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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
Turno General

Área Temática: **Biociencias y biotecnología**
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Título: Analysis of factors regulating repetitive sequences to maintain genomic stability in plants

Resumen de la Memoria:

I started my scientific journey at the Instituto de Agrobiotecnología del Litoral in Santa Fe, Argentina, under the guidance of Prof. Dr. Raquel Chan. Completing both my master's and Ph.D. theses, my research centered on understanding the roles of specific plant HD-Zip transcription factors in Arabidopsis thaliana and sunflower. Notably, I found critical protein regions important for transcriptional activities (Capella et al., 2014 Plant Cell Rep). Furthermore, my investigations highlighted the involvement of AtHB1 in regulating growth-related protein expression and promoting hypocotyl cell elongation (Capella et al., 2015 New Phytol). Over this time, I also contributed to 3 research papers (2 BMC Plant Biol and 1 J Exp Bot), and 2 chapter books (1 as first author). While at the Facultad de Bioquímica y Ciencias Biológicas, I assisted several assignments from the department of Molecular and Cellular Biology. This extensive experience has endowed me with a versatile skill set encompassing biochemical, molecular, and physiological approaches. Initially focused on plant biology, these skills have demonstrated their value across diverse scientific domains.

Transitioning to postdoctoral research in molecular cell biology, I joined Prof. Dr. Stefan Jentsch's lab at the Max Planck Institute of Biochemistry in Munich. There, I enhanced my skills in yeast genetics, mass spectrometry-based proteomics, and protein biochemistry. I explored nuclear envelope surveillance and chromatin dynamics of repetitive sequences after double-strand breaks, projects that culminated with two publications as the first and corresponding author (Capella et al., 2020 J Cell Sci; Capella et al., 2021 Nature Commun). Following Prof. Jentsch's passing, I joined Dr. Sigurd Braun's lab at the Biomedical Center Munich. This phase allowed me to extend my work to the model organism Schizosaccharomyces pombe, engage in high-throughput genetic screens, and gain expertise in RNA-seq techniques. Through my postdoctoral research in the Braun Lab, I was involved in a project where we demonstrated the role of Lem2 in RNA surveillance (Martin Caballero et al., 2022 Nat Struc Mol Biol). Additionally, I participated and assisted in the publication of 2 research papers (1 EMBO Rep and 1 Microbial Cell), 2 News & Views (1 Nat Struc Mol Biol and 1 Dev Cell, both as first author), and collaborated to explore plant histone variants through synthetic biology with Prof. Dr. Frederic Berger from Austria (1 Curr Biol and 1 PLoS Genet). Furthermore, we are in the final stages of completing another manuscript (Muhammad et al., in preparation).

Despite being abroad, I collaborated with my former supervisor in Argentina and continued mentoring a master's student, which resulted in 2 publications as co-first author (1 Plant Physiol and 1 J Exp Bot), 1 as corresponding author (1 Plant Cell Physiol), and 1 as third author (1 Plant Sci).

Upon returning to Argentina, I have been dedicated to establishing my research group, focusing on identifying molecular factors that modulate the stability of repetitive sequences in plants an area that largely remains unexplored. In pursuit of this objective, I am currently mentoring two Ph.D. students and one graduate student. Finally, I recently successfully secured two grants to fund my independent projects, marking a pivotal moment in my research journey.

Resumen del Currículum Vitae:

The eukaryotic cell genome contains vulnerable regions, particularly those with repetitive sequences, where DNA breaks occur more frequently. Repetitive sequences can create secondary DNA structures, posing risks to genomic integrity. Despite these risks, certain sequences, like ribosomal DNA (rDNA) and centromeres, play crucial physiological roles. Plants, as sessile organisms, face constant exposure to stressors causing DNA damage. In cases of DNA breaks within repetitive sequences, homologous recombination repair can lead to chromosomal rearrangements with severe outcomes, impacting fertility and viability. Diverse mechanisms exist to maintain the stability of such repetitive regions, with nuclear localization and transcriptional silencing being crucial. However, the molecular mechanism controlling rDNA relocalization, a long-standing question, remained unknown until our recent work. We unveiled the molecular events that regulate nucleolar rDNA release, which consists of a series of DNA damage-triggered posttranslational modifications that control the association of the main players maintaining the rDNA array within the nucleolus (Capella et al., 2021). While numerous factors regulating the integrity and localization of repetitive sequences have been characterized in humans and yeast, little is known about the proteins responsible for maintaining repetitive sequence stability in plants. The Ramon y Cajal project aims to unravel the molecular mechanisms regulating repetitive sequences in plants exposed to adverse environmental conditions, emphasizing rDNA. To identify factors maintaining repetitive sequence stability (Aim #1), we propose unbiased CasID approaches, utilizing dCas9 fused to a biotin-ligase to biotinylate proteins near specific genomic regions. Additionally, we will analyze transcription and copy number of repetitive sequences in specific mutant plants in genes encoding epigenetic regulators. Given the putative conservation in regulatory proteins modulating the integrity of repetitive sequences, we also propose to perform genetic screens using Schizosaccharomyces pombe. To study whether environmental conditions affect repetitive DNA stability (Aim #2), we plan to investigate the impact of diverse growth conditions on repetitive sequence integrity, analyzing transcriptional activity, copy number variations, and allelic variants within rDNA. We also propose to assess stability in plants exposed to exogenous phytohormones or inhibitors, investigating the role of factors discovered in Aim #1. Finally, we propose to analyze the role of regulatory factors in plants subjected to abiotic stress (Aim #3). We will explore the influence of epigenetic regulators from Aims #1 and #2 on plant responses to harsh environments. As an example, our ongoing work on DNA methylation in modulating responses to elevated temperatures illustrates the multifaceted roles these regulators play in orchestrating plant adaptations to stressors.

Through this proposal, we aim not only to offer a comprehensive understanding of the pathways regulating repetitive sequences for maintaining chromosome stability in plants but also to glean insights into the broader dynamic regulation of genome maintenance. Furthermore, these studies hold the potential to transcend fundamental insights, extending into practical applications.

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
Turno General

Área Temática: **Biociencias y biotecnología**
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Título: PhD

Resumen de la Memoria:

I am an evolutionary biologist currently holding a principal investigator position at Ludwig Maximilians University in Munich Germany, where I have established a completely new research line that focuses on population genomics, gene expression evolution and biodiversity discovery of fireflies. To achieve this, I have successfully been awarded 551,059 from three different funding entities and have build an international network of collaborators. I have integrated several bachelor, master and PhD students into my different projects on genomics and transcriptomics, building in this way the next generation of scientist. The success in the establishment of my own research line lies in my profound knowledge on tropical entomology, population genetics and functional molecular biology. In total I have 14 publications, where 81% of my work is published in Q1 journals and in 75% of my publications I am the first, corresponding or last author. My current research focuses on three main lines: (1) Investigating how species adapt to novel environments using a population genomics approach. (2) Studying how changes in gene expression influences the phenotype, within and between species. (3) Biodiversity discovery in Europe and the Neotropics. My future research goals will be focused on keeping on advancing our understanding of local adaptation of natural insect population at a phylogenetic scale. With the advent of RNAi and CRISPR-Cas9, I will be able to directly test functionally, the fitness impact of the identified genomic regions evolving under positive selection. In the future I will also be able to integrate and measure morphological variation and investigate how this variation correlates with the genotype. I additionally expect to move forward into behavioural experiments targeted to investigate reproductive barriers between populations, with the ultimate aim of integrating morphological, behavioural and physiological variation together with genetic variation. On the topic of biodiversity discovery I expect to develop a highly efficient pipeline to generate firefly genomes complemented with morphological imaging in order to have two lines of evidence for species discovery, focusing in Europe and the Neotropics. As scientific communication and outreach is of extreme importance to share scientific knowledge, I attend on a yearly basis, national and international conferences and I also share my research through social media and university outreach activities.

Resumen del Currículum Vitae:

I completed my licentiate studies in tropical biology and entomology in Guatemala. Studying and working in Guatemala as an entomologist provided me with a unique perspective and tools to approach a wide variety of research questions. To pursue a masters and a PhD in evolutionary biology I moved to Munich. During this time I built up strong foundations in molecular biology, gene expression analysis and populations genetics. After my PhD, I ventured to get experience outside of the academic environment, working for one of the biggest biotechnology companies, Thermo Fisher Scientific. This experience resulted in the development of a complementary company driven work ethic which expanded and enriched my academic background. My first postdoctoral position at the University of California Irvine (USA), focused on studying sex-biased gene expression and the identification of the evolutionary forces driving gene expression variation across different Heliconius butterfly species. I moved back to Munich to pursue a senior postdoctoral position where I led and executed lab work and bioinformatic analysis to study genome wide chromatin accessibility patterns and its relationship to gene expression. My gathered experience and knowledge, from bachelor student to the present, has equipped me with deep expertise in the areas of molecular biology, populations genetics, bioinformatics and firefly biodiversity. As a current principal investigator, I am dedicated full time on doing research on firefly transcriptomics and population genetics, integrating and training students in molecular biology and bioinformatics.

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023

Turno General

Área Temática: **Biociencias y biotecnología**

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Título: Understanding how signaling dynamics and cell interactions control embryonic development

Resumen de la Memoria:

Understanding how cells interact and interpret dynamic signaling to create precise spatial patterns during embryonic development is one of the central questions in developmental biology and regenerative medicine.

The human epiblast, which generates the embryo proper, develops juxtaposed to two extraembryonic cell populations: the extraembryonic endoderm (ExEnd) and trophectoderm (TE). During gastrulation, the cells of the epiblast differentiate into the three germ layers: ectoderm, mesoderm, and endoderm, which later specialize during organogenesis. Importantly, mesoderm and endoderm (mesendoderm) differentiation is restricted to a longitudinal midline region of the epiblast called primitive streak (PS), breaking its symmetry, and defining the anterior-posterior axis of the embryo for the first time.

Studies in model organisms have shown that signals from the extraembryonic cell populations are essential to primitive streak formation and symmetry breaking. In the mouse, BMP signals from the TE initiate Wnt signaling in the epiblast, which in turn also activates Nodal signaling. Complete loss of any of these signals leads to severe gastrulation failure. Moreover, Wnt and Nodal are restricted to the posterior side of the embryo by inhibitors secreted by a set of cells in the ExEnd, the anterior visceral endoderm (AVE). Therefore, mouse gastrulation is initiated by TE-epiblast interactions, while ExEnd-epiblast interactions have a central role in symmetry breaking. However, little is known about the role of embryonic-extraembryonic interactions during early human development.

In my postdoctoral work to date, I studied how the gastrulation-inducing signaling BMP controls cell differentiation in human pluripotent stem cells (hPSCs) in vitro. I discovered that a properly timed BMP4 pulse can induce endogenous Wnt signal, like in the mouse, and cell differentiation towards a PS fate much more efficiently than through any constant concentration. Most importantly, my work sheds light on a mechanism that relies on the duration of a pulse of signaling to induce cell differentiation, suggesting an important role for inhibitors in controlling signal dynamics. However, how the subsequent Wnt and Nodal cascade controls cell differentiation towards either mesodermal or endodermal fates, and the existence and role of an inhibitor center, a human homolog of the AVE, in this process remain largely unknown.

As a Ramon y Cajal Investigator, my research line will be focused on filling this crucial knowledge gap. I will do so by combining in vitro experimental studies with stem cells, bioengineering techniques, and novel mathematical and computational methods to (1) Study how Wnt and Nodal dynamics control human mesendoderm differentiation in vitro, (2) Characterize self-organization in the human ExEnd, and (3) Develop an in vitro model to study human epiblast-ExEnd interactions and their role in mesendoderm differentiation.

The proposed research line builds logically on my prior work but also diverges from it to investigate critical open questions. This research will uncover efficient protocols for mesendoderm differentiation and mechanisms of emergence and maintenance of asymmetries, which are essential for the proper development of the human body and might have implications in the study of congenital defects and protocols in regenerative medicine.

Resumen del Currículum Vitae:

During my research career, I have always pursued paths that allowed me to evolve as a fully interdisciplinary researcher to work on fundamental questions in developmental biology.

In 2013, I completed a 5-year BSc in Mathematics at the University of Seville, Spain. During my bachelor□s degree, I obtained a solid background in Mathematics and had my first contact with research and research conferences. My academic achievements were recognized by several local and national recognition awards, such as the Second National Prize of Spain in Science of the year 2012-2013 by the Spanish Ministry of Education.

Interested in the incredible world of Mathematical Biology, I pursued my graduate studies at the University of Warwick, which were funded by a competitive LaCaixa Foundation Fellowship for Postgraduates Abroad and a competitive EPSCR doctoral fellowship. My work focused on mathematically formalizing the Waddington landscape metaphor, and I leveraged this novel mathematical framework to study C. elegans vulval development and murine trunk development in international collaborations with Prof. James Briscoe (UK), Prof. Eric Siggia (USA) and Prof. Aryeh Warmflash (USA), leaders in their field. These projects resulted in two first-author (1 corresponding author) publications and several travel awards to present at international conferences, including an invited talk at the Annual SIAM Conference on the Life Sciences 2022.

I joined the Warmflash lab at Rice University in 2018 to gain first-hand experience in stem cell research from an experimental and quantitative perspective. My main postdoctoral project was focused on understanding how BMP signaling controls germ layer differentiation in human pluripotent stem cells. Although the publication of these results was delayed due to the COVID-19 pandemic, they are now accepted in Cell Systems, and I expect to co-author two additional manuscripts by mid-2024. I have also presented this work at over ten international conferences and seminars, such as the ISSCR Annual Meeting 2022. Moreover, these results have served as preliminary data for several grants, such as a 1.2 million dollar grant I co-wrote with my postdoc mentor, funded by the NSF in the US. I also completed a comprehensive literature review on insights into morphogen signaling dynamics during gastrulation, resulting in a first-author book chapter, and collaborated with the group of Prof. Mustafa K. Khokha at Yale University to study how membrane potential affects cell fate differentiation, a study published in Nature Communications.

In November 2023, I joined the Centro Andaluz de Biología del Desarrollo as a Principal Investigator through a competitive call within the María de Maeztu strategic plan, where I have started my own laboratory with a 2-year 250K □ budget, which includes my salary.

During my career, I have also shown leadership by obtaining funding and supervising undergraduate and graduate students, one of whom co-authors my last publication. I am currently co-directing an MSc thesis project. I have organized conferences and been co-chair of several committees, such as the Women and Mathematics Committee of the RSME. I have led a clinical transfer project collaboration with a fertility clinic in Houston, and I have been invited to peer-review for multiple journals, including Nature Communications & Development.

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023

Turno General

Área Temática: **Biociencias y biotecnología**

Nombre: HERNÁNDEZ PIÑERO, SARA BELÉN

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Título: Peptidoglycan remodeling during heterocyst formation

Resumen de la Memoria:

During my PhD at the University of Seville (2008-2013), I acquired a broad range of technical skills in genetics and molecular biology studying the mechanisms that allow the pathogenic bacteria Salmonella enterica to survive in the presence of bile. From this period, I have 6 research articles that describe and characterize general mechanisms (adaptation, mutation, and non-mutational preadaptation) and also specific proteins involved in bile resistance. In one of those articles, we found that some modifications of the peptidoglycan (the major component of the bacterial cell wall) increase bile resistance in Salmonella, which led to my subsequent research focus: the structure and plasticity of the bacterial cell wall.

