUROMIC COST Action, además de actividades de difusión en medios de comunicación.

Su trayectoria refleja independencia científica, liderazgo y capacidad de coordinación de proyectos multidisciplinares, supervisión de estudiantes de grado y máster, transferencia tecnológica y consolidación de una línea propia de investigación con impacto científico, tecnológico y social en nanotecnología, biocatálisis y materiales híbridos sostenibles.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Ciencias y tecnologías medioambientales
Nombre: PUIG CASTELLVÍ, FRANCESC
Referencia: RYC2025-055806-I
Correo Electrónico: puig.francesc@gmail.com
Título: Development of new methods for the analysis of omics data to study perturbed microbial systems
Resumen de la Memoria:

My research focuses on understanding how biological systems are impacted by exposures, with particular interest on microbial communities (anaerobic digesters, human-gut microbiome). Using metabolomics, metagenomics, chemometrics and chemoinformatics, I have contributed to advancing the knowledge on the underlying metabolic mechanisms occurring prior to onset or throughout the course of perturbations.

My interest in microbial metabolism began during my PhD research (2014-2018) at IDAEA-CSIC in Barcelona, where I investigated yeast metabolic responses under environmentally perturbed growing conditions using Nuclear Magnetic Resonance (NMR)-based metabolomics. To pursue the PhD, I established a new research line in NMR metabolomics at IDAEA-CSIC, where this area had previously been absent, demonstrating strong autonomy and independence. Two methodologies were proposed: one for the integration of resonances from ¹H NMR spectra, and another for the denoising of multidimensional NMR data (currently integrated into the commercial software Mnova). Graduating with honors (cum laude), I received a PhD award by the Spanish NMR group from the RSEQ in 2019.

Following my PhD, I did a first postdoctoral position (2018-2021) at AgroParisTech in Paris, in partnership with IRSTEA and Suez, one of the world's largest waste management companies. My research focused on the effects of perturbing agents on microbial degradation processes in anaerobic digesters. During this postdoc, I expanded my expertise in LC-MS metabolomics, metagenomics, and multi-omics integration, as well as transversal skills such as supervision, project management, and proposal writing. My results demonstrated a clear link between the metabolomic profiles of sludge and the corresponding microbial communities, showing that omics approaches can be effectively used to detect perturbations in these systems.

Since June 2021, I have been a postdoctoral researcher at the European Genomic Institute for Diabetes (EGID) in Lille, France, investigating how drugs, diet, and environmental factors interact with the human gut microbiome to explain variable responses to treatments in cardiometabolic diseases, integrating clinical, metabolomic, and metagenomic data. I also play a key role in establishing the IMPACT-PM metabolomics platform at EGID, now fully operational and processing +5,000 samples/year to characterize human samples.

In 2024, I secured 259k funding (as sole PI) through a competitive national research grant to launch my independent research in the area of the dark human metabolome, focusing on metabolites arising from the chemical exposome and the gut microbiome. This funding enabled me to establish my own team, including a postdoc and a lab technician. Over the next years, I will develop novel analytical (experimental and computational) approaches to study how microorganisms shape chemical exposures and interact with environmental pollutants, integrating metabolomics, metagenomics, and exposomics. This interdisciplinary research will not only advance key fields such as microbial metabolomics and ecotoxicology, providing critical insights on how microbes influence environmental pollutant dynamics and impact human health.

Resumen del Currículum Vitae:

I am currently the Principal Investigator of the Chem4GutMet project funded by the French research agency at EGID. My expertise spans analytical chemistry, metabolomics, chemometrics, microbial ecology and host-microbiome systems.

To date, I have published 24 peer-reviewed papers (17 as first or second author, and 3 as corresponding author), which have attracted +500 citations (h=17), with 2 more articles under review (in Nature journals). So far, my research has been featured in 2 journal covers, 1 spotlight and 5 press releases. I have also coded one R-package. I have contributed to 18 international and 4 national conferences as lead author in metabolomics and chemometrics, including three invited talks. Some of my publications are in high ranking journals such as Nature Communications, Trends in Analytical Chemistry and Bioresource Technology, and five of my papers have received over 50 citations each.

My research career is characterized by great internationalization, prioritizing the exchange of knowledge and collaboration with leading researchers in my areas. I have worked abroad for 7 years, including 29 months as a postdoc at AgroParisTech (Oct 2018 - Feb 2021) and since June 2021 at EGID. Since 2022, I am member of the International Research Laboratory of integrative metabolism, a network of researchers from EGID and Imperial College London (ICL). In this context, I work regularly at ICL as visiting researcher since 2022. In the past, I was member of the international consortium MIMS, dedicated to the development of multi-omics tools. I am a member of the organizing committee of the next RFMF conference, which is expected to gather +200 researchers from French-speaking countries. Overall, I have worked in 5 research institutions worldwide and independently established collaborations with researchers located mostly in Spain, France, UK, Portugal, and Argentina.

I have experience in competitive calls. In 2024, I have secured 259k € through a competitive program organized by the French research agency. I have also been selected 5 times as a reserve candidate in several competitive calls. I have participated in competitive selection processes for senior scientist positions at CSIC (once, ranking 3rd) and CNRS (three times, reaching the second evaluation stage).

During my research career, I have mentored and supervised one master's thesis at École Polytechnique (Paris), have trained a visiting PhD at CSIC, and at present I am co-supervising one PhD student at the Université de Lille/EGID and I supervise a postdoc and a technician. In addition to mentoring, I have contributed to teaching courses at École Polytechnique and at the Universidade de Aveiro (Portugal). I routinely engage in dissemination and outreach activities, participating in public events at schools and fairs, and sharing my research through websites and social media. I regularly review



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manuscripts for several scientific journals, including Analytical Chemistry and Metabolomics. I am a member of the Editorial Advisory Board of Metabolomics (SpringerNature). I have participated as an external proposal evaluator in international calls ([@Samuel de Champlain](#)) and I have also been invited to be included in the database of collaborators experts of the Spanish State Research Agency.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Ciencias y tecnologías medioambientales
Nombre: URIBE ARBOLEDA, JUAN ESTEBAN
Referencia: RYC2025-056661-I
Correo Electrónico: juanuribearboleda@gmail.com
Título: Key methodological advances and genomic workflows for evolutionary studies of disease vectors and their microorganisms

Resumen de la Memoria:

My early career, during my PhD (2011–2016) and first postdoctoral position (2017–2019), focused primarily on the molecular systematics of mollusks at multiple taxonomic levels using genomic techniques. During this period, and especially throughout my first postdoctoral appointment, I began applying this expertise to the systematics and genomics of arthropods of public-health relevance, particularly ticks, identifying a striking lack of integrative systematic and genomic approaches. My second postdoctoral appointment (2020–2024) allowed me to consolidate this transition, strengthening my skills as a supervisor and instructor of specialized courses, broadening my international collaborations, and laying the foundation for an independent research career.

I am currently a researcher at the University of Milan (2024–ongoing), where I lead the core component of a multi-institutional European project aimed at uncovering the population-genomic foundations of *Ixodes ricinus*, vector of Lyme disease in Europe. I have developed and implemented an integrative “genomic trident” strategy, nuclear genome, the mitochondrial genome, and the genome of a key endosymbiont. This work has provided me with extensive experience in chromosome-level and population genomics, large-scale data processing, and the development of integrative bioinformatic pipelines, while also strengthening my expertise in symbiont biology through collaborations with leading researchers in endosymbiont evolution.

Altogether, the research experience I have accumulated across Spain, France, Colombia, the United States, and Italy (~8 years) has equipped me with the conceptual and methodological basis to address evolutionary questions in ticks and their associated microorganisms. Building on this foundation, I developed a workflow that simultaneously isolates genomic data from ticks and their symbionts, enabling an integrated view of tick–microorganism interactions and advancing the study of their coevolution from a comprehensive genomic perspective.

Ticks (order Ixodida) are blood-feeding ectoparasites and major vectors of pathogens affecting humans, livestock, and wildlife. Beyond their role as vectors, it is increasingly clear that symbionts are essential for tick fitness and may even influence their vectorial capacity. For this reason, being able to separate and analyse the genomic information of both ticks and their associated microorganisms is critical. The workflow I developed to simultaneously isolate these genomic signals provides a powerful way to study how ticks and their symbionts diversify, evolve, and interact, particularly under rapidly changing climatic and ecological conditions. By integrating phylogenomics, population genomics, and symbiont genomics, this approach offers a more complete understanding of tick biology and the evolution of their associated microbes, ultimately supporting better strategies for monitoring and controlling tick-borne diseases within a One Health framework.

Resumen del Currículum Vitae:

I have published 44 scientific documents (39 SCI) in the fields of evolution, zoology, and parasitology, generating contemporary evolutionary hypotheses for highly diverse organisms, including ticks and molluscs. These publications resulted in 24 Q1 articles (54%), 15 as first author and 7 as corresponding author, reaching 870 citations (h-index 16; i10-index 23; Google Scholar), with an average of 130 citations over the last five years. To achieve this, I have developed genomic and computational workflows that integrate phylogenomics, systematics, taxonomy, and, more recently, population genomics. All this work was carried out during my postdoctoral training (45 months abroad and 48 in Spain), during which I disseminated my research through 34 national and international scientific meetings and delivered 12 courses in 5 countries (Spain, Chile, Colombia, Norway, and Brazil) on genomic techniques and their application to parasitic animals and their associated microorganisms (~400 teaching hours).

As summary, I completed my Biology bachelor’s degree (2011) at the Universidad del Magdalena (Colombia), followed by a Master’s in Biodiversity (2011–2012) and a PhD in Biology (2012–2016) at the MNCN-CSIC and Universidad Autónoma de Madrid (Spain), funded through a competitive FPI fellowship. During my PhD, I also undertook 7.5 months of research stays at the Muséum National d’Histoire Naturelle (France). I then obtained the Peter Buck Postdoctoral Fellowship at the Smithsonian Institution (2017–2019), which enabled me to lead an independent research project on gastropod systematics and to establish a new research line on tick evolutionary genomics (21 publications). Afterward, I secured a four-year “Talento” Fellowship (Comunidad de Madrid, Spain) at the MNCN-CSIC, consolidating my research on ticks and tick-borne diseases, supervising students, and contributing to a project updating Iberian tick distributions and characterizing key CCHF-vector endosymbionts. I currently hold a research position at the University of Milan (Italy), where I lead the population genomics component of a European project on *Ixodes ricinus*.

Additionally, I have actively mentored young researchers, including 1 PhD student (co-advised), 3 Master’s students, and 1 Bachelor’s student, whose training has resulted in 3 works in Q1 journals (and one manuscript under revision at *Genome Biology and Evolution*) and has provided them with the foundation to successfully continue pursuing scientific careers. I have also hosted and supervised visiting students and researchers from Colombia (2), Chile (5), Italy (1), and Norway (2).

I have delivered 6 invited talks, served on 4 thesis committees (2 PhD, 2 Master), acted as an external evaluator for the National University of Colombia, peer-reviewed 65 articles in high-impact journals, and currently serve as Associate Editor for 2 international journals. I have helped organize 2 scientific conferences, received 3 awards (including one from The Malacological Society of London), and actively contributed to outreach through 4 communications, as well as initiatives such as “Ask the Postdoc” and the “Thursday Social” at the MNCN.



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Área Temática: Ciencias y tecnologías medioambientales
Nombre: EVANGELINOS, DIMITRIOS
Referencia: RYC2025-056908-I
Correo Electrónico: dim.evage@gmail.com
Título: Response of the East Antarctic Ice sheet to ocean warming and tipping points
Resumen de la Memoria:

I am a marine geologist and paleoceanographer whose research delivers frontier advances in understanding how ocean circulation and climate variability have shaped the evolution and stability of the Antarctic Ice Sheet (AIS). My work focuses on the onset and evolution of the Antarctic Circumpolar Current (ACC) and its role in driving past ice-sheet instabilities during warmer-than-present climates.

I completed my education in Greece (BSc), Belgium (MSc), and Spain (PhD), and I have been awarded three prestigious individual postdoctoral fellowships: the MOPGA Fellowship (France), Juan de la Cierva Fellowship (Spain), and UKRI-Marie Curie Fellowship (UK), demonstrating a strong ability to secure competitive international funding. I trained at world-leading laboratories (MAGIC, Imperial College London; LEGOS, France; LIRA, Barcelona; IODP repository, USA), where I gained advanced technical and analytical expertise in sedimentology, isotope geochemistry, and seismic stratigraphy.