As a postdoc, I moved to the Laboratory for Molecular Infection Medicine Sweden (Umeå University, Sweden) where I joined the group of Prof. Felipe Cava in 2014. There, I was involved in many projects studying the chemical structure of the peptidoglycan of different bacteria under different growth conditions, acquiring new technical skills in mass spectrometry, next-generation sequencing, chemometrics, and high-throughput techniques. My research in bacterial cell walls led to 15 publications: 10 scientific papers (3 as first author), 4 bibliographic reviews, and a book chapter. Additionally, there are 2 more manuscripts in preparation of which I am the first author too, one of them available at BioRxiv. I collaborated with at least a dozen research groups and participated actively in the training and supervision of 9 master and graduate students. During the progress of my research career, I have learned and developed new techniques, designed experimental plans, and gained independence to develop new research lines.

In March of 2022, I came back to the University of Seville as a Distinguished Researcher after being awarded a María Zambrano Grant associated with the research group of Prof. Agustín Vioque (Instituto de Bioquímica Vegetal y Fotosíntesis). Here I am developing an independent research line that combines the expertise of Prof. Vioque's group (regulation by non-coding RNAs in cyanobacteria) with the extensive knowledge and capabilities that I have acquired during my postdoctoral stay in Sweden working on the bacterial peptidoglycan. My current research project aims to decipher which are the regulatory mechanisms behind peptidoglycan remodeling in cyanobacteria during the development of heterocysts (cells specialized in fixing atmospheric nitrogen). Despite the environmental and biotechnological importance of cyanobacteria, the information available on peptidoglycan remodeling in heterocysts (and even in the vegetative cells of cyanobacteria) is very scarce, and although the enzymes involved in peptidoglycan remodeling have been well studied in many bacterial models, how the activity of these enzymes is regulated remains unknown in most cases. So, this new research line guarantees the generation of novel results which could be of great interest to the biotechnology industry.

Resumen del Currículum Vitae:

I completed my Biology degree at the University of Sevilla (US), engaging in scientific research during my last year at Prof. Eduardo Villalobo's laboratory with a collaboration grant. Then I got my Master□s degree in Molecular Genetics and Microbial Biotechnology (with mention of quality, US) and started my doctorate studies.

I completed my Ph.D. under the supervision of Prof. Josep Casadesús at the Genetics Department of the US (as an FPU fellow), focusing on Salmonella's genetic and molecular mechanisms of bile resistance. The successful completion of my Ph.D. in 2013 marked my expertise in microbial genetics and bile resistance mechanisms, resulting in nine publications, including two highly-cited articles: PLoS Genet 2012, with more than 100 citations according to WOS and PLoS Genet 2015, (65 citations) that was awarded the IV Biomedal Research Prize (Spanish Society of Microbiology). I presented my research in many national (6) and international (4) scientific congresses. As part of my PhD training, I carried out short research stays at the laboratories of Laura Piddock (Birmingham); Laurent Aussel (Marseille), and Miguel A. de Pedro (Madrid).

In 2014 I got a fellowship (Martín Escudero Foundation) to perform my postdoctoral research at the Cava Lab in Umeå (Sweden), where I was working until 2022. There, I explored bacterial cell wall plasticity and expanded my skills in biochemistry, next-generation sequencing, and high-throughput techniques. My peptidoglycan research yielded three first-author research articles and the extensive collaboration with other research groups led to other seven high-impact publications in which I am a co-author. I published also four bibliographic reviews and a book chapter and there are still two manuscripts in preparation of which I am the first author (one of them has already been uploaded to BioRxiv). In Sweden, I had the opportunity to attend numerous scientific national (2) and international (4) congresses presenting both posters and oral communications.

In 2022, I returned to the US as a □Distinguished Researcher□ with a María Zambrano Grant associated with the group of Prof. Agustín Vioque. My current research integrates the expertise of Vioque Lab on cyanobacterial non-coding RNA regulation with my expertise in peptidoglycan analysis. The findings derived from the ongoing research on this subject are presently in the process of being compiled for the initial draft of a manuscript.

Throughout my scientific career, I have actively contributed to knowledge transfer by mentoring and supervising the work of 9 master's students (3 of whom are actively engaged in research for their PhD). I have collaborated on the teaching plan of the US (110 hours). I hold a teaching certificate (CAP) obtained in 2009 and received positive evaluations from ANECA to work as a Hired Professor Doctor in 2020. In 2022 I got the I3 certificate for an outstanding research trajectory (I3 Program).

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023

Turno General

Área Temática: **Biociencias y biotecnología**

Nombre: AYALA HERNÁNDEZ, RAFAEL

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Título: Unravelling the molecular basis of disease and development of novel bioinformatics tools

Resumen de la Memoria:

I have developed my academic career in multiple international settings since its early stages after completing my education at the University of Seville. This has allowed me to become proficient in state-of-the-art techniques and methodologies, and to build a comprehensive network of connections with top researchers from various fields.

After an internship at Diamond Light Source (the UK□s national synchrotron) and an MRes at Imperial College London (ICL), I pursued a PhD at ICL in the group of Prof. Xiaodong Zhang with an Imperial President□s PhD Scholarship. My main PhD project focused on the structural analysis by cryo-EM of the human INO80 chromatin remodeler, a large multi-subunit complex able to slide nucleosomes along DNA to allow access to the genetic material. We reconstructed the structure of INO80 bound to a nucleosome, revealing how it performs its sliding activity. Such findings were published in a Nature paper (of which I am 1st author), with other related papers in NSMB and Science.

Additionally, the highly interdisciplinary research atmosphere at ICL allowed me to initiate another research line in parallel focused on the development of new algorithms and tools for the analysis of large-scale biological data such as gene interaction networks, genomics and metabolomics. This project was in collaboration with several international research groups, including amongst others those of Profs. Marc Emmanuel-Dumas (ICL), Pierre Zalloua (Lebanese American University), Fumihiko Matsuda (Kyoto University) and Dominique Gauguier (INSERM).

After finishing my PhD, I continued my research in the group of Prof. Zhang as a postdoctoral researcher. I then focused on the structure and mechanism of other protein complexes involved in the molecular mechanism of multiple diseases. These included BRCA1/2, p97/p47 and Tel1/ATM. In early 2020, as part of the response to COVID-19, I worked on the development of novel antibodies as a treatment for the disease in a joint project with Prof. Xiao-Ning Xu. Besides, I extended my bioinformatics research line with the development of tools for the analysis and identification of non-coding RNA, and initiated another project focused on the analysis of spatiotemporal data.

In 2021 I joined as a postdoctoral scholar the laboratory of Prof. Matthias Wolf at the Okinawa Institute of Science and Technology (OIST). One of the projects I am developing at OIST consists in determining the high-resolution structure of bacteriophages by cryo-EM, with the end goal of engineering them for practical applications. Several papers describing these results have been published, with one in Nature Communications. Moreover, I have also been awarded my own research grant to study the architecture of shelterin, a telomere-binding complex proposed as a drug target to treat multiple diseases associated with telomere disfunction.

During my Ramón y Cajal period, I will combine my expertise in molecular mechanisms of disease, bioinformatics and software development to tackle the problem of antimicrobial resistance (AMR), which threatens to create a huge health crisis in the near future. The project will aim to develop new methods and tools to predict fast and accurately AMR from genomic features of clinical isolates. The developed methods will be validated in real clinical settings and distributed through user-friendly software tools.

Resumen del Currículum Vitae:

I completed my BSc in Biochemistry at the University of Seville (2010-2014), for which I obtained multiple prizes including a First National Award for Excellence in Academic Performance. During it, I was selected for a summer internship at Diamond Light Source, which introduced me to international research. I extended my education with an MRes in Structural Molecular Biology (2014-2015) at Imperial College London (ICL) funded by a □la Caixa□ postgraduate fellowship. I obtained the award to the best student of the Master□s.

I then started a PhD under the supervision of Prof. Xiaodong Zhang at ICL (2015-2019). I was awarded a highly competitive Imperial President□s PhD Scholarship which fully supported my PhD and included research funds that I managed directly. My PhD focused on the analysis of the INO80 chromatin remodeler by cryo-EM. In parallel, I also developed another research line about the creation of new bioinformatics algorithms and tools. The research outcomes from both lines led to multiple publications in very high impact journals (including Nature, Science, NSMB, Bioinformatics, Genome Medicine, Current Protocols in Bioinformatics and Analytical Chemistry), as well as several software packages available in high quality, curated repositories (CRAN and Bioconductor).

After my PhD, I became a postdoctoral researcher in a joint collaborative project of the groups of Profs. Xiaodong Zhang and Xiao-Ning Xu (2019-2021), where I worked on other protein complexes key for the molecular mechanisms of critical cellular processes and diseases. Upon the outbreak of COVID-19, I worked on the identification of new antibodies as a treatment for the disease. Additionally, I was classified as a key worker, and was responsible for ensuring the continued operation of the computational facilities of the group of Prof. Zhang to allow members of the laboratory to perform remote work efficiently. During this period, I also continued working on the development of bioinformatics tools, and also started my own independent line focusing on the development of new tools for the analysis of spatiotemporal data. My research from this period also included multiple publications in high impact journals, such as Structure and EMBO Journal.

Since 2021, I am a postdoctoral scholar at the Okinawa Institute of Science and Technology (OIST) (Japan) in the group of Prof. Matthias Wolf. Here, I am working on the structural analysis of bacteriophages, which has resulted in 3 publications (one of them in Nature Communications). Additionally, I have been awarded a research grant by the Japan Society for the Promotion of Science for the study of the shelterin complex as principal investigator (3,120,000 Yen, ~22,500 Euros).

Overall, my research career so far has resulted in the publication of 20 scientific articles (12 D1, 5 Q1, 2 Q2 and 1 Q4; 6 as first author; 2 as corresponding author) with a total of 521 citations, 7 software packages (all freely available with open-source licenses at curated repositories CRAN and Bioconductor) with a total of 85,000 downloads, 1 book chapter and 6 poster presentations. Additionally, I have supervised 4 PhD/MSc students and taught a course on R software development at OIST. The combination of my research skills, publication record and ability to initiate and lead my own research lines justify my transition into an independent researcher.

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
Turno General

Área Temática: **Biomedicina**
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Título: Investigación traslacional en fisiología del balance energético humano

Resumen de la Memoria:

After discovering my passion for studying human energy metabolism, I joined Dr. Jonatan R Ruiz's lab to pursue a Ph.D. in Biomedicine. During this time, I served as the project manager for the ACTIBATE study, an ambitious scientific project where I coordinated a team of over 50 researchers. Following the completion of my Ph.D., I made the decision to join the esteemed lab of Dr. Eric Ravussin. During my 2.5-year fellowship there, I conducted several human studies, which unfortunately faced delays due to the COVID-19 pandemic. Most of these studies have now been completed (with manuscripts in preparation) or are still ongoing, thanks to my adjunct faculty appointment. Currently, I am in the midst of my second postdoctoral training period in Dr. André Carpentier's laboratory. Fortunately, I have secured continuous funding to cover my salary throughout this 9-year training journey. These diverse training experiences have equipped me with the complex scientific skills required for developing my career as an independent researcher.

I am fortunate to have recently secured funding that allows me to establish my own independent laboratory at the University of Granada. With one postdoctoral research associate and three Ph.D. students, we are conducting several studies that have created the perfect momentum for the Ramon y Cajal grant. My research program focuses on investigating the physiology of human energy balance, with three primary areas of focus: i) Understanding the physiological mechanisms that counteract sustained alterations in energy balance; ii) Elucidating the role of short-term fluctuations in nutrient balance in the development of insulin resistance and ectopic fat deposition; iii) Designing and evaluating interventions aimed at treating or preventing obesity.

To date, I have contributed with significant advancements in knowledge. For instance, coordinating a large randomized controlled trial, I observed that human brown adipose tissue (BAT) volume and activity are not altered by exercise. Contrary to earlier expectations, BAT was not found to be associated with energy expenditure, energy intake, or bone mineral density. However, I discovered an intriguing positive correlation between BAT volume and whole-body adiposity in men and found that individuals with overweight or obesity maintaining a metabolically healthy phenotype exhibit higher BAT volume. I has also made important contributions to the indirect calorimetry methodology in humans, identifying a new reference metabolic cart for measuring human energy expenditure, and making advances on data treatment methods for improving the reproducibility of resting metabolic rate assessments. My research extended to exploring metabolic flexibility, especially the capacity for fat oxidation during exercise. Through systematic reviews and experimental approaches, I provided recommendations for assessing maximal fat oxidation in human adults. my investigations also delved into the effects of intermittent fasting on metabolic flexibility and cardiometabolic health. More recently I have conducted a clinical trial on the newer generation drug for obesity treatment, tirzepatide, revealing its effects on metabolic adaptation, fat oxidation, and appetite suppression and I have developed a novel method method for assessing insulin sensitivity in non-diabetic individuals.

Resumen del Currículum Vitae:

Guillermo is the author of 92 articles published in indexed journals in the Journal of Citation Reports. 58.7% (54) of the published articles are in journals indexed in the first quartile of the corresponding area of the Journal of Citation Reports. Of these, 16 articles are published in journals included in the first decile of the area. The sum of the impact factor of Guillermo's authored publications is 328, with an average impact factor of 4.56. Guillermo is the first author in 17 articles (of which 9 are published in first-quartile journals, 4 of which are also in first decile journals of the area), the second author in 30 articles (20 of which are in first-quartile journals), and the last author in 6 articles.

Guillermo's h-index according to Web of Science is 22, with a total of 1523 citations (1257 without self-citations) and an average of 14.79 citations per article. His h-index according to Google Scholar is 30, with a total of 2721 citations. Guillermo is the author of more than 100 communications at national and international conferences, including 5 invited presentations.

As a result of an intense mentoring activity, Guillermo has supervised 8 Master's Theses, 3 Doctoral Theses, and is currently supervising 3 Doctoral Theses. In addition, he combines his research activity with teaching in several Masters programs.

Dr. Sanchez-Delgado career has been supported by many funding sources including very prestigious grants such as FPU, Fulbright Ruth Lee Kennedy, EFSD Albert Renold, Ramon Areces Foundation, Martin Escudero Foundation, Fonds de Recherche Santé-Québec, and a Marie Sklodowska Curie Actions-Individual Fellowship grant. Guillermo has participated as a pre- or post-doctoral researcher in 16 research projects funded through competitive calls and in 5 research projects funded by private entities. He recently obtained funding as the principal investigator of a project funded by the of the Spanish State Research Agency, which has enable him to establish his own research laboratory.

Dr. Sanchez-Delgado s work benefits from a rich research network, maintaining active collaborations with researchers from various academic and non-academic institutions of the USA, Canada, Chile, UK, France, the Netherlands, Denmark, Sweden, Finland, Switzerland and Singapore.

Guillermo has served as a peer reviewer for articles in numerous journals in his field (Science, Diabetes, Obesity, Journal of Physiology, Scientific Reports, Frontiers in Physiology, Clinical Sciences, British Journal of Nutrition, etc.) and as a project reviewer at the Evaluation and Accreditation Directorate of the Andalusian Agency of Knowledge, the Translational Health Research Panel of the French National Research Agency, and the state scientific funding agency of Austria.