My pioneering work has redefined the timing and mechanisms of ACC onset and demonstrated how ocean-circulation changes triggered major AIS instabilities, providing key breakthroughs for understanding drivers, feedbacks and potential tipping points in future warming scenarios. These findings contribute to major SCAR (Committee on Antarctic Research) programmes (ICEPRO, PRAMSO, INSTANT), inform future international drilling strategies (IODP3-ICDP) and provide essential constraints for IPCC-relevant models. My research also supports the Antarctica InSync Science Plan, the UN Decade Collaborative Centre for the Southern Ocean, and preparations for the 5th International Polar Year.

Moreover, I co-lead the SCAR ICEPRO Action Group, coordinating three international Working Groups (DNA, biomarkers, phytoplankton) and four Antarctic expeditions for 2025-2026 Antarctic season. I serve as lead author for Theme 7 of the Antarctica InSync Science Plan and hold a leading role in the Wilkes Subglacial Basin Working Group.

My research line aims to investigate how ocean warming controls the stability of the East Antarctic Ice Sheet (EAIS), the “sleeping giant” of global sea level and the largest uncertainty in future climate projections. My previous work redefined the timing of ACC onset, fundamentally revising its role in Antarctic climate evolution. Building on these advances, the new line of investigation moves toward a mechanistic, quantitative assessment of EAIS tipping behaviour. It targets the EAIS’s most vulnerable sectors to calibrate key paleoclimate proxies, reconstruct ocean-ice interactions, and quantify past EAIS instabilities during warm periods analogous to near-future climates (+2-3 °C).

Resumen del Currículum Vitae:

My research provides cutting-edge contributions in Antarctic paleoceanography and paleoclimate, with a focus on the evolution of the Antarctic Circumpolar Current (ACC) and its influence on Antarctic Ice Sheet (AIS) dynamics during warmer-than-present climates. I apply a multidisciplinary toolkit integrating sedimentology, isotope geochemistry, organic biomarkers and seismic stratigraphy.

I have secured >€480,000 through 18 competitive grants including an EU-POLARIN Transnational Access Grant, the ECORD Outstanding Young Scientist Award and the IODP-France Research Grant. I am PI of six international projects and Co-PI on three others involving major international and private-sector partners (ANZIC, PONANT, SEDNA). I have contributed to seven additional national projects (>€3.6M), leading key scientific objectives and associated tasks. I served as PI on two Antarctic expeditions and one Arctic expedition and was responsible for seawater and sedimentology laboratories in seven polar campaigns.

I have published 26 indexed contributions (h-index: 12; 436 citations), including first-author papers in Nature Geoscience, Geology and Global and Planetary Change. My output also includes 11 additional publications with DOI, six book/report chapters, three open-access analytical protocols, 16 open datasets, one white paper and >65 conference contributions (25 as first author). I have delivered three invited keynotes, eight invited talks and invited lectures in leading early-career training programmes (ECORD Summer School 2025; GLASS 2022) and in BSc/MSc programmes at the University of Barcelona and the University of the Aegean. I have co-chaired four scientific sessions (Geological Society of London 2022; ISAES 2025; EGU 2025-2026). I was a reviewer for the 2025 SCAR Fellowship scheme, a judge for the EGU 2024 Outstanding Student and PhD Candidate Presentation contest, and have reviewed >20 papers for high-impact journals (Nature, Nat. Geosci., Nat. Commun.).

I am strongly committed to public engagement, having delivered >30 outreach activities in Spain, Greece and the UK, including school programmes, exhibitions, cruise-based science communication and media engagement (newspaper interviews, science communication articles, radio podcasts, YouTube videos). I have co-supervised 2 BSc, 3 MSc and 3 Erasmus+ theses, and a student from iFP Barcelona, and mentored >50 early-career researchers through ICEPRO, the GLASS School 2022 (USA) and the ECORD Summer School 2025 (Germany). I have also provided analytical and methodological training to several PhD students and supervised student research during polar expeditions.



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Área Temática: Ciencias y tecnologías medioambientales
Nombre: ARAFEH DALMAU, NUR
Referencia: RYC2025-056234-I
Correo Electrónico: nadalmau@stanford.edu
Título: Climate adaptation in coastal marine ecosystems
Resumen de la Memoria:

My research focuses on understanding and strengthening the resilience of coastal ecosystems from the impacts of climate change through the integration of ecological monitoring, remote sensing, climate modelling, and systematic conservation planning. I began my scientific career in Mexico, where I conducted pioneering work on the impacts of extreme marine heatwaves (MHWs) on kelp forests and developed my first independent research line, supported by competitive PI funding. During my PhD at The University of Queensland, supported by two competitive fellowships, I developed foundational methods in climate-smart conservation, including the first integration of climate velocity into spatial prioritization and a 35-year-remote-sensing framework to identify marine climate refugia. These contributions established my independent research trajectory and resulted in several high-impact publications and an award for an outstanding doctoral thesis.

Since 2022, as a Postdoctoral Researcher at the University of California, Los Angeles (UCLA) and then Stanford University (and Honorary Fellow at UQ), I have led or co-led multinational projects on climate adaptation across Latin America and the USA. My research has provided rare empirical evidence that marine protected areas enhance ecosystem resilience to extreme events, produced the first global assessments of kelp-forest protection and climate risk, expanded long-term monitoring programs (>800 km), and generated decision-support products (habitat maps, refugia layers, adaptation frameworks) used by agencies, NGOs, and international organizations. My work has informed policy processes at multiple levels: 60 policy citations including IPCC, IPBES, FAO, UNEP, and national authorities in Mexico, USA, Argentina, Australia, Germany, and the EU.

I have demonstrated strong scientific independence, securing ~\$182k as PI and ~\$2.9M as scientific lead (PI-equivalent), coordinating international teams, developing and supporting open-science tools (e.g., contributions to TNC Geoportal and Kelpwatch), and leading networks such as the IUCN Seaweed Specialist Group (Co-Founder and Co-Chair) and the Maskelp Foundation (Co-Founder and Director). My production includes 30 publications (8 first-author, 1 senior-author, all Q1 and most D1), >25 international conference presentations, and extensive mentoring, teaching, and knowledge-transfer activities.

Proposed research line:

My Ramón y Cajal program will develop the first comparative framework to understand the mechanisms that allow marine climate refugia to persist across contrasting socio-ecological contexts. Focusing on the temperate Pacific and the Mediterranean Sea, I will integrate high-resolution climate metrics and projections, ecological and remote-sensed time series, eDNA, and governance analyses to evaluate the resilience and conservation value of refugia. This will generate tools for climate-smart conservation planning aligned with the EU Biodiversity Strategy 2030, the EU Mission Restore Our Ocean and Waters, and Spain's 30x30 commitments, establishing a new research group in Spain dedicated to resilience ecology and climate-adaptation science.

Resumen del Currículum Vitae:

I am a marine scientist specializing in climate-change impacts, ecological resilience, and climate-smart conservation planning. My trajectory combines methodological innovation, empirical research, and applied contributions used by governments, NGOs, and international organizations. I hold a MSc (2016, UABC, Mexico) and a PhD (2022, The University of Queensland, Australia), supported by prestigious competitive fellowships (la Caixa, Australian Postgraduate from UQ). My PhD received the Dean's Award for Outstanding HDR Theses (top 10%). I have held postdoctoral positions at the University of California, Los Angeles (2022-2023) and Stanford University (2023-present), and I am also an Honorary Fellow at UQ, where I lead a climate-adaptation program as PI.

I have 30 scientific publications: 26 peer-reviewed papers and 4 first-author communications (3 in Science). I am first author on 8 Q1 peer-reviewed papers (most D1) and senior author on one (D1), with publications in Science, Nature Communications, One Earth, Global Change Biology, Communications Earth & Environment, and Methods in Ecology & Evolution. My work has accumulated 1,341 citations (h-index 15, Google Scholar) and has been covered by 237 media outlets. I also collaborate extensively and have co-authored papers in leading journals such as Nature Climate Change and Trends in Ecology & Evolution. I am regularly approached by journalists for expert commentary. I am regularly approached by journalists for expert commentary. I have 60 policy citations, with uptake in IPCC, IPBES, UN, FAO, and multiple national authorities, demonstrating high scientific and societal impact.

I have secured ~\$182k as PI and ~\$2.9M as scientific lead (PI-equivalent) through competitive funding from the Winifred Violet Scott Trust, PADI Foundation, Pew Charitable Trust/Lenfest Ocean Program, Stanford Sustainability Accelerator, and the Stanford Doerr School of Sustainability. I have contributed to major international projects funded by NASA, NSF, National Geographic, NCEAS, and CSIC (i-LINK). I have coordinated applied conservation initiatives with agencies such as SEMARNAT, CONANP, California's Ocean Protection Council, and The Nature Conservancy.

My leadership roles include Co-founder and Co-Chair of the IUCN Seaweed Specialist Group and Co-founder and Director of MasKelp, which connects practitioners and scientists across California, Mexico, Peru, Chile, and Argentina. I have organized international workshops, participated in high-level advisory processes, and provided invited scientific testimony to the California Legislature. My work has delivered direct conservation outcomes, contributing to the establishment of MPAs in Mexico and Argentina, proposals to expand MPAs in California, a kelp-harvest moratorium in Patagonia, and modifications to Mexico's fisheries law (NOM-032). I have supervised or mentored researchers at all levels (postdoctoral, PhD, MSc,



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undergraduate), taught >250 hours (e.g., Associate Lecturer at UQ), and trained >25 scientific divers and practitioners, including women from fishing communities.

Overall, my profile demonstrates a solid and independent scientific career with strong internationalization, methodological innovation, policy relevance, and leadership in emerging global research areas such as marine climate refugia and resilience-based conservation planning.



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Área Temática: Ciencias y tecnologías químicas
Nombre: POSADA PÉREZ, SERGIO
Referencia: RYC2025-056066-I
Correo Electrónico: sergiposada90@gmail.com
Título: Computational Design of Catalysts for Sustainable Energy and Green Chemistry
Resumen de la Memoria:

Dr. Sergio Posada-Pérez is a Marie Curie EUTOPIA researcher at Vrije Universiteit Brussel. His trajectory is marked by a progressive consolidation of an independent profile in computational catalysis and materials modelling, with a strong multidisciplinary dimension spanning heterogeneous and homogeneous catalysis, electrocatalysis, battery materials, perovskite photovoltaics, hydrogen storage, polymer chemistry, and machine-learning-driven materials discovery.

His PhD (Extraordinary Award, University of Barcelona) focused on transition-metal carbides for CO₂ conversion, revealing two MoC-based catalysts with superior performance to industrial Cu/ZnO/Al₂O₃ systems. His work demonstrated how the metal-carbon stoichiometry modulates reactivity, an insight that remains influential in the field. During his doctorate, he completed two international stays (Brookhaven National Laboratory and Cardiff University) that resulted in three publications and established the foundations of his later independence.

From 2018 to 2021 he carried out his first postdoctoral stage at UCLouvain as unique research executor of an FNRS project on aqueous Li-ion batteries. He developed a computational protocol to predict electrolyte-salt compatibility for metal batteries, later published in Nature Communications, and initiated a collaboration on hydrogen storage materials with Prof. Filinchuk, leading the computational component of a study published in Nature Chemistry. This period consolidated his expertise in electrochemistry, solid-state modelling, high-throughput workflows, and open-source scientific software.

In 2021 he returned to Spain with a Juan de la Cierva-Formación fellowship followed by a Marie Curie Individual Fellowship, establishing a new research line in solid-state modelling at the Institute of Computational Chemistry and Catalysis (IQCC, UdG). In Girona he developed independent lines on 2D materials, single-atom catalysts, battery cathodes, perovskite surfaces, and polymer catalysis, publishing 30 papers (21 as corresponding author), securing more than 50 million CPU-hours in RES and EuroHPC calls, and supervising or co-supervising multiple doctoral researchers. His first PhD student graduated in 2024 with the highest honours. His invited seminar at KU Leuven and participation in the EuroHPC User Forum Coordination Group reflect the international visibility of his research.

Since 2024, as a Marie Curie EUTOPIA fellow at VUB, he has expanded his research toward predictive electrocatalysis integrating periodic DFT, explicit-solvent simulations and machine-learning potentials. His current project focuses on sustainable catalytic processes for CO₂ conversion, hydrogen evolution and ammonia synthesis, and involves collaborations with Warwick and Matgenix startup. He has presented his work at Pacifichem 2025 conference and has been awarded with an FWO travel grant for a research stay.

Throughout his career, Dr. Posada-Pérez has demonstrated the ability to design, lead and execute high-impact research projects in different research fields, with key publications in Nature Chemistry, Nature Communications, JACS, Chemistry of Materials, ACS Catalysis, and Journal of Power Sources. His long-term objective is to develop predictive computational tools that accelerate the discovery of sustainable catalysts and materials for the energy transition.

Resumen del Currículum Vitae:

Sergio Posada-Pérez is a computational chemist specializing in heterogeneous and electro-catalysis, solid-state modelling, and data-driven materials discovery. He completed a PhD in 2018 (Excellent cum laude, Extraordinary PhD Award), where he developed cost-effective transition-metal carbides for CO₂ hydrogenation using ab initio simulations, predicting a catalyst now considered a reference in the field. During his doctorate, he secured competitive funding for two international stays (Brookhaven National Laboratory, USA; Cardiff University, UK), producing three publications in leading journals (including JACS).

From 2018 to 2021, he conducted postdoctoral research at UCLouvain (Belgium) in the group of Prof. Geoffroy Hautier, where he led computational efforts on aqueous Li-ion batteries. His work resolved the long-standing controversy on proton intercalation in layered cathodes published in Chemistry of Materials and introduced a simple but predictive protocol for electrolyte-salt selection in metal batteries, published in Nature Communications and now widely cited. He also co-led an international collaboration with Prof. Filinchuk on hydrogen-storage materials, culminating in a Nature Chemistry publication where he was responsible for the entire computational section.

In 2021 he moved to the Institut de Química Computacional i Catàlisi (IQCC, Universitat de Girona), supported first by a Juan de la Cierva-Formación fellowship and subsequently by a Marie Skłodowska-Curie Individual Fellowship. There he established an independent research line in materials modelling for energy and catalysis, opening new topics previously unexplored at the IQCC: 2D materials, single-atom catalysts, perovskite photovoltaics, aqueous batteries, polymer chemistry and ML-assisted modelling. During this period he published 30 papers, 21 as corresponding author, and secured more than 50 million CPU-hours as PI or co-PI in the Red Española de Supercomputación, plus 2.5 million hours from EuroHPC. He is a member of the EuroHPC User Forum Coordination Group, organizing the EuroHPC conferences. He has disseminated his work in international conferences like ECS and ACS.

Since 2024 he is Marie Curie EUTOPIA-SIF Fellow at Vrije Universiteit Brussel, where he continues consolidating his independent career through a project integrating electrocatalysis, single-atom catalysts and machine-learning interatomic potentials, in collaboration with academic (Warwick) and industrial partners (MATGENIX).

His scientific output includes 44 publications (+5 submitted), over 77% as first and/or corresponding author, more than 1500 citations, and several high-impact papers (Nature Chem., Nat. Commun., Chem. Mater., JACS). He has supervised one defended PhD thesis (Excellent), one MSc thesis (Honors), two undergraduate theses, a visiting PhD student, and currently supervises two additional PhD projects. He has obtained >300k€ in competitive national and European funding, has served as evaluator in Poland and Switzerland, and is referee for top journals such as Nature Catalysis, Nature Communications, ACS Catalysis and npj Computational Materials. He maintains a strong commitment to scientific outreach, participating in



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activities with BASF, the “Camins Infinitos” programme at the University of Barcelona, and leading hands-on workshops and talks during the European Research Night 2022.



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Área Temática: Ciencias y tecnologías químicas
Nombre: SALCEDO FERNÁNDEZ, PABLO
Referencia: RYC2025-054979-I
Correo Electrónico: pablosalcedo.fer@gmail.com
Título: Novel Metal-Organic Frameworks and composites for energy, biomedical and environmental applications
Resumen de la Memoria:

Since the beginning of his career, the interest and research work of Dr. Salcedo have been centered in the development of new materials for different socioeconomically key applications (energy generation and storage, catalysis, biomedicine, etc.). His work is mainly focused on the synthesis and characterization of new porous coordination polymers or Metal-Organic Frameworks (MOFs) and composite materials with remarkable chemical stability and enhanced properties. In his predoctoral period (2017-2021) at the advanced porous materials Unit (APMU) at IMDEA Energy (Madrid, Spain) under the supervision of Dr. Patricia Horcajada, he obtained a solid background in the synthesis and characterization of both novel and reported MOFs and composite materials based in carboxylate and phosphonate ligands to be used as drug delivery systems, photocatalyst and proton conductors. It is worth to highlight here that, due to the novelty of the APMU (created in 2016) he was the researcher that started the work on energy-related research lines (proton conductive and photo/electroactive materials). After this period, he moved to the "Stockage et Transformation Electrochimiques de l'Energie"-ST2E group of the Institut des Matériaux Jean Rouxel de Nantes (IMN, Nantes, France) with Dr. Thomas Devic. There he explored the chemistry of S-based ligands during more than two years (Sept. 2021- Dec. 2023) with the aim of develop electroactive MOFs for Li, Na and K-ion batteries as well as electrocatalyst for Hydrogen evolution reaction (HER). Finally, he joined the FQM-394 Biochemistry and Electronics as Sensing Technologies-BEST group (Jan. 2024) of the University of Granada (UGR, Granada, Spain) with Dr. Antonio Rodriguez with a Juan de la Cierva fellowship, where he is currently working on the synthesis of novel materials based on carboxylate, azolate and phosphonate ligands in the frame of two of the research lines (luminescent materials for sensing and novel agrochemical materials) of the group and in his own research line of phosphonate-based MOFs for osteoporosis treatment.

Resumen del Currículum Vitae:

Since the beginning of his career, Dr. Salcedo was involved in the development of new materials for different applications (batteries, fuel cells, photocatalyst, or biomedicine, among others). His work was mainly focused on the synthesis and characterization of new porous coordination polymers with remarkable chemical stability, but also on the preparation of composite materials with enhanced properties. In specific, Dr. Salcedo's research was focused on: 1) the synthesis of novel MOF structures based on challenging high-valent metals and non-commercial carboxylate/phosphonate/dithiolate linkers with various applications in different social and economic key fields, from photocatalysis (Chem. Mater., 2023, 35, 11, 4211, 14513, Nanores., 2021, 14, 450; Adv. Mater., 2021, 33, 2106627) or energy production and/or storage (Chem. Commun., 2025, 61, 9614, J. Mater. Chem. A, 2023, 11, 23909, J. Mater. Chem. A, 2023, 11, 25465, Chem. Mater., 2023, 35, 11, 4329) to biomedicine (Cryst. Growth Des., 2025, 25, 5, 1415, Nanomaterials, 2022, 12(23), 4139) or agriculture (ACS App. Mater. Interfaces 2025, 17, 2, 4147, ACS Omega, 2025, 10, 11, 11274, Cryst. Growth Des., 2025, 25, 13, 4685); 2) the association of different active species (e.g. drugs, conducting polymers, etc.) within the porosity of MOFs (ACS Appl. Mater. Interf. 2020, 12, 23, 25676, Molecules, 2020, 25 (15), 3519, Chem. Sci., 2020, 11, 10835-10843, Dalton Trans. 2019, 48, 9807-9817, Nanomaterials, 2017, 7, 321), obtaining composite materials with enhanced properties; and 3) crystallography studies of different novel compounds, mostly using single-crystal X-Ray diffraction techniques (Inorg. Chem., 2025, 64, 23, 11696, Eur. Poly. J., 2025, 232, 113943, Chem. Sci., 2025, 16, 5205). His research was carried out in collaboration with multiple national and international well-recognized institutions (ICGM-France, Stockholm University-Sweden, Cambridge University-UK, among others), leading to multidisciplinary collaborations. He also performed several stays in different international laboratories (e.g. IST in Lisbon, IMN in Nantes, ILV in Versailles) to perform different experiments and acquire complementary knowledge. This work leads to the publication of 36 papers (13 as first author and 3 as corresponding author) in high quality indexed journals with high impact factor (average IF = 7.2; e.g. Adv. Mater., Chem. Sci., J. Mater. Chem. A, ACS App. Mater. Interfaces, Nano Res.) resulting in an h index of 13 (total cites = 844, citation average in last 5 years = 156; 75% in Q1; 30% in D1; according with JCR) He is inventor of one patent and has published one book chapter. He also has contributed to >30 conferences (1 oral invited and 8 oral presentations; 25 national and 10 international), as well as several dissemination activities. Finally, he has been involved in 10 national (2 as PI) and 1 international funded projects and has been granted prestigious Juan de la Cierva fellowship (2022 call), attracting a total funding of ca. 90k€.



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Área Temática: Ciencias y tecnologías químicas
Nombre: ZACCARIA , FRANCESCO
Referencia: RYC2025-055693-I
Correo Electrónico: franc.zaccaria@gmail.com
Título: Integrated approach towards recyclable polymers (IntRePol)

Resumen de la Memoria:

As a junior PI, FZ will lead the development of an Integrated approach towards recyclable polymers (IntRePol). Leveraging his interdisciplinary background in monomer design, polymerization catalysis, recycling and energy-related materials, he will work on two cutting-edge research lines. The first research line targets the design of innovative aliphatic polyesters. These polymers are rapidly emerging as promising candidates for sustainable plastics, since they often combine good material properties with high recyclability via depolymerization. The latter is a "closed-loop" recycling approach fully aligned with global circular economy strategies. However, the performance and cost of aliphatic polyesters remain limiting. By applying advanced synthetic methodologies, FZ will debottleneck monomer synthesis to unlock scalable access to this class of polymers. The main focus will be on abundant, bio-derived substrates to ensure low cost, high accessibility and minimized carbon footprint. The second research line is even more ambitious and focuses on sustainable polymers for energy applications. Polymer electrolytes are attracting increasing interest as safer, potentially recyclable alternatives to the flammable liquid electrolytes used in Li-ion batteries. Their widespread deployment, however, is still limited by insufficient stability under demanding operating conditions and by the difficulty of combining robustness with recyclability. Recent advances indicate that appropriately designed monomers can yield electrolyte polymers accessible via ring-opening polymerization routes analogous to those used for recyclable polyesters. With his interdisciplinary expertise, including polymeric and energy-related materials, FZ is uniquely positioned to contribute in this emerging field.

Resumen del Currículum Vitae:

Dr. Francesco Zaccaria (FZ) is an MSCA Individual Fellow at the University of Girona (Spain). He graduated in Chemistry from the Federico II University of Naples (Italy), where he also earned his PhD in 2018 under the supervision of Prof. Vincenzo Busico. During his (under)graduate studies, he combined the expertise of his mentor in polymerization catalysis with a keen interest in fundamental organometallic chemistry, strengthened through collaborations with Prof. Budzelaar (University of Manitoba) and research internships with Prof. Bochmann (UEA, 2014) and Prof. Britovsek (Imperial College, 2017). His PhD contributed to the discovery of an unprecedented chain-termination pathway in olefin polymerization, the quantitative modelling of copolymerization kinetics and the investigation of selective ethylene oligomerization catalysts. His strong interest for NMR spectroscopy then motivated a four-year postdoctoral stay with Prof. Macchioni at the University of Perugia (Italy). There, he expanded his expertise beyond polymerization to include diffusion NMR methods and catalysis for energy applications. In 2022, FZ returned to Naples with a REACT-EU funded junior faculty position (RTDa), focusing on polymerization catalysis, often in collaboration with industry. As Project Leader, he directed the University of Naples research unit in a DPI-funded project on molecular cocatalysts mimicking the reactivity of methylaluminoxane. He also took part in collaborations on plastics recycling with Prof. Viegé (University of Florida) and Dr. Ginzburg (KU Leuven). In 2023 he served as visiting scientist at SABIC, working on olefin oligomerization. In January 2025, FZ joined Xplore LTD as Senior Scientist, leading the implementation of high-throughput experimentation methods, now offered commercially for CO₂ valorization, catalyst supportation, and plastics upcycling. In October 2025, he returned to academia with a MSCA fellowship with Prof. Costas at the University of Girona, where he is developing high-performance, fully recyclable aliphatic polyesters. For his contributions to polymerization catalysis, FZ received the 2024 "Flavio Bonati" National Prize of the Italian Chemical Society for outstanding under-35 researchers in organometallic chemistry. He obtained the National Habilitation to Associate Professor of Inorganic Chemistry in 2022. He has authored 41 journal articles, 2 book chapters, 4 international patents and 18 conference contributions, with over 830 citations and an h-index of 19 (Scopus, 11/12/2025).