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Dr. Sanchez-Delgado's career has also been prolific in knowledge transfer. Besides being coauthor of 2 Safe Creative licenses, he cofounded a company (BuenaVida Centro de Salud y Deporte) offering lifestyle-related health care in Granada, as a platform to bring the scientific knowledge and methods to clinical care, ultimately benefiting the local community. Four years after being launched, the company employees 12 health care providers and serves more than 250 clients in the Granada area.

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Área Temática: **Biomedicina**
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Referencia: RYC2023-043876-I
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Título: Computational Biology applied to Human Cellular Heterogeneity

Resumen de la Memoria:

I am a computational biology scientist interested in unravelling the complexity of biological processes such as fibrosis, tissue regeneration, and cellular niche interactions, and translating this knowledge into biomedical assets. My research career started at the crossroads of genomics and cell therapy publishing the most comprehensive transcriptomic signature to date of human mesenchymal stem and stromal cells. The hidden tissue heterogeneity I could glimpse on bulk RNA sequencing studies led me to become particularly interested in the single-cell transcriptomics technologies and enrolled in a dedicated post-doctoral program, focusing on human adipocytes heterogeneity in obesity and type II diabetes. I could later host the construction of the human uterus cell atlas (HUTER, a Human Cell Atlas European project). The transcriptomic scenarios I have pass through have equipped me with a profound understanding of the cellular states and populations, leading me to the reformulation of largely unresolved questions. Very recently I have published my first contribution as a leading scientist newly implementing a clustering method for certain single-cell comparative analysis that require adjustments in the applied grouping resolution.
I have further gained broad experience in deployment of computational analysis at the service of research, being part of the genomics unit for precision medicine at Health Research Institute La Fe (IIS La Fe), and latterly forming and leading the bioinformatics unit for the Carlos Simon Foundation (FCS INCLIVA Health Research Institute) to apply cutting-edge methods for processing, modeling, and interpreting largescale omics data for women's health research.
The proposed research line pretends to leverage my multidisciplinary expertise in both stromal cell biology and computational single-cell biology, to provide valuable insights into the understanding of fibrotic pathologies.
The accumulation of extracellular matrix, usually because of an inflammatory pathology, is commonly referred to as fibrosis, with stromal cells being the primary drivers of this process. Single-cell atlases of different tissues are partially revealing the diversity and functional heterogeneity in stromal populations, with even less insight in fibrotic processes due to an incomplete resolution of the allocated transcriptomic information. This project, supported by advanced single-cell techniques (scRNA-seq and scATAC-seq) and artificial intelligence optimized methodologies for integration and harmonization, focuses on analyzing fibrosis by untangling the complexity of stromal heterogeneity. I will identify and characterize key stromal cell subpopulations and cell states in multiple human organs and in various diseases, with particular interest on female reproductive organs. Comparisons between organs will provide valuable insights into shared and tissue-specific mechanisms. I will then model cellular differentiation in fibrogenic processes and cellular niche interactions and regulatory pathways. A subsequent translational approach for drug discovery has the potential to open new treatment avenues targeting fibrosis that might impact an enormous spectrum of diseases.

Resumen del Currículum Vitae:

Dr. Roson completed her BSc and MSc programs in Cellular and Molecular Biology at IE University in Segovia, Spain, where she received a studentship award for an excellent grade record. She then participated in a Marie Curie-funded research training program at the European Bioinformatics Institute (EMBL-EBI) in Cambridge, UK. Subsequently, she pursued her Ph.D. studies from 2009 to 2015 in a collaborative multicisciplinar project between the genomics and cell therapy laboratories at the Cancer Research Institute of Salamanca. Her thesis received the University of Salamanca s Extraordinary Prize distinction. At this stage, she enrolled in a 2-year postdoctoral program at the Karolinska Institute (Stockholm, Sweden) in a world-leading group on adipose tissue biology and gained broad experience in deploying single-cell analysis receiving expertise advisory from the Swedish Bioinformatics Service (SciLife-Lab). She could exploit later this technical knowledge to push forward the Human Uterus Cell Atlas (an H2020/HCA funded project). Dr. Roson joined the Reproductive Medicine Group at INCLIVA Health Research Institute as an emergent principal investigator in 2022, where she carries out her main research activity to date.

During her scientific career, she has published 20 documents derived from her scientific activity: (i) 18 original scientific papers, 4 of them in D1 (the rest in Q1), being first author of 3, and corresponding last author of 1. (ii) A high impact review paper to update the state of the art in reproduction physiology. And (iii) a methodological book chapter in specialized technical literature.
Her research work has been cited 333 times (WOS), currently achieving a WOS H-Index of 9. She has directly participated in 17 national and international research projects and presented the results in more than 25 national and international conferences and is an active member of the SEBiBC (Sociedad Española de Bioinformática y Biología Computacional). She is also actively involved in the social communication of science, participating in the Girls4Stem platform, a program aimed at fostering STEM career aspirations among girls.

Along her career she has constantly combined the development of her own research with collaborations to apply bioinformatic pipelines for a variety of end-users, both in academia and industry.

She has largely contributed to technological development, promoting the release of 3 specialized bioinformatic software packages, and pioneering a project to migrate bioinformatics to a CLOUD-based system. This project was considered by Amazon Web Services (AWS) a Success Case to report: Carlos Simon Foundation Performs Health Research 50% Faster with Bahia Software on AWS https://aws.amazon.com/es/partners/success/carlos-simon-foundation-bahia-software/

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She has demonstrated leadership capacity through the successful guidance of her own projects, the direction of four MSc theses and co-direction of as PhD thesis in progress. Additionally, she currently heads a bioinformatics unit that collaborates horizontally with the rest of research lines in the institute. https://fundacioncarlossimon.com/investigacion/el-utero-desde-la-perspectiva-de-la-biologia-de-sistemas-y-la-inteligencia-artificial/

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Área Temática: **Biomedicina**
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Título: Investigación traslacional en cáncer

Resumen de la Memoria:

Desde el inicio de mi doctorado en el Centro Nacional de Investigaciones Oncológicas (CNIO) hasta mi rol actual como Investigador Principal en el Laboratorio de Biopsia Líquida Experimental en el Grupo de Investigación Clínica y Traslacional en Cáncer del Instituto de Investigación Biomédica de Málaga (IBIMA), he estado vinculado al aspecto más traslacional de la biología molecular/biomedicina.

Durante mi doctorado (2010-2015) en el CNIO, realicé descubrimientos innovadores en el ámbito del feocromocitoma y paraganglioma hereditarios, destacando publicaciones en revistas prestigiosas como Nature Genetics. Mi investigación posdoctoral en el Instituto de Investigación del Cáncer (ICR) en Londres (2015-2019) se centró en la biopsia líquida y los mecanismos de resistencia a tratamientos y detección de enfermedad mínima residual en cánceres de mama y ovario.

Como Investigador Principal en el instituto IBIMA (2019-2023), he liderado proyectos pioneros y novedosos, incluyendo el desarrollo de un método ultrasensible para la detección de ADN tumoral circulante en cáncer de mama en etapas tempranas. Mi enfoque en la biopsia líquida y la aplicación de tecnologías avanzadas posicionan mis investigaciones en la vanguardia de la medicina de precisión y el diagnóstico temprano.

Me distingo por mi compromiso con la ciencia abierta, evidenciado en la publicación de todos mis artículos liderados como acceso abierto. Además, he recibido reconocimientos y becas destacadas a lo largo de mi carrera, consolidando mi posición como líder en el campo de la investigación oncológica.

La línea de investigación propuesta aborda las complejidades del cáncer de mama mediante el empleo de tecnologías de vanguardia para aislar células tumorales circulantes (CTCs) con una precisión sin precedentes en pacientes con cáncer de mama localizado. Con el aspecto clave del empleo de volúmenes sustanciales de sangre, la investigación tiene como objetivo realizar una exhaustiva investigación multiómica (genómica, epigenómica y transcriptómica) de las CTCs en subtipos de cáncer de mama HER2-positivo y triple negativo. Los objetivos primarios incluyen la caracterización de perfiles moleculares en el cáncer de mama localizado antes del tratamiento y en la enfermedad residual resistente después de la terapia neoadyuvante, comparándolos con células tumorales puras de biopsias sólidas. El estudio también busca correlacionar perfiles mutantes multiómicos con la respuesta al tratamiento y la progresión de la enfermedad, explorando asociaciones entre las CTCs y la respuesta tumoral a tratamientos neoadyuvantes y adyuvantes. Esta investigación pionera aborda una brecha en los estudios publicados hasta la fecha, basándose en el empleo de altas cantidades de CTCs, ofreciendo perspectivas sobre nuevos mecanismos patogénicos, objetivos terapéuticos y biomarcadores personalizados para la monitorización de la enfermedad en etapas tempranas del cáncer de mama.

Resumen del Currículum Vitae:

Licenciado en Biología y Bioquímica por la Universidad de Navarra y Máster en Biotecnología por la Universidad Autónoma de Madrid. Al finalizar mis estudios, me incorporé al Grupo de Cáncer Endocrino Hereditario en el Centro Nacional de Investigaciones Oncólogicas (CNIO) con el fin de obtener el grado de Doctor. Durante mi tesis obtuve dos becas pre-doctorales de la Fundación Ferrer Investigación y CIBERER-Bancaja, publicando en total 19 artículos científicos en revistas de alto impacto, 17 de ellos en revistas del primer cuartil. Destaca una publicación en Nature Genetics (IF=35,5, D1), de la cual soy primer autor. Este artículo fue calificado como excepcional por la ⍰Faculty of 1000⍰. Además, obtuve diversos galardones como son el ⍰Premio Nacional Sergio Vidal⍰, ⍰Premios para estudiantes predoctorales - CNIO⍰, ⍰Premio Real Academia de Doctores de España 2015. Mejor Tesis en Ciencias de la Vida y de la Salud⍰ y el ⍰Premio Extraordinario de Doctorado 2015 por la Universidad Autónoma de Madrid⍰. Además, pude participar en importantes conferencias nacionales e internacionales como el Simposio International de Feocromocitoma y Paraganglioma, Paris y Kyoto, 2011 y 2014. En 2015, continué mi carrera científica con una estancia postdoctoral en Londres en el ⍰Institute of Cancer Research (ICR)⍰, dentro del Grupo de Oncología Molecular dirigido por el Profesor Nicholas Turner. Gracias a esta estancia, pude especializarme en la utilización de la biopsia líquida en la investigación del cáncer, particularmente aplicado a cáncer de mama. Adicionalmente, aprendí a implementar los principios de Buenas Prácticas de Laboratorio y de Laboratorio Clínico. Publiqué varios artículos científicos destacando uno en la revista de alto impacto ⍰Clinical Cancer Research⍰ (IF=9.619, D1) en colaboración con el Memorial Sloan Kettering Cancer Center (MSKCC), una revisión publicada en la revista ⍰Cancer Discovery⍰ (IF=20.011, D1) y un trabajo publicado en "JAMA Oncology" (IF=20,871, D1). He participado en importantes congresos sobre la investigación en cáncer como son la AACR 2018, la EACR-ESMO Joint Conference on Liquid Biopsies 2019 como ponente oral y en seminarios para la formación de especialistas sanitarios en España (Valencia, 2019). Soy revisor para ⍰EBioMedicine⍰ y ⍰Cancer Genetics⍰ y "Cancers" y miembro editorial para la revista ⍰International Journal of Cancer and Treatment⍰. Además, soy miembro de la "International Society of Liquid Biopsy" (ISBL) desde enero del 2020 y actualmente el líder de la línea de biopsia líquida en el Instituto de Investigación Biomédica de Málaga (IBIMA). Adicionalmente,

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soy Investigador Principal en dos proyectos financiados por la Junta de Andalucía y Fundación Unicaja y poseedor de una Ayuda Postdoctoral 2019 por la Asociación Española Contra el Cáncer (AECC). Además, he sido beneficiario del premio Carmen Lavigne 2019 y 2020 (AECC). Cabe destacar mi participación como miembro del "Molecular Tumour Board" en los Hospitales Virgen de la Victoria y Regional de Málaga, ofreciendo respuestas personalizadas a casos de pacientes afectados por cáncer. Asimismo, soy Investigador Principal en el consorcio "Alianza Roche-Andalucía" en el área de biopsia líquida y cáncer y formo parte del Comité de Comercialización y Marketing del Centro de Investigaciones Medicosanitarias (CIMES-UMA).

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Área Temática: **Biomedicina**
Nombre: RODRÍGUEZ NUEVO, AIDA
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Título: Mitochondrial Strategies for Health-Span Extension

Resumen de la Memoria:

During my scientific career, I have explored diverse cellular processes in both healthy and pathological contexts. The common denominator has been my preference for novel biological questions and creative, albeit riskier, research projects. After my first contact with research before completing my BSc in Biotechnology; in 2012, I pursued a MRes in Biomedical Research at Imperial College London to gain more wet lab experience. During this period, I screened for inhibitors of the exocytotic route of extracellular remodelling proteins in breast cancer cells and studied a novel protein involved in the process.

In 2014, I returned to Spain to decipher the connection between mitochondrial dynamics and inflammation for my doctoral studies with Prof. Zorzano (IRB Barcelona). I studied animal and cellular models to uncover that the absence of Opa1 (a mitochondrial fusion protein) results in mitochondrial fragmentation with mitochondrial DNA instability, which leaks through the autophagic route and triggers TLR9-dependent activation of a cell-autonomous inflammatory response (EMBO J 2018). These findings, a part of my PhD thesis (2018, cum laude), set the premise for further studies on how uncontained mitochondrial material resulting from defective mitochondrial fusion can lead to intrinsic inflammatory responses in skeletal muscle; and we framed them in a review of the literature on mitochondria-derived immunogenic molecules (Cell Stress 2019).

Driven by my found fascination for mitochondria and scientific discovery, I joined the Böke lab in 2018 to delve into an otherwise unexplored field: the mitochondrial biology of dormant oocytes. These cells remain dormant for decades yet can give rise to a perfectly healthy embryo when activated and fertilized. The discovery of my postdoctoral work is that dormant oocytes employ a novel strategy by which mitochondrial activity is decoupled from the production of reactive oxygen species, presenting a new paradigm for mitochondrial function. By suppressing mitochondrial complex I, thought to be integral component of the oxidative phosphorylation machinery, dormant oocytes achieve a long undamaged life-span (Nature 2022). The disruptive nature of the discovery was highlighted by a News and View piece and attested by an immense national and international attention (Altmetric 797).

Furthermore, I reported that mitochondria in dormant oocytes also activate a strategy described to prolong life-span: the mitochondrial unfolded protein response. In my future research lab I plan to exploit the unique biology of oocytes and other long-lived cells to study and harness this mitochondrial preservation strategy with the translational goal of prolonging health-span in aging-prone tissue.

Resumen del Currículum Vitae:

After graduating with a degree in Biotechnology at the Autonomous Universtiy of Barcelona (2012), I pursued a MRes in Biomedical Research at Imperial College London (2013), where I conducted two full-time research projects on the remodelling of the extracellular matrix by cancer cells in the laboratories of Prof. Seabra and Prof. Gabra.

In 2014, I joined Prof. Zorzano (Institute for Research in Biomedicine IRB Barcelona) for my PhD with an FPI scholarship, to unravel the link between dysfunctional mitochondrial dynamics and inflammation, and I discovered the mechanism by which the deficiency of Opa1 (a mitochondrial fusion protein) results in mitochondrial DNA instability which triggers TLR9-mediated response in a cell intrinsic manner and leads to systemic inflammation (PhD with cum laude 2018) (EMBO J 2018; Cell Stress 2019).

Captivated by the versatile nature of mitochondria, in 2018, I joined Dr Böke lab (Center for Genomic Regulation CRG) for my postdoc to study this organelle in dormant oocytes, a remarkably understudied cell type. In less than 4 years, I uncovered an unprecedented strategy to prevent oxidative damage. By studying dormant oocytes, cells that remain dormant for decades and need to deliver a pristine cytosol to the next generation, I was able to define a new paradigm for mitochondrial function without the production of reactive oxygen species: dormant oocytes suppress the mitochondrial complex I, which was described as a major and essential component of the oxidative phosphorylation machinery (Nature 2022). After this work, I identified a lack of available and organized data on mitochondrial function in oocytes, thus we composed a comprehensive review of the reliable data on mitochondrial plasticity during oocyte development, for which I am the last and corresponding author (Trend Endocrinol Metab, provisionally accepted). Moreover, I am the lead researcher for our collaborations with the private health sector (Eugin Group, and Dexeus Mujer).
My stays abroad (MRes at ICLondon, and MPI-CGB, Germany), a strong network of international collaborators, and the international environment of the institutes where I conducted my research (IRB Barcelona and CRG), have made my research internationally recognised, as shown by the invitations to present my work at international conferences. Overall, I have presented my work at 10 scientific meetings (5 international and 5 national). Attesting for the excellence of my research, over the past year, I was invited lecturer at Vic University, IRB Barcelona and VHIR, as well as at popular international online series (mitoChats and ReproSeminars).

Throughout my career, I have impactful contributions by leading ambitious projects that diverged from the main expertise of the host laboratories, combined with extensive experimental work, and conceptual and experimental supervision of 9 students (2 PhD, 2 MSc, 3 BSc, and 2 Erasmus+ students). I have established myself as an emerging leader in the mitochondrial and oocyte biology fields, successfully mobilising resources and attracting international talent to develop my independent ideas. I embrace open science and outreach activities to engage the general public in the science we do.

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Área Temática: **Biomedicina**
Nombre: CASTELLS NOBAU, ANNA
Referencia: RYC2023-043622-I
Correo Electrónico: acastells@idibgi.org

Título: Exploring brain function and behaviour regulation: a journey through microbiota-gut-brain axis influences and mental disorders utilizing Drosophila melanogaster as model organism

Resumen de la Memoria:

I began my scientific journey at RadboudUMC (The Netherlands, 2010), as a researcher in training. During this period, I contributed to a comprehensive synapse screen of Drosophila models of neurodevelopmental disorders, investigating the impact of intellectual disability-associated genes on synaptic development. I worked on the development of an algorithm for automatic image quantification to asses synapse morphology. In 2011, continuing at Radboud UMC, I embarked on my PhD, focused on using Drosophila to study neurodevelopmental disorders. I generated and characterized the first Drosophila FoxP mutants, shedding light on FoxP's role in behavior and brain development. Working closely with clinical geneticists, I contributed to revealing ATP6AP2's influences in cognition and synaptic development, providing valuable insights into the clinical manifestations observed in ATP6AP2 patients. Additionally, we identified a rare deafness-dystonia syndrome linked to mutations in FITM2, facilitating accurate diagnosis for individuals affected with the same condition.

After my PhD, I was awarded with the Sara-Borrel postdoctoral contract (IDIBGI, Spain). My research line involves integrative Systems Biology, with particular emphasis on the microbiota-gut-brain axis and the regulation of the host□s behavior. The recent advancements in high-throughput technologies present an exciting opportunity to study complex biological systems, which cannot be understood using traditional biological tools but rather in a holistic manner. I like to perform highly multidisciplinary research combining cutting-edge technologies (shotgun metagenomics, metabolomics, and RNA sequencing) in humans and validations in the pre-clinical model of Drosophila melanogaster. While many human-related microbiome studies are often based solely on association data, and others rely solely on animal models missing the translational part, my research combines both approaches. By integrating clinical claims with functional research, my work aims to provide a more comprehensive understanding of the complex interactions between humans and the gut microbiome and its implications for human health and disease, ultimately facilitating the development of more effective therapeutic strategies and personalized interventions.
My research has made significant contributions to the field. These findings include the discovery of microbial signatures linked to memory through the gut virome (Cell Host & Microbe) and the impact of microbial alterations in proline metabolism and its association with depression (Cell Metabolism). I contributed to a study highlighting the importance of histidine catabolism by the microbiota and the repercussions in the accumulation of fatty acids in the liver. (Cell Reports medicine). I am also interested in understanding how brain functioning is modulated through peripheral organs. In this direction, we have recently published a study on how adipose tissue transcriptional profiling has associations with cognitive performance (Advances Science).
Owing to the absence of animal facility resources in the Girona region, I have established the Drosophila Fly Room IDIBGI facility (2020), this platform has played a pivotal role in facilitating access to Drosophila melanogaster as an alternative animal model for biomedical research to scientist and the industrial sector..

Resumen del Currículum Vitae:

Anna Castells Nobau pursued her undergraduate studies in Biology and Biochemistry and, a Master's in Neuroscience at the University of Barcelona. During her master's internship, she published her first scientific study as a leading author, focusing on the role of cerebrospinal fluid homeostasis in early brain development.
After completing her studies, Anna secured a research training position at the genetics department of Radboud University Medical Center (The Netherlands). In 2011 she was awarded the RadboudUMC PhD fellowship co-supervised by Dr. Annette Schenk and Prof. Simon E. Fisher. During her doctoral research, Anna utilized Drosophila melanogaster as a model organism to explore the functions of genes linked to neurodevelopmental disorders and acquired expertise in Drosophila physiology and behavior, as well as in human genetics and advanced sequencing techniques (whole genome sequencing, exome sequencing, mRNA sequencing, and computational biology). Her research resulted in 15 articles, including pioneering work on the implications of FITM2 mutations in a syndrome marked by deafness and dystonia. Furthermore, Anna elucidated the role of ATP6AP2 depletion in cognitive impairment and neurodegeneration and developed and characterized the first Drosophila FoxP mutants. She contributed to developing algorithms for automated image segmentation and quantification, facilitating high-throughput modeling of gene function in Drosophila. She developed a tool for automated quantification of Drosophila synapse morphology, published in PLOS Computational Biology, which earned recognition in the field and fostered numerous collaborations.
In 2019, Anna joined the Unit of Endocrinology, Diabetes, and Nutrition at the Biomedical Research Institute of Girona (IDIBGI), Spain, under the leadership of Dr. José Manuel Fernández Real. She established a Drosophila laboratory at the institution and developed novel methodologies, focusing on Drosophila host-microbiota interactions and behavior, diverging from her Ph.D. research. In 2021, she secured the Sara Borrell post-doctoral contract from the Instituto de Salud Carlos III to lead the project "Pioneering Drosophila as a model to study the microbiome's influence on cognition in the context of obesity." Anna's research primarily explores the complex mechanisms governing host-microbiome interactions and their effects on behavior and metabolism. Notable findings include investigations into the role of bacteriophages in cognitive performance by regulating the expression of memory-related genes Cell Host & Microbe (IF:30.3), as well as exploring the implications of gut microbiota in depression through alterations in proline metabolism Cell Metabolism (IF: 29), and the effects of histidine catabolism by the gut microbiota in NAFLD Cell Reports Medicine (IF:14.3). Additionally, her research has led to the development of three intellectual property patents.
As of 2020, Anna serves as the coordinator of the Drosophila Fly Room IDIBGI facility, which acts as a platform for research and technology transfer activities with industry partners, providing access to Drosophila melanogaster as an alternative animal model for biomedical research. She is engaged

in collaborative projects with companies like AB-BIOTICS SA. to test the effects of their probiotics on cognitive performance and mood-related disorders.

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Área Temática: **Biomedicina**
Nombre: GONZÁLEZ PEÑAS, JAVIER
Referencia: RYC2023-042530-I
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Título: Unraveling the genetic heterogeneity of complex psychiatric disorders

Resumen de la Memoria:

Javier González Peñas, M.Sc, PhD, holds a degree in Chemistry (2009, University of Santiago de Compostela (USC), awarded the End of Degree Prize), a master's degree in Biotechnology (2011, USC), a master's degree in Bioinformatics (2020, National School of Public Health, ISCIII), and a PhD in Molecular Medicine (2016, USC) with a focus on psychiatric genetics. Additionally, he has conducted research at the Psychiatric Institute of the State of New York (Columbia University, USA). Since October 2016, he has served as a postdoctoral researcher at the Institute of Psychiatry and Mental Health of the General University Hospital Gregorio Marañón (HGUGM), and since 2019 at the Spanish Network for Mental Health Biomedical Research (CIBERSAM). He has acquired state-of-the-art skills in analyzing and interpreting complex genetic data derived from various sources, including whole exome sequencing (WES), RNA sequencing (RNA-seq), whole-genome genotyping arrays, whole-genome methylation, human evolutionary markers, and gene-environment interaction (GxE) studies, among others. These technical and scientific capabilities have played a crucial role in the successful development of his independent research lines: the investigation of genetic heterogeneity in complex psychiatric disorders and the environmental modulation of their genetic architecture. These research lines have been developed based on hypotheses involving the existence of dynamic genetic susceptibility to psychiatric disorders throughout neurodevelopment, the presence of different biological subtypes within the framework of psychiatric diagnoses, and the involvement of complex structures in gene-environment interaction (GxE). He has demonstrated a remarkable ability to secure funding to support his research endeavors: has been funded through competitive personal grants (including a Sara Borrell Postdoctoral fellowship in 2020) and has participated in 17 national and international R&D projects (one as PI, 14 as a team member, and 2 as an external collaborator). Currently, he heads the psychiatric genetics laboratory at the HGUGM, overseeing an independent team of five members (including one postdoc, one Ph.D. student, and two M.Sc.).

Resumen del Currículum Vitae:

Javier González Peñas has co-authored 56 scientific publications (10 as first or corresponding last author) in ISI journals, including Nature, Nature Genetics, Cell, Nature Neuroscience, or Translational Psychiatry, among others, garnering up to 4,801 citations (4,696 since 2019). He has contributed to 1 book chapter. He has presented the findings of his research in 24 scientific congress presentations, noteworthy for his participation as a discussant or invited speaker on 6 occasions. The social impact of his work led to his involvement in various outreach activities, including interviews with TVE, Telemadrid, and Cadena SER, contributions to dissemination podcasts, and informative articles in medical journals. He has been funded through competitive personal grants (including a Sara Borrell Postdoctoral fellowship in 2020) and has participated in 17 national and international R&D projects (one as PI, 14 as a team member, and 2 as an external collaborator). In these projects, he has played a leadership role, significantly contributing to the acquisition of funding and the achievement of the proposed goals. Currently, he heads the psychiatric genetics laboratory at the HGUGM, overseeing an independent team of five members (including one postdoc, one Ph.D. student, and two M.Sc.). He has cultivated an extensive scientific network with both national and international collaborators. He is a collaborating member in international leading consortia, including the Psychiatric Genomics Consortium (PGC), the European network for the study of Gene-Environment interaction in schizophrenia (EU-GEI), and the Autism Sequencing Consortium (ASC). Notably, he has established and manages the CIBERSAM - schizophrenia platform for the utilization of genetic data generated in international projects, fueling numerous active collaborations. Engaged in educational activities, he has organized two editions of the mental health genetics course for the Spanish Society of Biological Psychiatry (SEPB; 2019 and 2023) and numerous departmental seminars. He has supervised three doctoral theses (2022, 2023, and one ongoing), three master's theses (2020, 2023, and 2023), and one bachelor's thesis (2022). These former students have secured stable research positions abroad or are employed in related industries. In addition to his mentoring roles, he has contributed as a reviewer for esteemed journals, including Nature Communications, Biological Psychiatry, and Schizophrenia Bulletin. He has also served on the editorial committees for Data in Brief and MethodsX journals from 2021 to 2023. Finally, he has actively contributed to the translation of genetic findings, developing a genetic diagnostic protocol involving the analysis of ASD trio exome data to output comprehensive reports for patients and their families. This protocol holds the potential for broader adoption in other hospitals and has been disseminated to patient and family associations, including Autismo Madrid.

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023

Turno General

Área Temática: **Ciencias agrarias y agroalimentarias**

Nombre: URBANEJA BERNAT, PABLO

Referencia: RYC2023-045303-I

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Título: Ecología del comportamiento y nutricional en insectos: una vía sostenible de manejo de plagas

Resumen de la Memoria:

A lo largo de mi carrera, he realizado 6 estancias de investigación (4 internacionales) con una duración total de 45 meses, y todas están relacionadas directamente con mi campo de especialización en entomología. Durante mi etapa predoctoral, realicé 2 estancias de investigación. En primer lugar, pasé 4 meses con en el IHSM-CSIC, donde estudié los efectos del cambio climático sobre los tres niveles tróficos (planta-herbívoro-enemigo natural) en cítricos (1 artículo SCI). En segundo lugar, pasé 4 meses en USA en la UF, donde estudié la susceptibilidad de distintos patrones de cítricos al vector del HLB, D. citri (1 artículo SCI). Tras la consecución de mi doctorado he tenido 4 contratos postdoctorales. Mi primer puesto como investigador posdoctoral en el ICIA, donde trabajé durante 8 meses en el programa de CBC del vector del HLB T. erytreae en Europa (3 artículos SCI y otros 3 artículos de divulgación y 2 informes científicos al sector). Seguidamente, obtuve un puesto posdoctoral como Investigador en Rutgers University en USA. En este grupo permanecí 20 meses y mis investigaciones se centraron en distintos aspectos de la ecología química, y la ecología del comportamiento y nutricional de insectos. Además, realicé una estancia de 2 meses en el USDA de Maryland (USA). En total durante mi estancia posdoctoral en USA, publiqué 7 artículos SCI y 6 comunicaciones a congresos internacionales. También, durante este período, organicé y moderé 4 simposios de investigación, y fui ponente invitado en 5 simposios internacionales. Después de mi estancia posdoctoral en USA, inicié mi siguiente posición como investigador posdoctoral en el IVIA. En este tiempo, trabajé en el CBC del cotonet de Sudafrica, Delettococcus aberiae, y realicé una estancia de investigación de 8 meses en Sudáfrica, tengo en revisión 2 artículos SCI resultantes de esta estancia. Finalmente, en septiembre de 2022 apliqué y gané un contrato postdoctoral altamente competitivo como investigador postdoctoral en el Instituto de Investigación y Tecnología Agroalimentarias (IRTA) de Cabrils (Barcelona), dentro del programa de Protección Vegetal Sostenible. Desde que llegue al IRTA he publicado 3 artículos SCI (+2 enviados) (primer autor y autor de correspondencia en 4 de ellos), 1 artículo divulgativo, 14 comunicaciones a congresos (13 internacionales). Además, es destacable mencionar que desde que llegué he dirigido/estoy dirigiendo 3 TFM, 2 TFG, y 1 tesis doctoral. Mi línea de investigación hasta es multidisciplinar en Entomología, destacando la investigación en control biológico, interacciones tróficas, ecología química, y ecología del comportamiento y nutricional de insectos. Mi primer objetivo en la línea de investigación a desarrollar será evaluar el efecto de la gutación sobre el comportamiento y los parámetros biológicos de los agentes de control (ACB) biológico en estos y otros cultivos de importancia en el centro donde me incorpore (Obj. 1). Estudiar y seleccionar plantas insectario en los sistemas seleccionados que produzcan gutación con un alto índice nutricional para los ACB (Obj. 2). Y estudiar el patrón de la gutación de las plantas sobre la comunidad de insectos y el manejo de plagas en condiciones reales de campo en distintos escenarios fitosanitarios (Obj. 3).