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Estudios del pasado: historia y arqueología
Nombre: MARSAL AGUILERA, ROSER
Referencia: RYC2025-055767-I
Correo Electrónico: roser.marsal89@gmail.com
Título: Human-water-environment interactions and ancient water culture: an integrative approach
Resumen de la Memoria:

I am a postdoctoral researcher specialising in the archaeology of water and the relationships between ancient societies, arid landscapes, and hydraulic systems. My work integrates archaeological methods, spatial analysis, hydrological modelling, 3D techniques, and the study of textual and historical sources, drawing on environmental and sociocultural perspectives. Throughout my career, I have developed an interdisciplinary approach that merges fieldwork, documentary research, and digital tools to study water culture in antiquity.

My research career has been shaped by a strong international profile, including research stays in the United Kingdom, France, Germany, Sweden, Spain, Cyprus, Jordan and Egypt, which have been crucial in defining my scientific trajectory. These experiences granted access to diverse hydraulic landscapes and analytical frameworks, broadening the comparative scope of my work. International collaboration has been a constant theme, with fieldwork in Kenya, Egypt, Cyprus, Jordan, and Spain alongside researchers from institutions across Europe, Africa, and Asia.

My postdoctoral research, supported by Margarita Salas and Juan de la Cierva fellowships, allowed me to integrate remote sensing, GIS, and geoarchaeological approaches while engaging with experts in digital archaeology, geomorphology, and water engineering. These experiences continue to shape my methodology and scientific perspective.

I am currently involved in several research projects spanning regional, national, and European contexts, often leading archaeological and environmental analyses of ancient water systems. Concurrently, I am an IP at an international project on one of Africa's earliest documented dams, exploring the technological, environmental, and sociocultural dimensions of hydraulic infrastructure.

My contributions to the field extend beyond individual projects. I have participated in 57 archaeological fieldwork seasons, and numerous research initiatives, and I also contribute to long-term archaeological missions in Egypt, Jordan and Cyprus, where I am involved in excavation, documentation and digital reconstruction programmes.

My commitment to the broader academic community is reflected in my active involvement in conference organisation, peer reviewing for scholarly journals, participation in specialist workshops on hydraulic landscapes, and the mentoring of postgraduate students. I regularly engage in public outreach activities, particularly those promoting gender equality and the social relevance of archaeological research.

My research has been built upon the acquisition of analytical tools, extensive international networking, and project management experience. I now aim to address key questions about the role of water in the development of ancient civilisations. I hypothesise that water management in arid regions has driven technological innovation, political organisation, and symbolic expression. I propose three lines of research: (1) developing advanced digital and geoarchaeological techniques, including historical photogrammetry, remote sensing and hydrological modelling, (2) investigating the technological and sociocultural dimensions of water infrastructures through integrated approaches, and (3) establishing a comparative framework across the Mediterranean, Western Asia, and North Africa to study past water cultural practices.

Resumen del Currículum Vitae:

I am a postdoctoral researcher specialising in ancient water culture and human-water-landscape interactions in Ancient Egypt, the Ancient Near East and the Mediterranean. My work integrates spatial and morphotechnical analyses, petrographic and mineralogical characterisation of hydraulic mortars, 3D modelling, comparative studies and historical/textual research to understand how past societies adapted to arid environments and developed long-term water strategies. My research spans four main areas: (1) ancient water culture in Egypt and the Near East; (2) hydraulic technologies in copper-producing landscapes; (3) water management, settlement organisation and socio-cultural dynamics in arid regions; and (4) interdisciplinary approaches to water, identity and landscape in early farming communities. My fieldwork experience includes 57 field seasons across Spain, Jordan, Egypt, Cyprus, and Kenya, during which I often coordinated hydraulic studies. I have co-directed research within national and international missions, including work at Kom el-Khamaseen (Egypt), Cova dels Xaragalls and Cova Gran de Collbató (Spain), and directed hydraulic investigations at Agia Marina Xyliatou (Cyprus) and Wadi al-Garawi (Egypt).

My MA at the UAB, including a research stay at the British Museum, introduced me to the study of water management in arid environments through ancient ceramic cultures. My doctoral research (UB) applied integrated spatial, hydrological, historical and archaeological analyses to southern Transjordan, producing the first regional synthesis of ancient water strategies for the 1st millennium BCE. My PhD demonstrated that combining topography, hydrology, hydro-technology, and archaeological/historical evidence clarifies site formation processes, resilience strategies, water-supply planning, patterns of continuity and innovation, and broader socio-cultural organisation. This work established the basis for subsequent comparative studies and shaped my long-term interest in water culture. During this period, I conducted research stays at the Collège de France, Sorbonne University, Heidelberg, and Tübingen, consolidating an international network that continues to shape my research trajectory.

My first postdoctoral project (Margarita Salas Fellowship, UB) broadened my international profile through research at Uppsala University within the Theban Harbours and Waterscapes Survey and later at the UAB, focusing on funerary epigraphy and water-related landscapes in the Memphite region. Following maternity leave, I obtained a Juan de la Cierva Fellowship, which enabled me to expand my work on hydraulic infrastructure in Ancient Egypt. I currently lead the Wadi al-Garawi Dam Project (Uppsala University), which investigates the oldest monumental dam in Africa, involving researchers from Egypt, Sweden, Spain, Italy and Germany and securing 3 sources of funding. I contributed to 20 projects, co-organised major scientific events and chaired the 1st WALs Conference. I regularly disseminate my work at international conferences and through outreach initiatives such as the International Day of Women and Girls in Science. I am firmly committed to training young researchers: I have taught 865 hours in BA and MA programmes in History, Egyptology, Ancient Studies, Archaeology, and Mediterranean Studies; supervised MA theses; and served on evaluation committees.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Estudios del pasado: historia y arqueología
Nombre: FERNÁNDEZ PASALODOS, ARNAU
Referencia: RYC2025-056088-I
Correo Electrónico: ARNAUPASALODOS@GMAIL.COM
Título: La guerra antipartisana en España, 1936-1952

Resumen de la Memoria:

Respecto a mis aportaciones científicas, la financiación obtenida a través de contratos, estancias y proyectos de investigación me ha permitido generar resultados de relevancia, comunicados mediante las siguientes publicaciones: trece artículos en revistas especializadas indexadas (SJR/JCR, etc.); dos monografías en Editorial Crítica y Galaxia Gutenberg; una coordinación de volumen colectivo en PUZ; ocho capítulos de libro en editoriales de primer nivel; una coordinación de dossier que saldrá publicado en septiembre de 2026 en la revista *Small Wars & Insurgencies* (SJR Q1); una coordinación de libro de actas de congreso en Editorial Comares; y cuatro reseñas en *Historia Contemporánea*, *Pasado y Memoria* y *Revista Universitaria de Historia Militar*. En más de una veintena de estas publicaciones figuro como primer autor. Respecto al impacto, según Google Scholar, mis publicaciones han sido citadas 46 veces desde 2021 (índice-h: 4). Todo ello ha supuesto una importante contribución a la generación de conocimiento en el ámbito de la historia sociocultural de la guerra y de la violencia, en particular en el marco de la Guerra Civil española y de la construcción de la dictadura franquista. La perspectiva comparada, transnacional e interdisciplinar con la que he trabajado ha suscitado el interés de proyectos de investigación nacionales e internacionales. En este sentido, destaca mi incorporación como investigador posdoctoral en el Centre for War Studies del University College Dublin (Irlanda), en el marco del proyecto ERC The Age of Civil Wars in Europe, c. 1914-1949 (CivilWars) dirigido por el profesor Robert Gerwarth. Un contrato que me ha permitido internacionalizar mi trayectoria a través de la organización de eventos, la colaboración con universidades europeas, y la coordinación y publicación en dossieres y libros colectivos en inglés. Esta trayectoria académica ha culminado en la concesión de un contrato Juan de la Cierva (2023) que me vincula con la UGR. Todas estas aportaciones científicas han sido fruto de mi tesis doctoral (2022, UAB, Cum Laude), así como de los contratos mencionados, pero también de un contrato posdoctoral en la UAB (2023) y de una estancia de dos meses en la UCM (2025). Respecto al liderazgo y al ejercicio de responsabilidades científicas, soy el investigador principal de un proyecto financiado por el Plan Propio de la UGR. También he formado parte del comité organizador de once actividades científicas; y en 2021 fui distinguido con el Premio Mary Nash entregado por la AHC.

Resumen del Currículum Vitae:

Respecto a mis aportaciones científicas, la financiación obtenida a través de contratos, estancias y proyectos de investigación me ha permitido generar resultados de relevancia, comunicados mediante las siguientes publicaciones: trece artículos en revistas especializadas indexadas (SJR/JCR, etc.); dos monografías en Editorial Crítica y Galaxia Gutenberg; una coordinación de volumen colectivo en PUZ; ocho capítulos de libro en editoriales de primer nivel; una coordinación de dossier que saldrá publicado en septiembre de 2026 en la revista *Small Wars & Insurgencies* (SJR Q1); una coordinación de libro de actas de congreso en Editorial Comares; y cuatro reseñas en *Historia Contemporánea*, *Pasado y Memoria* y *Revista Universitaria de Historia Militar*. En más de una veintena de estas publicaciones figuro como primer autor. Respecto al impacto, según Google Scholar, mis publicaciones han sido citadas 46 veces desde 2021 (índice-h: 4). He sido ponente invitado y comunicante oral en más de treinta congresos, seminarios y encuentros nacionales e internacionales. Para comprobar todas mis contribuciones véase el CVA aportado para la presente convocatoria.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Estudios del pasado: historia y arqueología
Nombre: BORAO ÁLVAREZ, MARÍA
Referencia: RYC2025-057361-I
Correo Electrónico: m.isabel.borao@uv.es
Título: Analysing the Upper Palaeolithic hunter-gatherer societies through the osseous technology.
Resumen de la Memoria:

My principal research interest lies in studying Late Glacial Maximum (LGM) and Tardiglacial hunter-gatherer societies in Southwest Europe, focusing on the analysis of osseous raw material exploitation. I have conducted techno-economic analyses to assess Solutrean, Badegoulian, and Magdalenian osseous exploitation in France and in the Central Mediterranean area of Iberia. This context is characterised by supposedly harsh environmental conditions and rapid cultural changes in technical behaviours.

To achieve this, I have implemented an innovative methodology focused on osseous industries with a new analytical perspective developed in France concerning Operational Chains. Osseous technology serves as a valuable tool for characterising an osseous assemblage by identifying techniques and operational schemas employed by a particular culture. It reveals territorial variations, external influences, and stratigraphic inconsistencies.

While there are several published works on the osseous industry in the Iberian Mediterranean area, they predominantly adopt a typological approach, leaving a gap in our understanding of the complete picture. Therefore, I conducted technological analyses on osseous raw materials to contribute to the comprehension of the social and economic dynamics during these periods, aiming to explain common technical patterns and specificities, and cultural changes beyond the traditional concepts of "influences of new cultures", "arrival or contact with other populations", or "climatic and landscape conditions". Central East Iberia has proven to be an ideal setting for this research due to the richness of its osseous assemblages and the absence of a human hiatus caused by the LGM conditions.

My research has also contributed to identifying the Operational Schemes of bone and antler exploitation during the same periods in France. I have been able to delve into the understanding of the techno-economic mechanisms set in motion, rooted in a pivotal cultural shift, namely the Solutrean, and its evolution throughout the Late Glacial period. I have outlined some of the social and economic implications that the Last Glacial Maximum (LGM) had in Southwestern Europe through the research of key sites. These sites have provided me with a unique perspective on the techno-economic landscape and its articulation by comparing typological and technological data and demonstrating that I could identify shared features that prove a relation between regions and consider the Pyrenees as a circulation area, but local peculiarities too, due to progressive regionalisation.

The future research will be amplified with the study of the Epigravettian culture in the Balkan Peninsula.

Resumen del Currículum Vitae:

My research journey began with the acquisition of five collaboration grants at the University of Valencia (2007-2011). The research conducted for my Master's thesis received the highest rating (cum laude) in 2010. I secured a research grant at the Museum of Prehistory of Valencia (2010-2012), followed by an FPI grant (project HAR 2011-24878) for my PhD (2012-2016). During this period, I enjoyed two research stays at the prestigious Université Paris I, Panthéon-Sorbonne (EEBB-I-14-08349 and EEBB-I-15-10245) under the supervision of M. Christensen.

Due to complications with endometriosis, I underwent surgery and various fertility treatments, which, unfortunately, resulted in depression. These health issues impacted my scientific production during this period.

Upon obtaining my Doctorate (2020) with the highest distinction (cum laude) and international mention, I have secured three postdoctoral contracts in Spain and a highly competitive APOSTD two years contract (APOSTD/2021/052) funded by the Generalitat Valenciana and the European Social Fund. This postdoctoral position was hosted at the renowned TRACES laboratory of the CNRS (UMR 5608).

I have collaborated on 17 projects funded by Spanish, French, Catalan and British states and regional funds, working with prestigious laboratories such as TEMPS, PACEA, and TRACES. My output comprises 20 publications (13 as first or sole author) in journals such as Quaternary International, Journal of Archaeological Science: Reports, and Journal of Palaeolithic Archaeology. I have participated in 16 national and international conferences, delivering 15 oral presentations and one poster, serving as the corresponding author in 14 of them. These include major UISPP, EAA and WBRG meetings, as well as a Guest Speaker at the 17th Archaeological Conference of Central Germany.

I co-organise the Virtual Conference for Women Archaeologists and Palaeontologists and the international workshop South-West Europe between 25-20 ka cal BP (València, 2026), both designed to foster inclusive research environments, strengthen professional networks and support early-career scholars.

I am a member of the research groups PREMEDOC (GIUV2015-213), SMP3C (UMR 5608), and the Worked Bone Research Group.

My teaching experience includes undergraduate courses in History and Biology at the University of València (2014-2017) and participation in the Nau Gran programme for learners aged over 50 (2025). I have taught at master's and doctoral levels, have served as a jury member for Master's dissertations, contributing to the supervision of postgraduate researchers, including the doctoral work of Rosana Cerezo (University of Salamanca) during her research stay at CNRS-TRACES and the master's dissertation of Patricia de Oliveira (University of València). I hold a Teaching Certificate (CAP), am accredited as an Assistant Professor (AVAP, Generalitat Valenciana), and have one recognised triennium.

Among my contributions to society, I highlight the organisation of the permanent exhibition of the Museum of Prehistory of Valencia and my annual participation in the European Researchers' Night, Expociencia, and the European Night of Museums, among others. I am a founder member of Espiera, an association made to exchange knowledge between the scientific community and the general public.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Estudios del pasado: historia y arqueología

Nombre: DUBOURG, NINON

Referencia: RYC2025-054917-I

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Título: Medieval Disability History

Resumen de la Memoria:

My trajectory as a historian of disability, ageing, and care in medieval Europe is defined by sustained international mobility, methodological innovation, and increasing scientific leadership. Trained in Paris and funded throughout my PhD by competitive fellowships, I built my early career on extensive archival work in Rome and on collaborations with major European research networks. This transnational foundation has since been reinforced by a highly competitive F.R.S.-FNRS postdoctoral fellowship in Belgium and my current Alexander von Humboldt Fellowship in Germany. These experiences have allowed me to work across archives, scholarly cultures, and methodological traditions, shaping a comparative and deeply international profile.

Throughout these stages, I have developed a distinct line of inquiry that demonstrates full research independence. I designed and executed major projects on clerical disability, lay religious practices, medico-legal expertise, and ageing in urban contexts, each time shifting historiographical perspectives and integrating new methodologies such as intersectionality, history of emotions, digital humanities, prosopography, GIS, and network analysis. My monograph and my leadership in prominent international conferences, edited volumes, and reference handbooks illustrate my capacity to open new research directions and structure emerging fields. I have coordinated long-term collaborative initiatives—most notably the EHES seminar on disability and deafness, which has become the largest francophone network in this field—demonstrating strong abilities in scientific leadership, community building, and public engagement.

These experiences converge in the new research line that I intend to develop during the Ramón y Cajal programme: the first comprehensive material history of disability in Europe between the 11th and 15th centuries. This project focuses on mobility aids, embodied practices, and the agency of disabled and elderly people, integrating texts, images, bio-archaeological remains, and museum collections. It proposes a transformative shift from normative and institutional histories of disability toward a material, experiential, and object-centred approach. By analysing assistive technologies—crutches, canes, orthoses, prostheses—as mediators between bodies, spaces, and institutions, the project addresses a major lacuna in current research and offers a new framework for understanding vulnerability, adaptation, and agency in medieval societies.

The University of Barcelona provides an ideal intellectual home for this agenda. The Hospitalibus group is a leading European hub for the study of medieval hospitals, care systems, social assistance, and lived experience, while project like Senecta investigates ageing, emotions, and social agency in later medieval societies. My project complements and expands these areas by introducing a material-cultural dimension to the study of vulnerability and by offering new methodologies—object biographies, digital databases, spatial analysis, comparative urban perspectives—aligned with their research strategies. My integration into these groups will reinforce UB's leadership in the social and medical history of the Middle Ages while allowing me to develop new lines of Spanish-funded research on ageing and disability.

Resumen del Currículum Vitae:

I am a medieval historian specialising in disability, old age, and the social history of care in Western Europe (13th–16th c.). My research combines archival analysis, material culture, and interdisciplinary approaches from disability studies, social history, and the history of institutions. Over the past decade, I have contributed to redefining the field by shifting the focus from normative sources toward lived experiences, embodied practices, and the materiality of mobility and care.

My main scientific contributions include the first large-scale study of papal petitions on clerical disability. My monograph *Disabled Clerics in the Late Middle Ages* (Amsterdam University Press, 2023) received the 2024 Lone Medievalist Prize and established a new framework for studying religious disability. I have also developed innovative work on retirement in institutional settings in fifteenth- and sixteenth-century Liège (current Alexander von Humboldt Fellowship), and on the material history of mobility aids, integrating textual, visual, and bio-archaeological sources. I have published widely in leading journals (*Journal of Medieval History*, *Social History of Medicine*, *Journal of the Canadian Historical Association*), edited special issues, and co-edited several collective volumes with major presses (Bloomsbury, Manchester UP, Arc Humanities, Presses Universitaires de Rennes).

My capacity to design ambitious research programmes is built on a 2-year experience as project manager in the École Pratique des Hautes Études in Paris, and is reflected in two ERC Starting Grant applications (2024, rated B; 2026, under evaluation), which strengthened my leadership in interdisciplinary and international project development. My research has been funded through competitive individual grants totalling €393,500. I have collaborated with teams in France, Belgium, Germany, Italy, and the US, and contributed to major funded projects.

I have organised transnational seminars and conferences, and founded the International Network for the History of Disability, Mental Health, and Deafness, with its own seminar in the Ecole des Hautes Etudes en Sciences Sociales in Paris, facilitating intercontinental collaboration in French-speaking research. I also contribute to international scholarly leadership through my service on editorial and scientific boards—including the Brepols *Women & Old Age* series, the journal *History of Psychiatry*, and the Scientific Advisory Board of *Hypothèses* (OpenEdition)—as well as through regular peer reviewing for major academic publishers such as Brill and Brepols.

I am committed to public engagement and knowledge transfer. I manage the Hypotheses.org blog Dishist, contribute to digital resources, and disseminate research through media appearances, museum collaborations, and public lectures. My open-access datasets and online pedagogical tools make primary sources accessible to students, scholars, and cultural institutions. Training and mentoring play a central role in my career: I have taught more than 825 hours across undergraduate and graduate levels, designed research-led seminars on disability and hospital history, supervised early-career researchers, and contributed to PhD committees. Through editorial work, peer-reviewing for major journals, and academic service, I actively support the development of younger scholars and the broader field.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Mente, lenguaje y pensamiento
Nombre: HRNJEZ, SAŠA
Referencia: RYC2025-055068-I
Correo Electrónico: shrnjez@gmail.com
Título: Hegelian-Marxist Understanding of Language and Questions of Translation
Resumen de la Memoria:

In the next five years, I aim to consolidate and expand the research directions that have emerged from my previous work, while also opening new avenues of investigation. A first line of research develops my ongoing engagement with Hegelian-Marxist philosophy of language, with particular attention to the intersections between Hegel, Gramsci, and Bakhtin. I will deepen the dialogue between Hegel's philosophy, contemporary philosophy of language, and Marxist sociolinguistics. The objective is to open new interpretative pathways by foregrounding Hegel's view of language as a fundamentally social practice. Drawing on the Phenomenology and the Jena lectures, I will examine whether a notion of ideology—understood not as “false consciousness” but as an epistemological condition of practical action—is already operative in Hegel's theory of language. This reassessment provides the basis for a productive engagement with Bakhtin's concept of dialogical, multi-voiced language and Gramsci's reflections on hegemony, common sense, and language. The project will generate a substantial impact on Hegelian-Marxist philosophy of language by reinterpreting Hegel's conception of language in light of contemporary Marxist debates on ideology. It is expected to lead to several publications, including peer-reviewed articles and book chapters.

A second line of research builds on the results of the LANGEST project and aims to advance the study of exophony through an interdisciplinary and bottom-up methodology. I will analyze concrete cases of exophonic authors—writers who produce literary or poetic work in a non-native language and accompany it with explicit reflections on linguistic displacement, culture and identity (e.g., Yoko Tawada, Franco Biondi, Jhumpa Lahiri, Anton Shammas, Antonio d'Alfonso, etc.). By collecting both their writings and related paratexts, I will construct an archive of exophonic texts to support a philosophical analysis of language grounded in real translingual practices. In parallel, I will investigate exophonic philosophical writings by thinkers such as Wittgenstein, Arendt, Jankélévitch, Kristeva, Lévinas, Kojève, and Weil, examining how writing in a foreign language shapes conceptual formation and critical potential. The aim is to develop a general theoretical model capable of accounting for exophonic and translingual practices across literature, philosophy, and cultural production. Given its interdisciplinary reach and methodological innovation, this research will form the basis of a future ERC proposal.

Both lines of inquiry converge on the central question of language and affirm the coherence of my expertise in the philosophy of language and translation. Taken together, they will culminate in a research monograph, to be published in English with a major academic press, representing the synthesis and culmination of my long-term work on these themes.

Resumen del Currículum Vitae:

Over the past decade, my research has developed along four complementary axes: German Classical Philosophy (with a focus on Kant and Hegel), Philosophy of Translation, Philosophical Hermeneutics, and Contemporary Marxism, especially Gramsci and Italian Marxism. I have authored more than forty publications in Italian, English, German, and Serbian-Croatian, contributing to the international visibility of my work. My academic trajectory began with PhD studies in philosophy in Turin, where I established a solid grounding in Kantian and Hegelian scholarship. This phase culminated in my first monograph, *Sintesi e mediazione tra criticismo e idealismo speculativo* (Mimesis, 2017).

A decisive turning point came with the award of a Marie Skłodowska-Curie Fellowship at the University of Padua (2018–2020), during which I developed an original research programme in the philosophy of translation. This project elaborated a conception of translation as a self-reflexive and transformational practice, drawing on Hegel, Benjamin, and Gramsci. It produced several peer-reviewed articles and a monograph, *Translation as Concept. Universality, Negativity, Time* (Padua University Press, 2021), which has attracted significant international attention, with translations in Portuguese, Spanish, and an English edition forthcoming with Springer Nature. My MSCA work also strengthened my international profile and played a key role in the creation of PHILTRA, the Research Center for the Philosophy of Translation at the University of Padua, where since 2023 I have been a coordinator and member of the Executive Board.

From 2021 to 2022, a postdoctoral fellowship at the Austrian Academy of Sciences and the University of Vienna (ÖeAD) allowed me to deepen the study of Gramsci's thought and further investigate the political and cultural dimensions of translation.

Since 2022, I have served as Junior Assistant Professor in the History of Philosophy at the University of Florence and Principal Investigator of the project LANGEST, funded by the Italian Ministry of University and Research (EU-Next Generation). The project expands my research on philosophy of translation by exploring the nexus between language and estrangement, with particular attention to exophony and translingualism. Over the past three years, LANGEST has strengthened my international collaborations, supported the organisation of numerous academic events, and led to the creation of the international journal *Philosophy of Translation* (Taylor & Francis), where I serve as one of the Editors-in-Chief.