Resumen del Currículum Vitae:

Tengo una formación multidisciplinar en Entomología, destacando la investigación en control biológico, interacciones tróficas, ecología química, y ecología del comportamiento y nutricional de insectos. Esta formación me ha permitido mejorar la gestión de plagas en los diversos laboratorios en los que he estado. Fruto de estas investigaciones he publicado 20 artículos SCI (95% Q1), 2 artículos indexados, 5 artículos de divulgación científica, 4 informes científico-técnicos, 1 capítulo de libro. Me gustaría resaltar mi papel de liderazgo en 26 de las 32 publicaciones al figurar como primer autor, y que 17 de mis 20 artículos se han publicado desde 2019. También soy autor de la invención de una patente relacionada con la ecología nutricional de insectos. Tengo un total de 52 trabajos presentados en congresos (41 orales y 11 posters) realizados en conferencias nacionales (11) e internacionales (41), de los cuales, 2 han sido premiados a mejor presentación oral. Además, recibí otro premio por tener el mejor CV postdoctoral, permitiéndome asistir al Congreso Internacional de Ecología Química en India. A lo largo de mi carrera, he realizado 6 estancias de investigación internacionales con una duración total de 45 meses, que han contribuido significativamente a mi desarrollo profesional. He participado en 9 proyectos de investigación como investigador que me han permitido expandir mi red de colaboraciones. He participado en más de 40 acciones de transferencia en las que se incluyen jornadas técnicas, seminarios, acciones de divulgación y días de campo, compartiendo mis hallazgos con expertos, profesionales y agricultores del sector. Estoy dirigiendo actualmente 1 tesis doctoral. He dirigido 11 trabajos de final de grado/máster y he recibido 2 estudiantes internacionales. He sido profesor docente de las asignaturas de Protección de Cultivos, y Entomología Agrícola en la UJI de Castelló, y estoy acreditado como Profesor Ayudante Doctor. He desempeñado el papel de editor en varios capítulos de revistas científicas de mi área (p.e., Current Opinion in Insect Science). Soy revisor de artículos científicos en publicaciones científicas. He sido parte del comité científico y organizador de 2 congresos. Además, he liderado la organización de 4 simposios de congresos internacionales. Soy miembro del comité ejecutivo del global International Organization for Biological Control (IOBC).

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023

Turno General

Área Temática: **Ciencias agrarias y agroalimentarias**

Nombre: SÁNCHEZ MORILLO-VELARDE, MARÍA PIEDAD

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Título: Carrera científico-técnica en acuicultura

Resumen de la Memoria:

I got my PhD in Biology at the Universidad de Murcia in 2013 (Cum laude) with the thesis entitled "Development of formulated feeds and nutritional requirements of the common octopus (O. vulgaris)", developed in the IMIDA (Murcia). During this time I acquired skills related to the formulation and development of different feeds, perfoming growing trials with experimental feeds, studying their digestibility and collecting and processing experimental data. In 2014 I worked as Head of the Production Department in the aquaculture company Alevines de Guardamar S.L. Among other responsibilities I was in charge of the sowing, feeding, vaccination, purification and classification of sea bream and European sea bass juveniles. After that, as a contracted doctor, I led the experimental design and formulation and elaboration of diets, applying all the knowledge acquired during my PhD in the project "Development of cuttlefish, Sepia officinalis, aquaculture production technology - feed and husbandry refinements" funded by FCT and developed at CCMAR, Portugal. Ending this contract, I moved to Mexico, where I worked as a postdoctoral researcher at Institute of Marine Sciences and Limnology (ICMyL, UNAM, Mexico) for 2 years, where I contributed to implement techniques, work areas, laboratory, biological materials and R statististic for isotopic analysis creating the isotope analysis laboratory and leading a scientific project and offered this technology to other collage projects. The greatest achievement in my scientific career came in 2016 when I gained a position as Senior Researcher of CONACyT at the ICIMAP (University of Veracruz, Mexico), in order to create and implement the Aquaculture research line. At ICIMAP, I led my own research group, being responsible for the Aquaculture Laboratory, and teaching and supervising bachelor"s, MSc"s and PhD students. Despite the success obtained in the development of the aquaculture line and the progress of the group, in 2020 I had to return to Spain, leaving a consolidated line in the charge of my colleagues and the students I trained. Later I joined the IEO-CSIC of Murcia in the Marine Environment area (2020-2023) and since September 2023 in the Aquaculture area where I develop my research in the research group "Physiology and Welfare of Marine Species".

My scientific and professional training allows me to propose the development of an independent line of research focused on improving the feeding and nutrition of aquaculture production through the use of new feed formulations and ingredients that alleviate the current pressure on marine natural resources. I will focus my efforts on studying the relationship between nutrition and the key biological systems that determine better animal welfare. In addition, I will identify stress indicators that will allow us to evaluate the state of welfare of the organisms in culture based on their nutrition, growing conditions and environmental conditions and thereby facilitate the prevention of stress. These advancements could contribute to human well-being, national economic development, more sustainable and environmentally friendly practices, enhancing the circular economy, highlighting novel business opportunities, and promoting the conservation of the marine environment and technological progress in the aquaculture industry.

Resumen del Currículum Vitae:

I got a PhD (Cum laude) in Biology (University of Murcia, UMU, 2013), a MSc in Management of living marine resources and aquaculture (UMU, 2008) and another one in Food safety management (University of Camilo José Cela, 2014). I have focused my research career on the development of cephalopod aquaculture (using a multidisciplinary approach based on understanding the species" biology and ecology), with a major focus on cephalopods, but also on other taxa such as fish and crustaceans. I have published a total of 20 indexed papers (and 2 submitted) in international peer-reviewed journals (12 as main author). I have authored 5 book chapters and written 13 scientific project reports. I have been awarded with the distinction of "National Researcher Level I" by the National Council of Science and Technology of Mexico in the periods 2016-2022 for the quality and relevance of my scientific contributions. In 2022, as proof of the quality of my scientific trajectory, I achieved the positive evaluation of R3 Certificate by the AEI and scientific and teaching of "Contratado Doctor" stage by ANECA. Furthermore, my level of maturity and scientific consolidation allowed me to pass the selection process (archieving the 8th position of six places) for a Senior Scientist position at the CSIC.

I lead my own research group and I established the Aquaculture research line at University of Veracruz (UV). Also, I was responsible for the creation and monitoring of the Aquaculture Laboratory, as well as launching multiple specific multidisciplinary lines of research (promoting the already existing network and establishing new collaborations for UV, both nationally and internationally) with the aim of developing a sustainable aquaculture in Veracruz. I have participated in 20 R&D competitive projects (12 national and 8 international) and I have led my own project as Senior Researcher and I had 2 other projects approved subject to budget availability. In addition, I have been invited to participate in 6 other projects submitted to various international calls. I have participated in three oceanographic campaigns at IEO-CSIC, one of them as a chief deck officer. As an educator, I have taught a total of 1500 h in postgraduate (master's and PhD) studies at UV, Mexico. I have been involved in the supervision of 10 theses (2 PhD, 4 MSc and 4 professional residencies) and served as a thesis committee member (1 PhD and 2 MSc), all of them at the international level. I have carried out stays in 3 countries (UK, Portugal and Mexico) for a total of 6 years and 6 months. In total, I have participated in 29 conferences, half of them with oral presentations and the other half with posters. I have given several disseminated talks on the results of my research in different conferences as well as in the "Women and Science" campaigns. I have also disclosed my work in popular science magazines and on television, both in Spain and Mexico.

I have participated in various working groups and seminars as an Expert Advisor in Aquaculture, invited by different international government entities, as well as a member of the evaluation committee for "General Knowledge Exams" in the PhD program; in the "Art, Science, Light" Award (2017-2019) given by the UV to "The best master's and PhD theses" and in the "PhD access tests" in UV. I have been a reviewer of several scientific projects and articles.

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Turno General

Área Temática: **Ciencias agrarias y agroalimentarias**

Nombre: FRESÁN SALVO, UJUÉ

Referencia: RYC2023-044634-I

Correo Electrónico: ujuefresan@gmail.com

Título: Consolidación de una trayectoria investigadora dedicada a dietas saludables y sostenibles

Resumen de la Memoria:

My entire career as a researcher has been devoted to sustainable diets. It could be framed in 3 main periods:

1. Early research on sustainable diets (2016-2017)

During my first postdoc at the University of Navarra, I took the lead and started up a new research line focused on not only healthy but also sustainable diets. I was able to be self-sufficient, and managed to acquire all the required knowledge, skills and data for such a research line. This innovative research line was a great success, and I was awarded by the Spanish Society of Epidemiology and the Planetary Health Alliance for this research line that I led.

2. Consolidation as a dietary sustainability researcher (2017-2019)

During my second postdoc, I was part of the Environmental Nutrition research group at Loma Linda University (USA). This group is specialized in the assessment of the food system-related environmental impact, consolidating my trajectory on sustainable diets. Mainly, I served as leader and coordinator of an international project (USA-Mexico-Peru) aimed at the development of an environmental impact database of almost 300 foods using LCA methodology. I led several publications aimed at the environmental impact and nutritional quality assessment of different diets, and specific food products recently introduced in the market at that time. This line consolidated me as one of the pioneering researchers on the study of plant-based meat alternatives worldwide. My publications related to this research line were awarded by the American and Spanish Societies of Nutrition.

3. Promoting sustainable diets in Spain (2020-ongoing)

During the last three years, I have been working as a senior postdoctoral researcher at ISGlobal. I was the co-Principal Investigator of a research project aimed at designing and implementing a digital pilot intervention focused on changing eating behaviors towards sustainable diets using mHealth technologies (i.e., a smartphone□s application) in Spain. Thanks to this program I extended my research knowledge and skills on sustainable diets from observational to interventional research.

I have been recently awarded with one out of three Daniel Carasso Fellowships, and, as a consequence, promoted to Assistant Research Professor. My research project will end up in the development of tools, such dietary screeners, useful to leverage a general dietary transition towards a healthy diet with low environmental impact in our country.

My recognition as a leader researcher on sustainable diets has exponentially increased over the years as demonstrated, for example, by the invitations as key speaker to conferences and meetings worldwide, or my recruitment as expert by deputy entities in the Nutrition field, such as the World Health Organization, the European Federation of Association of Dietetics, or the Spanish Agency for Food Safety and Nutrition; overall indicating a trajectory towards scientific excellence.

The research line to be developed if Ramón y Cajal is granted will be focused on advancing on sustainable diets in Spain. The major objective will be designing an intervention to promote a large-scale eating behaviour change in Spain among people with chronic diseases, and evaluate the association of sustainable diets with changes in microbiome, and nutrigenomics.

Resumen del Currículum Vitae:

I am a Pharmacist, Masters in Public Health and PhD in Biomedicine. I did my PhD in the Molecular Biology Institute of Barcelona, thanks to the fellowship JAE-PREDOC awarded by the CSIC.

I did my first postdoc (2016-2017) at the Department of Preventive Medicine and Public Health of the University of Navarra, funded by the European Research Council. Serving as a nutritional epidemiologist, I led some studies aimed at the health effects of foods and dietary patterns. Moreover, I set up a new research line focused on not only healthy, but also environmentally sustainable and affordable diets.

Being awarded with the McLead Fund-Loma Linda University fellowship two consecutive years (2017-2019), I worked as a postdoctoral researcher at the School of Public Health of Loma Linda University (USA), in the Environmental Nutrition research group. I served as head and coordinator of a multidisciplinary international project aimed at the development of an American food environmental impact database. I led several publications focused on the environmental impact of different food system phases (i.e., packaging, transportation), and the healthiness and environmental sustainability of plant-based meat analogs.

Coming back to Spain, I worked as a researcher at the Public Health Institute of Navarra (2019-2020), thanks to a postdoctoral contract through CIBER-Epidemiology and Public Health. Adapting to circumstances, my research line was focused on risk factors for COVID-19 and other infectious diseases.

From 2020 to 2023, I worked as a postdoctoral researcher at ISGlobal, funded by a postdoctoral Severo Ochoa fellowship. The main objective of my research line was to design and implement individual behavioral change interventions promoting sustainable diets in Spain, using digital tools. Within

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the same institution and research area, from December 2023, I work as an Assistant Research Professor, thanks to the Daniel Carasso postdoctoral fellowship.

In total, I have published 41 peer-reviewed scientific papers in high impact factor journals (First author:22; Last-author:1; Corresponding author:17). I have communicated major findings in 8 international scientific conferences and 5 national ones (Invited speaker:4; Oral communication:6; Poster:3), in addition to in more than 25 outreach activities to the general population. I have been awarded four times by scientific institutions (i.e., Spanish Society of Nutrition 2018, American Society of Nutrition 2019, Spanish Society of Epidemiology 2020, and Planetary Health Alliance 2021). My publications have been cited 37 times across 33 policy documents, and 17 policy documents which cite my work have been cited a further 131 times in 117 other policy documents, fact that corroborates the influence of my research on policy. I am an active reviewer for many journals, and I have served as a guest editor in a special issue of the journal Nutrients.

I have collaborated with different national and international universities to give lessons and seminars, and I have tutored 1 Bachelor degree thesis, 14 Masters thesis and a PhD (ongoing). Additionally, I am an active member on several scientific and academic committees, not only at the national level but also at the international one. Furthermore, I do not miss any opportunity to outreach sustainable diets in radio programs, reports or podcasts.

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Área Temática: **Ciencias agrarias y agroalimentarias**

Nombre: FONT FORCADA, CAROLINA

Referencia: RYC2023-043297-I

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Título: Breeding and fruit tree quality: obtaining Prunus rootstocks and fruit cultivars, adapted to the conditions of the Mediterranean area and introduction of resistance to the main pest and diseases

Resumen de la Memoria:

The main research line that I have carried out has been directed to the use of classical and biotechnological tools in plant breeding programs with emphasis on agronomical and biochemical techniques, development of molecular markers, and localization of QTLs and candidate genes affecting agronomic and fruit quality traits of interest in breeding programs of almond (CITA), peach and Prunus rootstocks (EEAD-CSIC), apple, peach, and pear (IRTA) fruit trees, and bioinformatics tools (UCDavis). Taking into account all the experience that I have been acquiring during my formative years, the research title to be developed would be: Breeding and fruit tree quality: obtaining Prunus rootstocks and fruit cultivars, adapted to the conditions of the Mediterranean area and introduction of resistance to the main pest and diseases. Obtaining new varieties of fruit with integrated resistances and high fruit quality is of high relevance in the Ebro Valley area, as the new varieties adapted to the edaphoclimatic conditions with integrated resistances and high fruit quality would improve the fruit yields of growers, and the efficiency of these crops. The integrated resistances (as, powdery mildew, scab, fire blight, Monilinia, Sharka, and Xanthomonas) would allow to eliminate or reduce the use of fungicides and pesticides. Organoleptic, taste, appearance, and visual traits cannot be forgotten since they have a strong influence on consumer acceptance. Also, in the Prunus and Malus breeding program we have to considerer the use of rootstocks, because is mainly directed to overcome soil and disease problems to which peach scions have limited or no resistance. The development of new breeding genetic techniques using molecular markers will contribute to increasing efficiency in the long breeding process. The 3 objectives that I will develop are: 1) Breeding and selection of peach and apple cultivars with good agronomical, fruit quality, sensorial, and organoleptic properties and well adapted to the Mediterranean fruit growing areas. Selection and characterization of Prunus rootstocks in heavy and calcareous soils to avoid iron-chlorosis, root asphyxia and replant limiting conditions. 2) Developing new apple and peach cultivars resistant to principal diseases with as long shelf life and well adapted to the edaphoclimatic conditions of the Ebro Valley. 3) Identification of genomic regions related to important traits, genome wide association, and application of bioinformatics tools in peach, apple, and Prunus rootstocks. The leadership that I have been acquiring over the years, as well as the agronomical, biochemical, physiological, and molecular/bioinformatics techniques learned in the different Centers where I have been working (CITA, PCTAD, EEAD, UCDavis, and IRTA), has guided my research professional career to lead the apple and peach breeding programs, being involved in 3 international projects and leader another 2 as PI (1 National and 1 Regional). This research will be devoted to solving real problems of agricultural production in the belief that the excellence in science should be accessible to all the stakeholders in the food industry. It is expected that the results of my project will have a great social, environmental, and economical impact as they respond to the problems posed by the Spanish society.

Resumen del Currículum Vitae:

Education and Research career: BSc. in Agricultural Engineering (University Miguel Hernández, Spain) and ENSAIA, France), with degree project at INRA (Martinique). First MSc. in Plant Biodiversity and Genetic Resources (2006) at Université des Antilles-Guayana (France) and Sustainable Agriculture Department of CATIE (Costa Rica). Second MSc. in Plant Breeding (2007) at the University of Lleida (UdL)-IAMZ and CITA-Aragon. Ph.D. dissertation at UdL in 2012. I was granted at CITA and PCTAD (2013-2014), followed by international Postdoctoral positions (2014-2016) granted by UC Davis (CA, USA). Postdoctoral experience at EEAD-CSIC with a Juan de la Cierva-Incorporación grant (2017-18). Full Researcher at IRTA (Lleida, from 2018-2022), working as Rosaceae Breeder-Leader. During this period, I have created collaborations with Plant and Food (P&F) researcher center in New Zealand jointly with the Spanish grower association FruitFutur and T&G Global (New Zealand). Co-author of 3 registered industrial property marketed in Spain and other international countries. I collaborated in 21 national research projects, of which I led 1R&D national project (RTA2017-00102-C03-02) and 1 regional project (Comunitat Ris3Cat), achieving more than 500,000 . I participated in 3 international projects (University of Tunis, University of California and INVITE-Horizon 2020). In summary, I have published 32 JCR articles in high impact factor journals (21 as first author, 22 in Q1, and 6 in D1, and 4 as corresponding author), 1 book chapter (as first author) and 25 non-JCR articles (9 internationals, 16 nationals). I collaborated in 30 presentations to national and international conferences. As teaching and mentoring activities I co-directed the MSc. R Amri (IAMZ-Zaragoza; 2017-18), and 1 SCI publication (Amri et al., 2021, Frontiers Plant Sci). I am currently directing the Ph.D. student F. Grignaffini, I supervised an Erasmus student (University of Ljubljana); and other 6 Trainee students, working in the Genetic Breeding Program Team (2018-2022). I collaborated with other PhD students (P Mignard, EEAD-CSIC), and MSc students (A Monteagudo, University of Zaragoza). As the organisation of dissemination activities, I organized the XXIII, XXIV, XXVI & XXVII editions on Agricultural Fairs of Mollerussa, from 2018 until 2021, and the tastings of the new apples for the Agrifood sector and agricultural Cooperatives. I participated in the organization for the international XII Eucarpia Symposium, 2007. I participated in the II, III & IV Int. award for the Best Golden Apple, from 2018 until 2020 as expert-committee and as IRTA Member. I participated in the organization of the Science dissemination activities organized by CSIC Aragón (2009) and I collaborated during 4 years as teacher in the Master: New technologies and tools used in Plant Genetic Breeding (University of Zaragoza). I am frequent reviewer for 12 SCI journals. I got the 1st prize awarded in Sant Miquel Fair published in the magazine Fruticulture and the PhD extraordinary award in 2014. Finally, my research international experience included predoc (Guadeloupe, Costa Rica, Martinique, France, and USA-Washington State University) and postdoctoral stays (two Centers of Research at UCDavis-USA). As other merits, I have the ANECA accreditation (ASSISTANT PROFESSOR DOCTOR) and the R3 research quality certificate

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Área Temática: **Ciencias físicas**
Nombre: VELILLA PRIETO, LUIS
Referencia: RYC2023-045648-I
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Título: Molecular Astrophysics: Circumstellar medium

Resumen de la Memoria:

My research is focused on the study of circumstellar envelopes (CSEs) of evolved stars, mainly Sun-like but also massive stars. My goal is to understand the mechanisms of molecular gas and dust grains formation and how chemical complexity grows in these objects, which are main contributors to the synthesis and enrichment of matter in the Universe. In order to tackle this challenge, I have developed an interdisciplinary approach encompassing astronomy, physics, and chemistry through observations, theory, and physicochemical modeling, for which I created new methods and tools to characterize evolved stars. Thus, I have knowledge on observational radioastronomy (single dish and interferometry), stellar physics, radiative transfer, chemical models, and molecular spectroscopy. My main original contribution is the development of the spectral scan technique and the methods for high spatial resolution interferometry in the millimeter wavelength domain, and the implementation of radiative transfer and chemical models to investigate in this field. I have discovered for the first time in space five new molecules and characterized with unprecedented detail the CSEs of several evolved Sun-like stars, being one of the first Spanish authors that published a paper on AGB stars with ALMA data. To date, the richest oxygen rich CSE of an evolved star, the Calabash nebula, has been known to be the richest thanks to my high-sensitivity line survey with the IRAM-30m. My study on the molecular content of the AGB star IK Tau is also a major reference for other studies in the field and also for theoretical groups investigating molecular collisions of astrophysical interest. The continuation of my research during the postdoc stage led me to explore the connection between evolved stars and Young Stellar Objects (YSOs) after the discovery of methanol in post-AGB stars, a tracer of shock-induced chemistry in YSOs. Since this research line was almost unexplored, I decided to submit a project to the Spanish MICINN three years ago called Chemistry in Outflows of Post-AGB stars (CHIPS) which was awarded approximately 140.000 EUR for three years to open my own independent research line at the Instituto de Física Fundamental (IFF-CSIC). The current state of this research line looks promising. In May 2023, one Nature paper with me as first and corresponding author was published reporting the detection of asymmetries in the formation of the outflows of a evolved star with important implications on the anisotropic chemical formation of dust grains, molecular blobs, and also on the stellar wind driving mechanisms. Following this, my work was selected to appear as the science highlight in the ESO ALMA science website and I had the opportunity to present this work in the conference ALMA at 10 years (Puerto Varas, Chile). I am also carrying out, and I have done, other actions within the framework of the project including papers, observational projects as PI, outreach projects, mentoring TFM students, and searching for funding opportunities and a tenure-track like position that would allow me to settle this new research line and offer a PhD.

Resumen del Currículum Vitae:

I am a R3 researcher working as PI of a JIN project. I was awarded a FPI fellowship (MICINN) to carry out my doctoral studies. My PhD, on molecular complexity of evolved stars outflows was supervised by Dr. Cernicharo and Dr. Sánchez-Contreras. It was carried out in the Molecular Astrophysics Group at the CAB (INTA-CSIC), and the ICMM (CSIC). During this period, I did a 3 months stay at the LAB (CNRS, Université Bordeaux) under the supervision of Dr. Agúndez, thanks to an awarded FPI short stay fellowship. I defended my thesis on June 9, 2017, and I was awarded with the European mention for the doctorate and with an excellent cum laude grade. After a one-year postdoc in Madrid (ICMM and IFF, CSIC), I moved to Sweden in September 2018, to work as a postdoc at the Chalmers University in the Astronomy and Plasma Physics Division for three years. I rejected a fourth year extension to develop my own research line in the field of evolved stars, thanks to an awarded JIN project by the MICINN. I also obtained the "Atracción de Talento 2" grant, which I rejected, since I opted for the JIN project. I was ranked 7th in the Physics area reserves in the RyC 2021 call (RYC2021-033615-I). I am author of 31 articles in international peer-reviewed journals in Q1 with 666 citations. My h-index is 16, and my first publication is from 2014. I have participated in more than 20 contributions presented in international conferences. I am principal investigator of more than 15 ALMA, APEX, NOEMA, CARMA, IRAM-30m, and Yebes-40m projects, which are among the observatories with the highest observing pressure in the world (ALMA or IRAM, between 5-10). I have participated as a researcher in different national (AYA in Spain and VK in Sweden) and international projects (e.g. ERC), as team member, leading important parts of the projects, and now as PI. I am highly engaged in teaching and mentoring. I have taught in the Stellar Physics course (Master level) in Chalmers and I have been also invited as a teacher at two international schools in Molecular Astrophysics and interferometry (INAOE in Mexico and ESO Garching), and several seminars at different institutions. I have supervised one TFM (Valencia Internacional University), one JAE Intro CSIC student (currently doing a PhD in our group), an UCM Prácticas en empresa student, and I am currently supervising a TFM student from the UAM. In terms of outreach, I have participated in more than 10 events including two chapters of on-line books, collaborations in articles, blogs, and press releases, public talks, guiding tours, and organizing events such as the Astronomy on Tap (Gothenburg). I am member of the IAU since 2018, ascribed to the Stars and Stellar Physics (G) and the Interstellar medium and Local Universe (H) Divisions, as well as to the Astronomy for Equity and Inclusion Executive Committee Working group. I am an associated member of the working group "OurGalaxy" (Square Kilometre Array project). I am member of the SEA and the EAS. I have also participated in the Astro 2020 decadal survey "Origins" project and I am part of the SKA "Our Galaxy" working group. I am referee for Astronomy and Astrophysics, the Astrophysical Journal and Nature. I am a native Spanish, fluent in English, and I speak basic Swedish.

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
Turno General

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Título: High-dimensional entanglement distribution for long-range quantum communications

Resumen de la Memoria:

I finished my BSc degree in Prof. Juan P. Torres group at ICFO, thanks to being awarded a Summer Fellowship in 2011. I then finished my MSc in Photonics in 2012 and defended my PhD thesis in 2017. I was then awarded a postdoctoral fellowship by the Claude Leon Foundation, to work in Prof. Andrew Forbes group at the University of the Witwatersrand, in South Africa. There I supervised the work of several MSc and PhD students while performing various quantum optics experiments myself, e.g. spatial mode detection by means of sum-frequency up-conversion for quantum teleportation purposes. This is still a large ongoing collaborative project that I started and currently lead. I also spent five months as a visiting scientist at Heriot-Watt University, in Scotland, performing a spatial entanglement swapping experiment for quantum communication. I then moved to Japan in 2019, where I was able to find an Associate Professor position under the supervision of Prof. Takashige Omatsu in Chiba University. Although I had to change my line of research, working in projects mainly based on laser physics and material science, I had the freedom to apply for my own research funding. I obtained funding as principal invesitigator in the Early-Career Scientist (KAKENHI) call by the Japan Society for the Promotion of Science (JSPS), and an Invitational Fellowship for Foreign-based Researchers to Japan by the National Institute of Information and Communications Technology (NICT). I finally decided to come back home in 2021, and bring with me the experience I could accumulate over these past years. I was awarded a Severo Ochoa Fellowship to work in ICFO, under the supervision of Prof. Valerio Pruneri, to develop a diffractive-optics-based technology to identify objects using Artificial Intelligence recognition algorithms. I combine my Research Fellow position at ICFO with a part-time Lecturer position in the Autonomous University of Barcelona (UAB). This is the third year that I teach in the subject of Quantum Optics in the Master of Photonics and also in the 4th year of Physics BSc; the "Photonics Laboratory" in the Master of Photonics; the Ones i Òptica subject in the 2nd year of Physics BSc; and the Ampliació de Física Clàssica subject in the 2nd year of the Nanoscience and Nanotechnology BSc, in which I am the coordinator of this 8 credit subject as well.

I will briefly summarize the different research fields that I have been working on during my research career. During my MSc, PhD and first postdoctoral position in South Africa, I mainly focused my research in quantum optics experiments, using structured light and single pixel imaging techniques for quantum communication purposes. By the end of my first postdoctoral fellowship I was also involved in the construction of laser systems but including metamaterial-based diffractive technology, field that I continued investigating during my second postdoctoral fellowship in Japan. My plan is to use all the knowledge I acquired during my international research experience, and consolidate my position in Barcelona by starting a new line of research in ICFO.

Resumen del Currículum Vitae:

I had the opportunity to publish our work in over 20 peer-reviewed articles in high-impact international journals. I have collaborated with more than 30 international research groups, and still collaborating with Naples, Glasgow, Heriot-Watt, Jena and Chiba Universities, among others; leading the majority of the projects resulting in either the first or corresponding authorship in most of my published work. Some of the results presented were the first contribution to different new lines of research. I had the opportunity to present our work in more than 20 seminars and 25 international conferences: 4 of which were invited lectures and 1 keynote. I have a 15 h-index with over 750 citations according to the Web of Science, and reviewed over 20 manuscripts for high-impact international journals such as Optica, Photonics Research, Optics Letters, among others. I also chaired several sessions of SPIE international conferences and SAIP (South African Institute of Physics), hosted an international workshop in Chiba, and I am a member of OPTICA since 2018.

I have been awarded several fellowships supporting my academic career such as the ICFO Summer Fellowship in 2011, the Claude Leon Foundation Postdoctoral Fellowship in 2017, the Severo Ochoa Postdoctoral Fellowship in 2021, and two consecutive Marie Sklodowska-Curie Actions (MSCA) Seal of Excellence in 2021 and 2022. I obtained funding in the Early-Career Scientist (KAKENHI) call by the Japan Society for the Promotion of Science (JSPS) as a Principal Investigator, and prepared several Invitational Fellowship for Foreign-based Researchers to Japan. In ICFO it is not possible to apply for funding as a Principal Investigator if you are not a Group Leader, but I have prepared several work packages in different granted projects, and I am currently supervising and working in the development of technology related to 5 national and European projects. I am also collaborating with public institutions such as CTTI or FGC, and also with organizations in the private sector such as Telefónica, Indra or T-Systems, in order to develop technologically innovative solutions to address different needs of our society. As part of the dissemination activities sharing our results with the scientific community, I have also contributed to explain our results in several interviews with public media such as Catalunya Ràdio or el Periódico, using accessible language so the whole society could understand the importance of our findings.