My academic path is marked by substantial international experience, including study and research stays in Serbia, Italy, Germany, Austria, Chile, the Czech Republic, and Japan. I am a member of several research groups (Hegelpd, GEIST) and scholarly societies (Società Italiana di Storia della Filosofia, International Gramsci Society, Sociedad Iberoamericana de Estudios Hegelianos). At the University of Florence, I have taught six courses across BA and MA programmes, supervised theses, and contributed to PhD training. I also act as peer reviewer for numerous journals and have twice served as evaluator for the Horizon Europe MSCA Postdoctoral Fellowships. I hold two Italian National Scientific Habilitations for Associate Professor in Theoretical Philosophy and in History of Philosophy.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Mente, lenguaje y pensamiento
Nombre: ALMAGRO HOLGADO, MANUEL
Referencia: RYC2025-055639-I
Correo Electrónico: manuelalmagroholgado@gmail.com
Título: Lenguaje, propaganda, injusticia y polarización
Resumen de la Memoria:

A substantial part of my philosophical research to date has focused on the study of political polarization in general, and affective polarization in particular. Despite the political nature of this phenomenon, my work does not only fall within the field of political philosophy, but also within the political philosophy of language and political epistemology. The main reason for this is methodological, as reflected in the research objectives I have pursued. For example: (i) I have carried out a conceptual analysis of the concept of polarization in order to clarify a highly confusing literature, in which more than 200 expressions contain the term; (ii) I have explored the relationship between the rise of public opinion division in contemporary democracy and phenomena widely discussed in the previously mentioned fields, such as deep disagreement, epistemic vices, and the distinction between cognitive and conative mental states; and (iii) I have examined how linguistic phenomena related to offensive speech interact with polarization. Nevertheless, my approach to studying polarization is interdisciplinary and has an important practical motivation. My research introduces a novel and original concept of affective polarization aimed at improving our ability to detect polarization at early stages and to design effective interventions.

My previous research has fundamentally reshaped my understanding of the mechanisms driving political division in contemporary democracies. The growing fractures in Western societies are not best explained by a lack of critical thinking among citizens, nor simply by moral shortcomings. Instead, the rise of polarization is closely tied to the spread of divisive narratives by certain political actors and to the embedding of controversial ideas at the core of particular political identities. My work shows that the linguistic, cognitive, and affective mechanisms involved in this process can lead fully rational individuals to adopt positions that ultimately harm both public life and their own well-being.

As a RyC fellow, I will advance this line of inquiry through a natural yet innovative expansion of my previous research, centered on the idea that political polarization grows through strategies that resonate with the experiences and background assumptions of specific segments of the population. The project has three overarching aims: (i) to refine our understanding of political polarization by distinguishing it from adjacent phenomena –such as extremism and radicalization– that are gaining increasing attention in philosophy; (ii) to develop a theoretical account of some linguistic mechanisms that have been partially overlooked in the literature –such as the phenomenon of hate narratives– that influence and sustain political division, as well as to devise ways of measuring their presence in public opinion; and (iii) to examine the points at which the epistemic and linguistic dimensions of polarization become inseparable, with particular attention to their implications for epistemic injustice, silencing, and related forms of discursive harm. These aims are articulated into four work packages, each with clearly defined objectives and deliverables (ver la memoria).

Resumen del Currículum Vitae:

I am a philosopher specializing in political philosophy of language, political epistemology, and experimental philosophy. I am developing a new theoretical and empirical approach to affective polarization, which seeks to understand the rise of affective polarization through the impact of certain linguistic phenomena in public discourse, and thus expand the range of tools available for both early detection and depolarization.

My PhD had an international mention, cum laude, and an Extraordinary Doctorate Award. I have more than 30 publications, of which 22 are published in Q1, Q2 and Q3 journals (SJR/JCR). 14 of them are Q1 (SJR/JCR) in prestigious journals such as Philosophical Psychology, Argumentation, Metaphilosophy, Hypatia, Topoi, International Journal of Philosophical Studies, Synthese, Philosophy & Social Criticism, and Personality and Social Psychology Bulletin. I have a six-year research evaluation (sexenio). My work has received 238 citations (Google Scholar, with H-Index of 9 and i10-index of 9) in top-journals such as Nature, Synthese, Thinking & Reasoning, and Social and Personality Psychology Compass. One of my co-authored papers received an award from the prestigious European project PERITIA. I am the sole author of the first monograph fully devoted to the philosophical aspects of affective polarization, which has been shortlisted for the very prestigious Nayef-Al Rodhan Book Prize 2025 (£20,000) awarded by the Royal Institute of Philosophy. This book is published by Routledge (SPI Philosophy 5/23) in the Routledge Studies in Contemporary Philosophy series. Leading authors in the area such as Ophelia Deroy, Christoph Kelp or Robert Talisse have published in the same series. I have been invited to co-edit a book symposium on my book for the European Journal of Analytic Philosophy (Q1 SJR). I also have 5 book chapters, 3 of them in international publishing houses within the SPI ranking: the first one will appear in Oxford University Press (SPI Philosophy 1/23) in a book on the intersection of Philosophy of Language, Ethics, and Political Philosophy edited by Robin Jeshion and Julija Perhat, the second one is published by Springer (SPI Philosophy 3/23) and the third one by De Gruyter (SPI Philosophy 9/23). I have also published 2 book reviews and 1 encyclopedia entry. I am Principal Investigator of two research projects in competitive concurrence: a project for emerging research groups (CIGE/2023/8, 20.000,00€) and a National Plan project (PID2023-150151NA-I00, 91.125,00€, 14 international researchers in the work team) with a FPI contract associated, and PI of a teaching project (UV-SFPIE_PIEE-3897420). I have been part of the work team of 4 National Plan projects (PID2022-140562NB-I00, PID2021-126826NA-I00, PID2019-109764RB-I00, FFI2016-80088-P), 2 funded by the BBVA Foundation (OPIDPOLA and BBVA2021- Leonardo), 2 from CCAA (P18-FR-2907, B-HUM-459-UGR18), and member of 5 international and national networks: EPISOC, STAL, APPLY, FiloLab and VLC Philosophy Lab. I have delivered more than 50 talks (32 by invitation and 26 with evaluation committee) in several countries. I have spent 24 months abroad in excellent universities, such as the University of Connecticut (USA), the Ludwig-Maximilians University (Germany), and the Université Paris-Sorbonne (France) (see the CVA for more info).



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Área Temática: Producción industrial, ingeniería civil e ingenierías para la sociedad
Nombre: PENSALFINI, MARCO
Referencia: RYC2025-056843-I
Correo Electrónico: marco.pensalfini@gmail.com
Título: Bioinspired metamaterials for mechano-chemical modulation of soft tissue fibrosis
Resumen de la Memoria:

Fibrosis is an aberrant healing response driven by dysregulated biochemical and mechanical cues, which underlies pathology across organs and impairs the integration of biomedical implants. While local pharmacology and mechanical off-loading have shown promise, current devices are largely empirical and decoupled from tissue biomechanics, limiting efficacy and translation. This project aims to introduce a rational design framework for bioinspired metamaterials that jointly modulate tissue mechanics and locally deliver therapeutics to mitigate fibrosis and favor tissue regeneration. Using skin wound repair as an accessible model with cross-organ relevance, we will design architected, sheet-like materials that (i) buffer tensile stresses across wide deformations and (ii) couple stretch to controlled, on-demand drug release.

Our central inspiration derives from epithelial mechanics: under large strain, intermediate filament networks entangle into star-like architectures that sustain load with nearly constant tension, providing a remarkable biological analogue of superelastic materials. Translating this principle to artificial soft devices, we will engineer multiscale fiber or beam networks that reconfigure under stretch to stabilize interfacial tension while compressing embedded, porous capsules to mechanically trigger delivery of pharmacological substances. This dual action aims to tune the cellular microenvironment sensed by fibroblasts and immune cells, attenuating pro-fibrotic signaling and promoting organized matrix deposition.

The research will develop along three work packages. WP1 will establish computational models linking network topology (e.g., fiber length, extensibility, connectivity) and capsule properties (e.g., size, porosity, compliance, substance viscosity) to the obtained release kinetics under prescribed deformations. We will also explore snap-through beam microstructures as alternative mechanisms for attaining capsule compression. WP2 will aim to translate validated unit cells into centimeter-scale, manufacturable sheets via membrane-mediated or direct connections, combining homogenization and machine-learning surrogates to tune emergent superelastic-like responses against the compliance of target tissues (e.g., skin). WP3 will focus on fabricating macro-scale unit cells and multi-cell sheets by additive manufacturing and controlled entanglement, quantifying force-extension and release profiles and iteratively refining material designs for durability, repeatability, and clinical usability.

Building on my track record in tissue biomechanics, wound mechanobiology, and multiscale mechanical modeling, this research program will introduce a novel design paradigm for mechanotherapeutics. Anticipated outcomes include: (1) validated in silico platform to co-optimize mechanical buffering and drug delivery; (2) prototype dressings tailored to mitigate hypertrophic/keloid scarring or aid chronic wound closure; (3) transferrable principles for soft-organ applications and implant interfaces. By bringing together state-of-the-art computation, bioinspired architectures, and scalable fabrication, the project lays the groundwork for a new class of mechano-chemical metamaterials capable of actively instructing tissue healing. In the long term, we expect this program to generate unique opportunities for clinical translation of findings.

Resumen del Currículum Vitae:

I hold BSc (2011) and MSc (2014) degrees in Mechanical Engineering, both summa cum laude, from Bologna University, where I attended the selective Collegio Superiore excellence school. This program offered tuition waiver, stipend, and interdisciplinary training (I took Economics, Philosophy of Science, Physics & Technology) to students with outstanding GPA (27/30; no grade <24). During my MSc, I spent the 2012-2013 academic year at the University of Wisconsin-Madison through a competitive call, attending specialist courses in mechanical and biomechanical engineering and gaining research experience in biomechanics, which led to my first publication. My MSc thesis focused on designing a parallel robot to test human joints, combining mechanical engineering with biomechanics.

In 2019, I completed a PhD in Mechanical Engineering in Prof. Mazza's group at ETH Zurich, focusing on skin biomechanics. I characterized load transfer across tissue scales, its relevance for mechanobiology, and its alteration with aging and repair. I developed advanced experimental techniques (ex vivo tensile and suture retention tests with optical strain tracking, in situ tests with microstructural visualization, in vivo suction with ultrasound, wound elastography) and combined them with nonlinear simulations in clinically relevant contexts (e.g., 3D face model for age-related sagging). My findings, presented at international conferences and published in 12 journal articles, contributed to the early development stages of skin-like hydrogels (Cutiss AG) and a skin testing device (Citius AG). I also proposed an elastographic technique to monitor wound healing biomechanics, earning the 2020 Young Investigator Award from the Swiss consortium for skin research. During my PhD, I supervised 2 MSc theses (one was awarded ETH Silver Medal), 4 BSc theses, and 3 semester projects, strengthening leadership and project management skills. I also collaborated with biologists, clinicians, and industry. Towards the end of my PhD, I secured a Swiss National Science Foundation fellowship to work with Prof. Buganza-Tepole at Purdue University, developing an open-source mechano-biological finite-element model of wound healing.

After my PhD, I spent a year working as Senior Research Engineer at Zimmer Biomet, gaining experience in translating academic research into marketable products, regulatory compliance, and industrial manufacturing optimization.

In 2020, I joined Prof. Arroyo's group at UPC as Research Director on his ERC grant and later led a Marie-Curie replacement grant from AEI. Through multiscale computational models of cytoskeletal Brownian dynamics, I uncovered biophysical principles of cytoskeletal self-organization under external and internal loads. I acted as main liaison with experimental collaborators (Prof. Treppe, IBEC) and supervised 1 PhD and 1 BSc student.

Since 2024, I have been Lecturer at QMUL, leading a group of 1 PhD and 9 MSc students investigating multiscale biomechanics and mechanobiology of fiber-network materials (connective tissues, epithelia, biomaterials). We aim to distill bioinspired design principles to create materials that regulate



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tissue by releasing physicochemical cues. In 2025, I received ERC in Italy's "Best Frontier Project Award," and one of my students won a "Best Poster Award."



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Área Temática: Psicología
Nombre: ALCALÁ MARTÍN, JOSÉ ANDRÉS
Referencia: RYC2025-055517-I
Correo Electrónico: jose.alcala@urjc.es
Título: Trayectoria Jose Andres Alcala

Resumen de la Memoria:

Soy psicólogo experimental especializado en aprendizaje asociativo, interacción entre claves, emoción y gradientes de generalización. Soy Doctor en Psicología por la Universidad de Jaén (2018), donde también cursé el Grado en Psicología y el Máster en Neurociencia Cognitiva, recibiendo el Premio Extraordinario de Fin de Carrera y el Premio Extraordinario de Doctorado. Durante mi FPU centré mi tesis en el papel de la incertidumbre en la adquisición de nuevos aprendizajes.