I contributed closely in the training and mentoring of more than 7 young researchers, becoming most of them lecturers or postdoctoral fellows after my supervision. I have also participated in the Quantum Ideas Factory in 2023 as a Mentor, preparing a Challenge for the MSc students enrolled in the DIGIQ program. I have been part of the evaluation committee of 5 MSc and 1 PhD thesis defences, and evaluated 5 project proposals in the MSCA program as an Expert. I am currently in contact with Telefónica, and other 5 European and Japanese institutions with the aim of constituting a research team to carry out a project related to the use of high-dimensional quantum key distribution (QKD) protocols for the 6G cellular communication network technology working in the THz regime.

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
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Título: Beyond the frontiers of the Standard Model in the Quantum Computing era

Resumen de la Memoria:

Several of the phenomena observed in the Universe cannot be described by the current Standard Model (SM) of particle physics, such as the matter-antimatter asymmetry or the origin of Dark Matter. Theories beyond the SM (BSM) that give explanations for this often predict the existence of new particles and/or processes that are forbidden in the SM. This proposal approaches such theories in a threefold way, including advanced analyses of the dataset of one of the main experiments at the Large Hadron Collider (LHC), LHCb, followed by an implementation of these and other relevant results into a global analysis aimed at providing a theoretical interpretation.
The need for new measurements in order to perform such interpretation leads present and future experiments to computational bottlenecks. The technical aspect of the research lines proposed in this grant is embedded in this context, using Quantum Computing (QC) for one of the biggest challenges in the particle physics community: track reconstruction. Such an approach will be first used for a new experiment under construction designed to measure magnetic and electric dipole moments of short-lived fermions at the LHC, and will also be ported to the LHCb use case.
The impact of an observation in either of the searches would be the first unequivocal evidence of the existence of new particle(s) and hence, an open door to unravel long-standing mysteries of fundamental physics. Which particular model it is, will be ascertained with the second part of this proposal. In turn, this will bring the complete theory that supersedes the SM and gives an explanation to all the phenomena in the Universe one step forward. Moreover, the application of QC combines computer science, quantum mechanics, and artificial intelligence in a unique way, providing an interface with fundamental physics. This opens the door to a future computing landscape that is able to deal with the highest computational complexities and timings that the LHC has struggled for so long to deal with.

Resumen del Currículum Vitae:

I have a strong background in particle physics, particularly in Beyond the Standard Model (BSM) searches and precision measurements. Having successfully contributed to data analysis within the LHCb experiment at CERN in decay processes from both of these areas, I acted as convener in the LHCb working group specialized in b decays to charmonia, coordinating the efforts of over thirty researchers from different institutes. Moreover, I also took part in theoretical collaborations, such as MasterCode, aimed at bringing together theorists and experimentalists in interpreting data from various experiments within various BSM frameworks. As a main contributor to this and smaller-scale collaborations, I have acquired expertise in developing phenomenological standalone codes and implementing experimental constraints - not only from LHCb but also from Dark Matter or direct searches - as well as providing a complementary approach to my work as a member of LHCb. This has provided me with a broad overview on the field of particle physics.

After successfully defending my PhD at the University of Santiago de Compostela, I have done two postdocs in The Netherlands, in the Dutch National Institute for Subatomic Physics and the University of Maastricht. During these, I have expanded my expertise in fundamental physics research, not only in data analysis involving particles I hadn't previously studied but also inspecting the several aspects of charged particle reconstruction in the LHCb experiment, from track extrapolation to magnetic field studies. From my expertise in this area stems my ongoing work in applications of Quantum Computing (QC) and Quantum Machine Learning for particle physics. In this context, I coordinate the work stream within the QC4HEP group dedicated to track and jet reconstruction with QC, that tackles two of the main bottlenecks for collider experiments with approaches that are highly transferable to wide variety of fields, such as chemistry, biology or industry. The work in this collaboration is done in close contact with IBM Research.

Throughout the projects I have carried out during my research career, I have acted as teaching assistant for two courses and successfully supervised students at Bachelor, Master, and PhD level, and actively contributed to the organization of various outreach events. In this regard, I am part of the Organizing Committee of Women in Quantum Development, aimed at promoting Diversity, Equity and Inclusion in the quantum ecosystem, and of the Startertalks, with the purpose of introducing LHCb aspects to new members of the collaboration. Moreover, I am a reviewer both for peer-review journals and internal review processes within the collaborations I am part of.

The research project in this grant will enable me to build upon my current knowledge with an ambitious, intersectional and interdisciplinary project focused on BSM physics searches at LHCb, phenomenological studies and Research and Development for planned particle physics experiments. The feasibility of carrying this project to a successful result is supported on the leadership skills I have acquired in different types of collaborative efforts, and my track record as a main contributor in several publications in peer-reviewed journals.

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
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Título: Modelling galaxies in a new era of cosmological surveys

Resumen de la Memoria:

New opportunities to address unresolved problems in astronomy and particle physics will arise with the advent of a new generation of galaxy surveys (such as EUCLID, DESI, 4-MOST, J-PAS, PAU, TAIPAN, and LSST). What are the fundamental components of our Universe? What is the nature of dark energy and dark matter? What is the mass of neutrinos? The answers to these questions will reveal how the universe has evolved up to this point, why it behaves as it does, and how it will continue to evolve over time.

To take full advantage of these surveys, we require accurate galaxy formation models and the dark matter haloes that host them. However, today's galaxy population models need to be more complex and capable of properly modelling scales on the 1-halo regime. My current and future research aims to combine cosmological simulations with physical-motivated galaxy formation models to extract the largest amount of cosmological and galaxy formation information from these surveys.

For this, I developed a state-of-the-art galaxy population model that can reproduce galaxy clustering in both real and redshift space with unprecedented precision. I compared my model, the SubHalo Abundance Matching extended model (SHAMe), to semi-analytical models, hydrodynamic simulations, and observations. I also demonstrate that SHAMe can reproduce statistics other than the two-point function, including the bispectrum and the kNN cumulative distribution function. Last year, I demonstrated that my model can reproduce simultaneous galaxy clustering and galaxy-galaxy lensing from observations and simulations, which no other empirical model has been able to achieve.

I combined my state-of-the-art galaxy population model with the scaling technique (Angulo & White 2010) to create a method for constraining cosmology through galaxy clustering. I improved this scaling technique to ensure that the power spectrum error is less than 3% when scaling simulation in a 10-sigma region around Planck's best-fitting parameters (Contreras et al. 2020). I test the combination of these two techniques by constraining the cosmology of a cutting-edge hydrodynamic simulation, the Millennium-TNG simulation. In the coming years, I intend to constrain cosmological information from current and future galaxy surveys, as well as address many of the current discrepancies in measurements of cosmological parameters such as S8 and the Hubble parameter.

Resumen del Currículum Vitae:

I did my PhD at Universidad Catolica de Chile from 2013 to 2017. I have been a postdoc at CEFCA, Teruel, Spain, and at DIPC, San Sebastian, Spain. I spent 18 months making long-term (3-6 months) visits to the Institute for Computational Cosmology (Durham, UK), as well as short-term visits to Germany, Australia, and Chile.
I have been awarded several grants and recognitions, including 2 Juan de la Cierva fellowships ("Formación" in 2018 and "Incorporación" in 2021); two highly-competitive PhD grants: one from the research department of my former institution (VRI, for 1 year); and one from the Chilean government (CONICYT, for 3 years) that paid for my PhD plus some personal expenses; 11.3 million CPU hours in proposals I am Co-PI in MareNostrum and Picasso supercomputer, and 2.4 million CPU hours in a proposal I am PI; 2 travel grants I used to visit Durham University (UK) during my PhD: a Newton Fund from the Research Council UK and LACEGAL by the European Union (to cover for 18 months of travelling); and 1 night for observing at the Magellan/Baade telescope.
I have co-supervised six undergraduate senior theses and one master's thesis over the past few years. This led to four publications in Q1 journals. In 2022, I began co-supervising two doctoral candidates, one at the Donostia International Physic Center (Spain) and the other at Case Western Reserve University (USA). I have taught students from different genders and nationalities, gaining extensive tutoring experience.
Since the beginning of my PhD. in early 2013, I had 48 articles published in international peer-reviewed Q1 journals, 13 as the first author plus one as a conference proceeding. Since 2021, I have published an average of one paper every 6-7 weeks. According to the NASA Astrophysics Data System (ADS), these have been cited more than 1850 times (h-index of 26). All the papers where I am involved have been finally released in a free-access database (www.arxiv.com) as well as part of a Q1 journal. Also, all my latest papers have included a statement that the data of those works are available for everyone upon reasonable request.
I have actively participated in the astronomical community by (a) being a referee in the Q1 journal for 22 papers with 46 iterations (b) having oral participation in several international conferences, most of them as an invited speaker, which have taken place in several countries, including Argentina, Australia, Austria, Chile, China, Colombia, England, Germany, Japan (webinar), Nederlands, Poland, Spain & USA (webinar).; (c) being SOC of 6 international conferences, LOC in two conferences and chair and organaser in two sympossium sessions of the EAS meeting and a SEA meeting; (d) being part the organisation committee of 5 international conferences (e) creating a collaboration network with people working in South America, North America, Europe, Asia and Australia and (f) participate in several outreach projects. I am also a member of the Sociedad Española de Astronomía (SEA) and the European Astronomical Society (EAS)

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
Turno General

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Título: Gravity beyond Einstein: theory and observations

Resumen de la Memoria:

My research focuses on the study of theories of gravity beyond Einstein's General Relativity (GR) motivated by high-energy physics. Due to its incompatibility with quantum mechanics, GR is not a complete theory, and therefore it must be replaced by a more fundamental theory. It is expected that such theory will introduce corrections to Einstein's equations. My research focuses on studying these modifications of Einstein gravity, known as higher-derivative corrections.
These corrections arise naturally in string theory – our most promising candidate for a theory of quantum gravity – and they become relevant when gravity is extremely strong, like in black holes or at the Big Bang singularity. Part of my work consists in studying these particular string-theoretical corrections to black holes from a top-down approach, investigating how they affect some of their properties, like the black hole entropy.

An usual limitation of higher-derivative gravities is that, due to their mathematical complexity, one can only obtain approximate answers from them. One of my most important contributions was the discovery of new extensions of GR with unique properties that allow one to perform exact computations. The discovery of these theories has opened up many new avenues for research (in black hole physics, cosmology, gravitational waves and holography) and has triggered a revolution in this area, with hundreds of follow-up papers by researchers worldwide. To mention one application, some of my new theories are able to resolve the singularities inside black holes, something that is expected to happen in a complete theory of gravity.

On the other hand, higher-derivative theories also play an interesting role in the holographic correspondence, which relates a theory of gravity defined on a negatively curved space with a conformal field theory (CFT, a kind of quantum theory) that lives on the boundary of that spacetime. This duality allows us to learn about other branches of physics (e.g., strongly coupled quantum theories) from gravity, and by considering theories of gravity beyond Einstein one can study more general holographic CFTs. Some of my papers have unveiled previously unknown properties of general CFTs by following this approach.

Besides theoretical questions, higher-curvature corrections have an observational interest. Thanks to the observation of gravitational waves from black hole binaries by the detectors LIGO and Virgo, we are for the first time able to perform high-precision tests of Einstein's theory in strong gravity situations. These observations also allow us to look for deviations with respect to GR. Thus, part of my work focuses on studying the observational signatures of higher-curvature corrections. Some of my recent works have provided groundbreaking advances on the computation of the vibration frequencies of black holes beyond GR, which is a crucial result in order to test these theories against observations.

Regarding future work, I intend to keep developing these research lines, with an special emphasis on the study of observational aspects of theories beyond GR. This is an strategic area that will keep growing in relevance in the next decades with the advent of third-generation gravitational-wave detectors.

Resumen del Currículum Vitae:

I did my PhD at IFT-Madrid from 2015 to 2019 under the supervision of Prof. Tomas Ortin and Dr. Pablo Bueno. During that time I also spent six months at the Perimeter Institute for Theoretical Physics (Canada), where I got in touch with Profs. Robert Myers and Robert Mann. From 2019 to 2023 I worked as a postdoc at KU Leuven (Belgium), where I collaborated with the group of Prof. Thomas Hertog and other colleagues. I am currently a "la Caixa" Junior Leader fellow at the University of Barcelona.
I am an expert in gravity, holography, black holes and extensions of Einstein's theory of General Relativity. I have published nearly 60 papers in the best journals in my area and my works sum over 2200 citations, with an h-index of 27, according to INSPIRE-HEP (standard data base for fundamental physics). I have received around 500 citations/year during the last two years. I have given around 40 talks including conferences and seminars at international institutions.
This success is the result of original research lines that I have developed independently or together with key collaborators. Some of my works have provided significant advances in established areas, like the study of black holes in string theory or the analysis of the signatures of beyond-GR physics on gravitational waves. On the other hand, my groundbreaking works on new theories of gravity beyond Einstein have triggered a revolution in this area and have inspired a great deal of literature by other international groups. One of my papers received coverage by the media and I was invited to write the main article for outreach journal Investigación y Ciencia.
My research is funded by prestigious grants. I am currently the holder of a "la Caixa" Junior Leader fellowship, one of the most competitive grants in Spain, allowing me to be the PI of my own project. My work at KU Leuven in 2020-2023 was funded by a personal research grant from the Research Foundation – Flanders (FWO), a prestigious fellowship from the Flemish government. During my PhD at IFT-Madrid (2015-2019) I was funded by a "la Caixa"-Severo Ochoa fellowship. I was also awarded a "Visiting graduate" fellowship from the Perimeter Institute, where I spent six months. In 2022 I was awarded a Maria Zambrano postdoctoral fellowship, which I declined.
As a recognition of my exceptional academic trajectory during my PhD, I was awarded the "Premio extraordinario de doctorado" by the Universidad Autónoma de Madrid. I have also received two honorable mentions at the essay competition of the Gravity Research Foundation (2017 and 2019).
I have an international network of collaborators, including renowned researchers like those mentioned above, but on top of that, I am an independent researcher carrying out my own research program. I have officially supervised two PhD theses (K. Fransen, KU Leuven 2022, and D. Pereniguez, UAM 2022) thanks to my close collaboration with these PhD students. Furthermore, I have been the leading author in a good portion of my papers, again

with students or other postdocs. In addition, I have supervised three Msc theses, four bachelor projects and I have accumulated around 70 hours of teaching experience.
As another sign of my leadership, I am an established reviewer for some of the most prestigious journals in my area, such as PRL, JHEP, CQG and PRD, and I get invited to talk at international conferences.

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
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Título: Bridging quantum information and machine learning

Resumen de la Memoria:

My research interests center around the synergies between quantum information theory and other areas within physics, mathematics, and computer science. Much of my research focuses on the application of concepts inspired by quantum information theory to other disciplines. Throughout my career I have used the tools of quantum information theory for understanding phenomena in quantum field theory, thermodynamics, machine learning, and causal inference. These tools, at the same time, have enabled a better understanding of quantum information processing tasks in complex scenarios.

My research has developed along three main lines: the first encompassing the broad definition of quantum information outside quantum information as the application of quantum information theory to other disciplines; the second regarding the certification of quantum phenomena in complex networks; and the third exploring the synergies between various areas of physics (quantum mechanics, statistical mechanics, and quantum many-body physics) and machine learning.