Tras el doctorado he desarrollado una trayectoria postdoctoral internacional. Fui investigador postdoctoral en la Universidad de Jaén y, posteriormente, en las universidades de Leicester y Nottingham (Reino Unido) gracias a un proyecto del ESRC centrado en principios dominio-generales de competición y facilitación durante el aprendizaje. Más tarde obtuve un contrato de Atracción de Talento Internacional [María Zambrano] en la Universidad Complutense de Madrid, donde empecé a integrar el aprendizaje asociativo con el procesamiento emocional y del lenguaje, generando trabajos pioneros sobre cómo las características emocionales moldean los gradientes de generalización. Desde 2023 soy Ayudante Doctor (Lecturer) en la Universidad Rey Juan Carlos.

He realizado estancias de investigación en la UNAM (México), la Universidad de Vermont (EE. UU.), la Universidad de Buenos Aires (Argentina) y la Universidad de Granada, y mantengo colaboraciones estables con grupos de referencia en aprendizaje, emoción y procesos cognitivos. Soy IP o co-IP de dos proyectos competitivos: un proyecto de la Agencia Estatal de Investigación sobre gradientes de generalización emocionales, un proyecto URJC para jóvenes investigadores.

Mi producción incluye en torno a 20 artículos JCR (aprox. la mitad como primer autor; buena parte en Q1-Q2), un capítulo de libro y varias contribuciones de divulgación, con un índice h de 10 y más de 250 citas. He presentado mis resultados en más de veinte congresos internacionales, soy miembro de SEPEX y actué como revisor para revistas como Motivation & Emotion, Cognition & Emotion, Affective Science, Journal of Cognition o QJEP. En el ámbito docente acumulo más de 600 horas en asignaturas de grado y postgrado de Psicología (Introducción a la Psicología, Pensamiento y Lenguaje, Historia de la Psicología, Emoción y Motivación, Introducción a la Neurociencia. Afectiva).

Tengo reconocidos un sexenio de investigación y un quinquenio de docencia.

Resumen del Currículum Vitae:

Mi trayectoria investigadora se ha desarrollado en el marco de la Psicología Experimental y los Procesos Cognitivos, con especial énfasis en el aprendizaje asociativo y su interacción con la emoción. Tras una beca de colaboración inicié el doctorado en la Universidad de Jaén con una FPU, donde, bajo la Teoría Atencional del Procesamiento de Contextos, mostré que la experiencia previa con la incertidumbre facilita nuevos aprendizajes tanto en tareas espaciales como apetitivas en ratas. Estos trabajos, publicados en revistas de referencia y reconocidos con el Premio Extraordinario de Doctorado, sentaron las bases de mi interés por cómo el contexto y el estado del organismo modulan la adquisición de nuevas asociaciones.

Mi carrera posterior ha estado marcada por una clara internacionalización y por la búsqueda de principios de aprendizaje de carácter dominio-general. Realicé estancias competitivas en la Universidad de Vermont, la Universidad de Buenos Aires y la Universidad de Granada, donde amplí mi repertorio de modelos (ratas, sapos, planarias y humanos) y tareas (aprendizaje espacial, evitación, cadenas conductuales, aprendizaje predictivo e instrumental). Posteriormente disfruté de un contrato postdoctoral de tres años financiado por el ESRC en las universidades de Leicester y Nottingham. En este periodo lideré el proyecto [Competition and Facilitation During Learning: Searching for Domain-General Principles], en el que propusimos un modelo teórico que sitúa la contigüidad espacio-temporal como determinante central de los fenómenos de competición y potenciación entre claves.

A mi regreso a España, gracias a un contrato de Atracción de Talento María Zambrano en la UCM, amplí mi interés hacia la interacción entre aprendizaje, emoción y lenguaje. En este contexto publiqué la primera evidencia de que las características emocionales de los estímulos moldean los gradientes de generalización de manera análoga a las dimensiones físicas, abriendo una nueva línea que integra aprendizaje asociativo y procesamiento emocional. Desde 2023 soy profesor ayudante doctor en la URJC y he consolidado mi independencia como IP y co-IP de dos proyectos competitivos centrados en la generalización y la evitación, además de mantener una red de colaboraciones con grupos punteros en aprendizaje, atención y emoción.

La línea que propongo desarrollar profundiza en la caracterización de los gradientes de generalización en función de variables emocionales y de aprendizaje, combinando medidas conductuales, fisiológicas e inducciones emocionales. Mis objetivos incluyen: (1) estudiar cómo la congruencia emocional entre estímulos condicionados y no condicionados, así como fenómenos como el [peak-shift], configuran la forma del gradiente; (2) analizar la relación entre generalización y respuestas de evitación, especialmente relevante para los trastornos de ansiedad; (3) trasladar estos efectos a medidas implícitas como la conductancia de la piel; y (4) realizar una integración teórica que conecte los hallazgos de aprendizaje asociativo, emoción y generalización.



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Área Temática: Psicología
Nombre: CLER, GABRIEL
Referencia: RYC2025-055175-I
Correo Electrónico: gabrieljcler@gmail.com
Título: Neurobiology of developmental language disorder: Motor and transdiagnostic approaches
Resumen de la Memoria:

I am a researcher with scientific expertise in behavior and brain correlates of neurodevelopmental communication disorders (developmental language disorder, stuttering), supported by technical expertise in analysis pipeline development in R, Python, Matlab, and bash including machine learning; quantitative structural neuroimaging in grey and white matter; automated and manual acoustic measures of speech; and high-quality acquisition and processing of speech, vocal tract kinematic, and electromyographic signals.

My academic training was initially in computer science (BS, 2007). My doctoral studies (Boston University; mentors Cara Stepp, Frank Guenther) involved studying motor control with behavioral studies, through which I gained broad knowledge in speech and language disorders, acoustics, kinematics, and interacted with a wide range of study participants (with and without communication disorders; pediatric, adult, and geriatric). My postdoctoral studies (University of Oxford; mentors Kate Watkins, Steve Smith) involved collecting and analyzing structural neuroimaging in children with developmental language disorder (DLD) and adults who stutter. I have spent the last several years as an assistant professor at the University of Washington, Seattle, WA, building my own lab and developing my own line of research focused on the neural correlates of DLD in adulthood.

Due in part to political changes affecting the safety of my family members and me, we have begun the process of relocating permanently to Spain. I am currently a visiting researcher at the Basque Center on Cognition, Brain and Language (BCBL) while still an assistant professor in the US. I am working with BCBL to integrate with relevant research groups (Marie Lallier's "Educational Neuroscience and Developmental Disorders" group; Arthur Samuel/Efthymia Kapnoudis' "Spoken Language" group; Cesar Caballero-Gaudes' "Signal Processing in Neuroimaging" group), while writing grants to establish my own line of research here.

My research focuses on a very common but virtually unknown neurodevelopmental disorder, DLD, a heritable disorder that affects ~7.6% of the population, or two children per classroom. DLD is characterized by impairments in language comprehension and production, particularly in grammar, and has long-term impacts on mental health, employment, and incarceration. My specific line of research involves determining the behavioral and neural correlates of DLD, towards improving awareness, assessment, and treatment of DLD. I use neuroimaging to unravel specific neural correlates of DLD in children and adults, with a focus on quantitative structural imaging. I also use the motor system as a non-linguistic cognitive system with which to directly study learning in DLD, unconfounded by existing language skills and appropriate as a potential screener in multilingual contexts. Finally, in my proposed work at BCBL, I would incorporate local expertise on dyslexia to unravel the similarities and differences between these neurodevelopmental disorders, which can both affect literacy, are frequently co-morbid, and are not currently assessed well together or separately, especially in multilingual populations.

Resumen del Currículum Vitae:

Throughout my career, I have published my work broadly (28 journal articles; 5 peer-reviewed conference papers; 17 as first or senior author) and have presented nationally and internationally at conferences (57 conference presentations). I have been gaining recognition for my scientific contributions through international invited seminars. I have been recognized as a successful early-career researcher, evidenced by invited talks directed at trainees. I have received notable distinctions including the Washington Research Foundation Ronald S. Howell Distinguished Faculty Fellowship (2023-2025), the NIH Outstanding Scholar in Neuroscience Award (2020), an Editor's Choice selection in Brain, and a Postdoctoral Abstract Merit Award from the Society for the Neurobiology of Language. As a student and postdoctoral fellow, I was selected as a mentee/protégé for several workshops and trainings as was awarded funding to attend; I have now been the mentor through one of these mechanisms rather than the mentee (award to Noelle Abbott, Research Mentoring-Pair Travel Award to attend ASHA Convention, 2024), highlighting demonstrates my continued advancement toward research independence.

I have secured competitive funding at every stage of my training, including an NIH F31 to fund doctoral work at Boston University and an NIH F32 fellowship to support my postdoctoral work at the University of Oxford. As an assistant professor I have obtained five internal and external awards to support my program of research and served as Co-I on a major NIH R01. I have developed a strong record of mentoring, including supervising a postdoctoral researcher, chairing multiple master's and undergraduate theses, and supporting trainees in securing their own competitive funding (seven undergraduate research grants and three imaging-hour awards since 2021). My service record reflects leadership and engagement in the field: I serve on the editorial board of Journal of Speech, Language, & Hearing Research, review for numerous journals and internal funding mechanisms, and have participated on two NIH study sections. I also teach across undergraduate, master's, and doctoral levels, contributing to training at multiple points of the academic pipeline.

Taken together, these achievements demonstrate my independence, leadership, and growing international visibility. A Ramón y Cajal contract would enable me to move my research program to Spain and establish full research independence here. This would facilitate the expansion of my work with existing and new international collaborations, foster new research directions, and lay the foundation for sustained scientific innovation while training the next generation of researchers.



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Área Temática: Tecnologías de la información y de las comunicaciones
Nombre: MARTÍN SÁNCHEZ, DAVID
Referencia: RYC2025-056249-I
Correo Electrónico: marsandav@gmail.com
Título: Photonic devices for security applications
Resumen de la Memoria:

CURRENT POSITION

2025-present Research Fellow. CSIC, Spain
2022-present Honorary Research Fellow. University College London, United Kingdom

PREVIOUS POSITIONS

2023-2025 MSCA Postdoctoral Fellow. CSIC, Spain
2019-2022 Postdoctoral Fellow. University College London, United Kingdom
2016-2019 Predoctoral Fellow. Universitat Politècnica de València, Spain

ACADEMIC EDUCATION

2016-2019 PhD in Telecommunications. Universitat Politècnica de València, Spain
2014-2016 MSc in Biomedical Engineering. Universitat Politècnica de València, Spain
2010-2014 BSc in Telecommunications. University of Seville, Spain

PARTICIPATION IN RESEARCH PROJECTS

2026-2029 ODE4EC-DIG (European Research Executive Agency, 20,022,098.75€)
2025-2028 SecPIC (Spanish Government, 114,850.00€), Principal Investigator
2023-2025 SQPRIM (European Research Executive Agency, 181,152.96€)
2019-2023 PHOTOClin (European Research Council, 2,163,061.00€)
2018-2019 OPTONANOSENS (Spanish Government, 324.280€)
2016-2018 SAPHELY (European Commission, 3.228.838€)

FELLOWSHIPS

2025-2028 Andalusian Government's Postdoctoral Fellowship 2024
2023-2025 Marie-Sklodowska Curie Actions' Postdoctoral Fellowship 2022

PUBLICATIONS

- 13 articles in scientific journals (8 as first author)
- 17 conference presentations (10 as first author/speaker)
- All my articles were published open access in Q1 journals
- h-index 9, 192 citations (source: Google Scholar)

INTERNATIONALIZATION

- 3 years of experience at an international university ranked among the top 10 worldwide
- 4 research institutions, 25 co-authors
- I established new collaborations with IMB-CNM and TU/e
- Currently collaborating as Honorary Research Fellow at University College London
- 2 COST Actions

INDEPENDENCE AND LEADERSHIP

- I am principal investigator of SecPIC project
- I have been granted 523,625.24€ to conduct my own research
- Supervisor of 3 undergraduate students, 3 master students, 2 PhD, and 1 postdoc

KNOWLEDGE TRANSFER

- 3 contracts
- 3 software tools (open source code)
- 1 patent filed

DISSEMINATION ACTIVITIES

- Participation in public outreach events
- Communication through social media
- Seminar for PhD candidates
- 3 years selected for the European Commission's science fair

Resumen del Currículum Vitae:



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In 2016, I enrolled in a doctoral program at the Nanophotonics Technology Center of Valencia, a top-notch photonic innovation institute in Spain. I joined Jaime García-Rupérez's biophotonics group, to develop of lab-on-chip (LoC) solutions for non-invasive early diagnosis of cancer and affordable mass-screening programs. My research focused on increasing the surface-to-volume ratio within the LoC, to boost sensitivity and enable earlier diagnosis. I achieved 5x increase of the sensitivity by using porous substrates. In addition, I explored photonic membranes to further increase the sensitivity by a factor of 2. In 2019, I was awarded my PhD (Cum Laude) for these contributions.

After this, I took a position at University College London (UCL), ranked among the top 10 universities worldwide. There, I joined Paul Beard's world-leading group on photoacoustic imaging, a promising technique for improving the clinical diagnosis and treatment of cancer and other major diseases. I participated in the development of a new generation of optical ultrasound sensors, aiming to improve image quality and penetration depth. I achieved a 10-fold increase in sensitivity, enabling for the first time deep imaging and paving the way towards translational medicine.

In 2023, I was awarded a Marie Skłodowska-Curie Postdoctoral Fellowship (MSCA-PF) and joined CSIC, Spain's leading research institution and ranked among the top 3 in Europe. In particular, I joined Piedad Brox's hardware security group, renowned for their design of secure hardware architectures and cryptographic primitives. My goal was establishing a new research line to study photonic cryptographic primitives. For that aim, I used the experience I acquired throughout my career to develop photonic devices that were sensitive to manufacturing variabilities, to derive a physical identity for digital devices. Thanks to this work, in 2025 I have been awarded a new postdoctoral fellowship funded by the Government of Andalucía. At the same time, I have been awarded the research project SecPIC funded by the AEI, where I am the principal investigator, which pioneers the use of PICs for tackling the threat of quantum computing to cryptography.

I wish to establish a research line focussed on providing robust cryptographic identification entities based on optical structures. In this line, I would exploit the preliminary results I am obtaining in this field and I would advance in the understanding of these entities, whose research is still scarce. Moreover, in this research line I would address the challenge of miniaturising the optical structures and integrating them in wearable devices and Internet-of-Things (IoT) devices. I would achieve this by using photonic integrated technology.

Obtaining a Ramón y Cajal fellowship would allow me to establish myself in my institution and would mean the foundation of my own research group. The future prospects of this line are promising, driven by the demand from the industry sector. As a consequence, the research results are expected to be easily transferable. This will also allow me to secure more funding and attract early-career researchers to work in this line. Thanks to this fellowship, I would be leading this research line in my institution and realising my goal of becoming a fully independent researcher.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025 TURNO GENERAL

Área Temática: Tecnologías de la información y de las comunicaciones
Nombre: RAMÍREZ RONDÓN, JUAN MARCOS
Referencia: RYC2025-055733-I
Correo Electrónico: juanmarcos26@gmail.com
Título: Invex Optimization for Signal and Image Processing and Machine Learning Problems
Resumen de la Memoria:

Juan Marcos Ramírez Rondón is a distinguished international researcher who has made outstanding contributions to signal and image processing, as well as machine learning applications. Over the past few years, he has built a distinctive and coherent scientific trajectory that advances from robust nonlinear signal models to AI-driven systems for communication networks, remote sensing, and societal probing. His publications have received approximately 279 citations (h-index 10, i10-index 11), with more than 80% of his articles appearing in Q1 journals. His research integrates theoretical rigour with practical impact, producing both analytically grounded algorithms and real-world applications. Specifically, Dr. Ramírez has made significant contributions to robust nonlinear filtering, robust transforms, median-based compressive sensing signal reconstruction, feature fusion for image classification, hyperspectral and multispectral image fusion, and 3D seismic wavefield recovery. His work includes publications and recognitions in top venues such as AAAI (Honourable Mention in the AI for Social Impact Track, 2024) and KDD 2025 (accepted paper on error bounds for NSUM estimators). In addition, he has led the design, implementation, and assessment of technological tools based on explainable and interpretable machine learning to detect and classify performance anomalies in mobile networks from tabular data. Other significant steps taken by Dr. Ramírez include his involvement in analysing and evaluating survey estimation techniques to solve complex problems in the health and social sciences, including detecting COVID-19 infections, and predicting voting intention. These activities have generated over 40 peer-reviewed scientific publications in high-impact conferences, collaborations with recognised scholars, technology transfer with industry leaders such as Nokia and Ecopetrol, and over 15 open-source, reproducible research repositories. Dr. Ramírez has been recognised twice with the Mario Gerla Best Paper Award and, most recently, with the Honourable Mention for the Best Paper in the AI for Social Impact Track of the prestigious Annual AAAI Conference on Artificial Intelligence. Moreover, he has been actively involved in developing emerging scholars and professionals in the field of computer science. He has mentored young researchers, guiding and supervising PhD and master's students and PhD interns. His research leadership has also been acknowledged through his involvement in projects. He was awarded a Marie Curie postdoctoral fellowship, highlighting his potential and excellence in research. Dr. Ramírez has also been pivotal in several high-impact Spanish research projects, such as DRONAC, ECID, NetPredict, and SocialProbing. Recently, he has been part of the UrbanSwarm research team that received funding approval from the Driving Urban Transitions (DUT) European project. Building on this trajectory, he now proposes a Ramón y Cajal research line on invex optimization for signal and image processing and machine learning, aimed at bringing global optimality guarantees to non-convex models widely used in engineering and AI.

Resumen del Currículum Vitae:

Juan Marcos Ramírez Rondón is a distinguished postdoctoral researcher with extensive experience in signal and image processing and machine learning applications. His scientific contributions encompass developing, implementing, and evaluating cutting-edge methodologies and algorithms, including the class of recursive weighted myriad filters, innovative feature fusion methods for spectral image classification, hyperspectral and multispectral image fusion, and leveraging machine learning for healthcare and social sciences applications. His scholarly output includes numerous high-impact publications in prestigious journals, such as IEEE Transactions on Signal Processing, IEEE Transactions on Image Processing, Signal Processing, Signal Processing: Image Communication, IEEE Transactions on Geoscience and Remote Sensing, IEEE Journal on Selected Topics in Applied Earth Observations and Remote Sensing, IEEE Journal on Selected Topics in Signal Processing, and the International Journal of Medical Informatics. Furthermore, various works co-authored by Juan Ramírez have been published in important international events such as ICASSP, ICIP, IGARSS, DCC, and AAAI. These scholarly activities are complemented by his commitment to open science and his maintenance of reproducible research repositories on GitHub (JuanMarcosRamirez.github.io).

The research work of Juan Ramírez was supported by the Horizon 2020 Research and Innovation Program of the European Union with a Marie Curie Skłodowska Actions (MSCA) postdoctoral fellowship from the Got Energy Talent (GET) program at Universidad Rey Juan Carlos, Spain, from 2019 to 2021. Furthermore, he was also supported by the Research Secretary of Universidad Industrial de Santander, Colombia, with a postdoctoral internship in 2018. His current position as a Postdoctoral Researcher at IMDEA Networks has been supported by Spanish National Projects such as ECID, NetPredict, SocialProbing, and AEON-CPS. His scientific contributions have been recognized through successful collaborations with eminent global scholars (Antonio Ortega, Marco Ajmone Marsan, Ajitesh Srivastava, Carlos Baquero, and Jaya Champati). Additionally, Juan Ramírez has played an essential role in research, development, and innovation activities with industry leaders like Nokia, proposing, implementing, and evaluating machine learning methodologies for detecting and classifying performance anomalies in mobile networks. Recently, Juan Ramírez has contributed to young researchers' academic and professional development, supervising PhD students and interns at IMDEA Networks. It is worth noting that his recent research has received the following awards: (1) Mario Gerla Best Paper Award at the MedComNet 2022 Conference, (2) Honorable Mention for the Best Paper for the AI for Social Impact Track of the AAAI, and (3) Mario Gerla Best Paper Award at the MedComNet 2024 Conference. In summary, Juan Ramírez's career is characterized by high-level scientific achievements, impactful contributions to technology and society, and a commitment to the next generation of researchers. His work exemplifies the synergy between academic excellence and practical application, making him an asset to any research and development endeavor.



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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2025

Turno RYC-INIA-CCAA

Área Temática: Ciencias agrarias y agroalimentarias
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Título: Valorización de residuos para desarrollo de preservantes de la madera
Resumen de la Memoria:

My research career focuses on the valorisation of forestry and wood-industry side-streams and on developing sustainable, low-toxicity solutions for wood protection. After early international internships in Finland working on mycorrhizal communities and forest microbiology, I specialised in wood science, fungal degradation and biomass chemistry during my MSc and PhD at the University of Eastern Finland. My work has focused on understanding how natural compounds, extractives and thermochemically derived liquids interact with wood and fungi, and how these compounds can be used as protective agents while limiting environmental impacts.

As a postdoctoral researcher, I expanded this approach by applying hydrothermal liquefaction and other conversion methods to a wide range of residues, including coffee by-products, bark, sawdust, spent mushroom substrate and tomato residues. These studies revealed that many underutilised materials contain antifungal, antioxidant or otherwise valuable components that can strengthen the circular bioeconomy. I also collaborated internationally to study fungal risks under future climate scenarios and to test bio-based treatments in engineered wood products. Together, these experiences shaped a multidisciplinary profile connecting wood durability, fungal biology, waste valorisation, and ecotoxicology.

The research line I propose builds directly on this background and addresses key needs of the Spanish forest-wood sector. The first sub-line focuses on identifying and valorising local side-streams produced in forestry and sawmills through extraction and hydrothermal processing. Because tree composition varies across regions, generating specific knowledge for Spain (particularly Castilla y León and Salamanca) is necessary to unlock higher-value uses for these materials.

The second sub-line targets blue stain fungi, repeatedly highlighted as one of the main industrial problems in Spain. By identifying the dominant fungal species and testing bio-based treatments derived from the valorisation work, this research aims to mitigate economic losses and improve wood quality before processing.

The third sub-line focuses on developing bio-based wood preservatives with lower toxicity than current commercial formulations. This includes assessing antifungal activity, fixation to wood, and ecological impacts of extracts and compounds obtained from local residues. The goal is to promote safer, renewable preservation strategies and extend the lifespan of construction wood.

Overall, my trajectory and proposed research converge on advancing sustainable, circular solutions for the forest-wood sector and strengthening the role of wood as a renewable material in Spain.

Resumen del Currículum Vitae:

am a postdoctoral researcher at the University of Eastern Finland whose work focuses on sustainable wood protection, biomass valorisation and fungal degradation processes. I hold a DSc in Agriculture and Forestry, with my doctoral research focused on bio-based wood preservation, an MSc in Wood Materials Science and a BSc in Environmental Sciences. My career has developed through international environments in Finland, Spain, Slovenia and Canada, combining wood science, fungi and wood interactions, hydrothermal conversion technologies and ecotoxicology.

I have authored 21 scientific articles, with an h-index of 9 and over 260 citations. Most of my publications address wood durability, natural preservatives and the valorisation of industrial side-streams such as bark, coffee residues, spent mushroom substrate and tomato waste. Other contributions include studies on mycorrhizas, indoor microbiomes and automated fungal growth analysis. I have served as first or corresponding author in a large share of my publications, reflecting an active role in designing experiments, analysing data and leading writing efforts.

My technical expertise covers fungal isolation and cultivation, antifungal assays, wood treatment and leaching procedures, mechanical and decay testing, ecotoxicity assessments and advanced statistical analysis. I have worked with hydrothermal liquefaction and extraction processes to explore chemicals and bio-based ingredients with potential industrial applications.

I have secured eight competitive external grants between 2017 and 2024, and I have participated in writing several national and European project proposals. I am co-manager of the MSCA doctoral network DESTINY and have contributed to international projects such as ECOCIDE, PolyTree, and Damage2Value. Additionally, I received the Ron Cockcroft Award (IRG) in 2025 for my contributions to wood preservation.

My professional network includes collaborations with institutions such as the Natural Resources Institute Finland, IRIAF (Spain), the University of Ljubljana and Université Laval, as well as industrial partners in the wood and bioeconomy sectors. I have presented my work in international conferences across Europe, Asia and Oceania through posters, oral presentations and invited contributions.

My experience also includes teaching and training activities at the University of Eastern Finland, where I have lectured in wood materials, biomass chemistry, environmental technology and laboratory courses. I have supervised multiple master's theses and co-supervise doctoral candidates working on wood preservatives and bio-based materials.



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Overall, my career combines research, lecturing, collaboration, project development and training within the fields of wood protection, biomass valorisation and sustainable materials, contributing to both scientific knowledge and industrial innovation.