Quantum information theory has changed how we understand the foundations of quantum physics, impacting fields such as the simulation of many-body systems and quantum thermodynamics. I have explored these influences in various areas. Within quantum field theory, I studied the information content of the vacuum and its extraction by probes interacting with it. A realistic modeling of the phenomenon revealed that much more entanglement than originally thought can be extracted from the vacuum state of a quantum field. I have also developed techniques to efficiently characterize quantum thermodynamic interactions, and to analyze causal influences mediated by quantum systems. I am currently interested in refining the methods that I have developed so they can be used to approach real-world scenarios.

The second line is the characterization of quantum phenomena, such as entanglement and nonlocality, in quantum communication networks where many parties process systems distributed by independent sources. Many standard tools are of no help in these situations, and new ones must be created. I have focused on the creation of such numerical techniques, and on the development of notions of multipartite entanglement and nonlocality that are of relevance in the context of networks. My works define the widely used notions of Genuine Network Multipartite Entanglement and Full Network Nonlocality. I am interested in the demonstration of such concepts in experiments and its use in the analysis of multipartite cryptographic protocols. I am also the main author of a two comprehensive reviews, on nonlocality in networks and on semidefinite programming in quantum information.

I also work on how physics can help for machine learning tasks, either by speeding up computations or by opening new paradigms. I have shown that using physics-based solutions for machine learning produce algorithms that learn faster, more efficiently, and more robustly against interferences by an adversary. I have also demonstrated that tensor networks, a tool developed for the characterization of many-body quantum systems, can be used as ML algorithms with privacy-preserving guarantees. Finally, I have designed and analyzed quantum machine learning algorithms in state-of-the-art quantum computers.

Resumen del Currículum Vitae:

I completed my Degree in Physics from Universidad Complutense de Madrid in 2014 with honors including the excellence grade (Matrícula de Honor) in 26 out of 37 courses, three mentions to outstanding achievement from Comunidad de Madrid, and receiving the Extraordinary Degree Prize (Premio Extraordinario del Grado en Física). After that I was selected to the exclusive PSI Master's program in theoretical physics from Perimeter Institute (Waterloo, Canada), being the second student of Spanish nationality accepted to the program. The articles product of the research I did there have become standard literature in relativistic quantum information (two papers, >170 citations each).

After the Master's I obtained a La Caixa Foundation fellowship to do my PhD in Instituto de Ciencias Fotónicas under the supervision of Prof. Antonio Acín. I defended my thesis on October 15th 2019, obtaining the grade of excellent cum laude and the special PhD thesis award (Premio Extraordinario de Doctorado) of Universitat Politècnica de Catalunya.

During 2020 and 2021 I was a postdoc at the Mathematics Department of UCM. Then, I joined Instituto de Ciencias Matemáticas in Madrid until September 2023. Since then, I am a post-doctoral researcher at Université de Genève.

In 2018, my research received the "IBM-Q Best paper award" to the best research articles making use of the IBM quantum computing platforms and I was appointed Visiting Graduate Fellow at Perimeter Institute. I was also appointed Qiskit advocate in 2020, and Trusted Reviewer by the IOP in 2021. Also that year, I was offered a Group Leader position at the quantum algorithms division of BBVA R&D.

I have supervised several undergraduate research projects, TFG and TFM, and I currently supervise one PhD student. I have taught at Universitat Pompeu Fabra, Universitat Politècnica de Catalunya, and Universidad Complutense de Madrid. I hold ANECA's accreditations for Profesor Ayudante Doctor and Profesor Contratado Doctor. I have been part of the organizing committee for four conferences (1 national, 3 international), and I have experience as a referee for journals and grant proposals (QuantERA 2021).

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I have been advisor for articles in news outlets, and I have written two popular science articles in Revista Española de Física. I am also an advocate of open source in research, actively collaborating with the Open Source Office at UCM by delivering talks in quantum computer programming. I have participated in the development of the Qiskit quantum computing library. Being Qiskit Advocate, I mentored a project during the Qiskit Advocate Mentorship Program of 2021 (Elena Peña Tapia, now at IBM Zurich). I also have delivered training in quantum computing for private companies (Everis Madrid, 2019).

I do research in the certification of quantum phenomena and in the synergies between quantum information and machine learning. My record includes publications in some of the top journals of the field of Physics, and in Machine Learning journals and top conferences. Four of my papers have been featured as Editor's Suggestions. 19 out of my 26 papers do not have my PI as coauthor, and I already have my own, international network of theoretical and experimental collaborators. I am currently interested in quantum nonlocality in complex networks, and in the use of tensor networks for privacy-preserving machine learning.

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Área Temática: **Ciencias sociales**
Nombre: GALLOIS , SANDRINE
Referencia: RYC2023-042575-I
Correo Electrónico: Sandrine.Gallois@uab.cat

Título: Exploring Biocultural Diversity: Ethnoecological contributions to sustainability.

Resumen de la Memoria:

I am an ethnoecologist with an interdisciplinary research background rooted in cultural anthropology, botany and education. My research program focuses around three main realms: human and cultural evolution; the impacts of global change on local livelihoods and cultures; and art-science approaches for sustainability.

Based on my long-term field-based ethnographic engagement with Indigenous communities and my participation in innovative educational programs towards sustainability, my work has contributed to: i) recognizing Indigenous Peoples and Local Communities livelihood in a changing context; ii) bringing childhood in ethnoecological research and cultural evolution theories; and iii) assessing the impacts of art-based approaches for sustainable education and transformation. My insights can be described through the following seven key achievements:

1. Understanding human evolution from ethnographic data
2. Depicting the multiple impacts of global change on Indigenous Peoples and Local Communities (IP&LC) livelihood and culture
3. Documenting the biocultural diversity with ethnobiological evidence
4. Pioneering the field of children s ethnobiology
5. Highlighting children s central role in cultural transmission and cultural evolution theories
6. Exploring the potential of art-based approaches for science education
7. Fostering transdisciplinary spaces bridging science, art, and civil society for stimulating sustainable transformations

My entire career has a strong international orientation: I have conducted a double Ph.D. in France and Spain, a postdoctoral research in the Netherlands and participated in nine international projects, creating an active international network that spans several EU countries, North America and Africa.

Committed to an interdisciplinary approach for a comprehensive assessment of research topics, I have gone beyond my initial academic background and reached out to experts in different research fields, establishing strong, fruitful, and ongoing collaborations between diverse academic networks.

My scientific training and experience are strongly interdisciplinary. Throughout my career, I have profusely proven expertise in combining methods and theories from several academic areas, including botany, ecology, cultural and social anthropology, and ethnoecology. This manifests in my own research, where I work with different data collection tools (semi-structured and structured surveys, participant observation, focus groups, and participatory research), combining quantitative and qualitative data from different theoretical frameworks.

My academic background is based on the ground, thanks to a strong experience living in close relation with Indigenous Peoples in remote and challenging conditions for more than 30 months in total.

My independence and leadership are also reflected by the 12 scientific publications I have led as first or sole author and the co-edition of a Special Issue in the Journal of Ethnobiology. In addition, I will co-lead three symposiums in international congresses taking place in the following months.

I plan to pursue research inquiries to maintain and valorize biocultural diversity. Specifically, I aim to develop a research line in ethnobotany for sustainability and explore, document, and revitalize the diversity of human-plant relations using innovative approaches

Resumen del Currículum Vitae:

I am an ethnoecologist with an interdisciplinary background spanning anthropology, ecology, and children's studies. My research focuses on human and cultural evolution, global change's impacts on local livelihoods and cultures, and art-science approaches for sustainability.

I have conducted research on local ecological knowledge of indigenous peoples, cultural knowledge transmission, and the intersection between science and society through artistic approaches. I have lived in close relation with indigenous peoples for over 30 months, and I combined qualitative and quantitative approaches.

Throughout my career, I have published 43 scientific publications, including book chapters, policy briefs, and articles in peer-reviewed journals. I have participated in 14 national and international congresses and served as associate editor for two journals. I have strong research experience and leadership skills, having won a highly competitive personal grant and led research teams in Cameroon and France. I have also co-supervised two PhD theses, six Master theses, and two internships. I am currently teaching courses on Biocultural Diversity, Human Ecology, and Biodiversity and Planetary Health. My entire career has a strong international orientation thanks to an active international network across several EU countries, Africa, and North America, collaborating with research centers, universities, and civil society organizations.

Over the next 5 years, I plan to develop a research line on ethnobotany for sustainability, exploring, documenting, and revitalizing human-plant relations' diversity. To do so, I aim to consolidate a strong research team and attract additional funding through ERC and H2020 grants and national funding programs.

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Área Temática: **Ciencias y tecnologías de materiales**

Nombre: CUESTA GARCÍA, ANA MARÍA

Referencia: RYC2023-043624-I

Correo Electrónico: a_cuesta@uma.es

Título: Advanced characterization of eco-cements by using state-of-the-art synchrotron techniques

Resumen de la Memoria:

Climate change is a fact and finding strategies to reduce greenhouse gas emissions of industrial processes is challenging but very much needed. Portland cement (PC) and concrete industries contribute around 8% of the total human produced CO2 emissions. Consequently, a grand challenge is to find strategies to produce more sustainable building but maintaining mechanical performances and durability requirements. The use of supplementary cementitious materials (SCMs) is currently the best strategy to reduce CO2 emissions in the cement industry.

My focus, motivation and vision, in the last few years, have been the use of state-of-the-art synchrotron characterization techniques such as pair distribution function (PDF) and ptychographic X-ray computed nanotomography for better understanding of cement hydration with the final goal to contribute to the development of cements with lower carbon footprints. In my current project, different pozzolanic materials have been selected to be used as SCMs to prepare LC3 binders. However, the access to synchrotron techniques is not easy neither fast. So, my future projection is also to use, laboratory X-ray computed microtomography (micro CT) combined with laboratory x-ray powder diffraction (LXRPD). The innovative approach is to take data in the same volume of the same paste within a thick capillary with time. The results from both techniques should agree resulting in more reliable information to measure the degree of hydration of the different component within the cement pastes. These techniques are both available at the SCAI laboratories at UMA and the optimization of a new protocol is key to have accuracy in the analysis at the early age hydration of PC with SCMs materials.

Main objectives of the research line: (i) To develop cements with a reduced CO2 footprint with different selected SMCs. The mechanistic understanding of low-carbon cement hydration is key to be able to accelerate their hydration kinetics at early ages, 3 days or earlies. (i) To use laboratory computed tomography combined with other techniques, f.i. X-ray powder diffraction, for determining the degree of hydration of amorphous materials in cements. The long-term aim is to monitor the reaction of the amorphous components of SCMs in calcined clays. (ii) To further characterize the microstructures of unaltered low-carbon cements through synchrotron X-ray imaging techniques.

Resumen del Currículum Vitae:

1. Scientific contribution

-Publications in ISI: Co-author of 42 publications (29 published on Q1 journals) with 1313 citations, 3 book chapter, and 57 communications presented to congresses (51 international).

-Hirsch Index: 18 (Scopus).

-Background: I have been working on the application of powder diffraction to cement related materials using the Rietveld method since 2010. In 2011, I was awarded a FPU-grant to perform my PhD Thesis at the University of Malaga (UMA). My PhD Thesis was defended on the Nov-2015. I obtained the maximum qualification "Cum Laude" with the International Mention. During my PhD, I performed a 3 months stage in Erlangen. Moreover, in 2017, my PhD Thesis was recognized by the AUSE and I won the 3rd PhD Thesis Prize. One of the publications of my PhD was internationally recognized with an award by "PANalytical BV"(https://www.uma.es/sala-de-prensa/noticias/la-doctoranda-de-la-uma-ana-maria-cuesta-recibe-el-premio-panalytical-award-2013/).

In 2016-2017, I worked at ALBA Synchrotron as postdoctoral researcher in a project focused on advanced characterization of cements using novel techniques such as ptychographic X-ray computed nanotomography, PDF and high-pressure powder diffraction.

In 2018-2020, I worked at UMA in a project: Advanced characterisation of sustainable ecocements: understanding hydration to improve their performances.

-Funding: In October 2020, I was granted with a research project, as principal investigator which belongs to Proyectos de I+D+I «Retos Colaboración» 2019, for young Researchers. Project entitled Microstructure analyses of Limestone Calcined Clay Cements by Advanced Synchrotron Techniques.

-Large facilities experience & Internalization: Expertise with large installations as I performed close to ten experiments/short stages, on ALBA and ESRF synchrotron. Later, I performed two experiments at SLS, short international stages, (Swiss Light Source, Switzerland) using Ptychographic X-ray computed nanotomography (in cSAXS beamline). Moreover, I worked in collaboration with the cSAXS group, mainly with Dr. Ana Diaz. I have other international collaborations: i) Prof. Monica Dapiaggi, Univ. Milano; ii) Dr. R.U. Ichikawa, Institito de Pesquisas Energéticas e Nucleares de Sau Paulo; iii) Dr. V.K. Peterson, Australian Nuclear Science and Technology Organization and iv) Dr. B. Lothenbach, EMPA.

2. Society contribution

-Scientific dissemination: (i) Participation as Principal Investigator in the SCIENCE-PIIISA innovation program in the 2018/2019 and 2019/2020, 2022/2023 for secondary education students; (ii) Participation in the Researchs Night in 2019; (iii) Congresses: 57 conferences/posters.

-Transfer of knowledge: (i) Participation as researcher in 13 research contracts with private companies, 4 of them international, for example: Lafarge Center de Recherche, Master Builders Solutions Deutschland Gmbh, Buzzi Unicem SpA and CTS Cement Manufacturing Corporation.

3. Contribution to young researchers:

-Supervisor of Students, PhD Thesis: Finished (i) Advanced quantitative synchrotron X-ray imaging of cement micro- and meso- structures. Shiva Shirani. Date of dissertation: Oct-2023; Final mark: sobresaliente, Cum Laude; in progress (ii) Early age hydration of low-carbon cements studied by combined X-ray diffraction and imaging. Jaime Fernández Sánchez, starting date: February 2023.

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Área Temática: **Ciencias y tecnologías de materiales**

Nombre: DIAZ PAYNO, PEDRO

Referencia: RYC2023-042644-I

Correo Electrónico: pedrojose.diaz@imdea.org

Título: Bioingeniería, ingeniería de tejidos y biofabricación

Resumen de la Memoria:

From 2013 to 2015, I worked as research assistant at Prof. Kelly lab at TCD (IRE) before being awarded the IRC scholarship (most prestigious award for PhD in Ireland), to pursue my PhD on The development of a biomimetic scaffold for osteochondral tissue engineering based on the characterization of growth factors present in articular cartilage and growth plate tissues. I defended my PhD in December 2019. My PhD research resulted in several high impact publications, including Biomater (first-author; IF:12.5), Mater Today Bio (IF:10.7) and Acta Biomater (first-author; IF:8.9), as well as a patent of the fabrication of such scaffolds. During this time, I worked as teaching assistant for 3 years developing www.med3dp.com: 3D printed innovations for humanitarian healthcare; and I supervised 4 PhD students and train them in lab skills and advanced freeze-drying protocols; I was elected 3 years in a row (2015-18) the Head research student representative for the School of Engineering. My team managed to secure 75k for TCD engineering PhD students in critical need of economic support. After my PhD, I joined Profs. Zadpoor (TUDelft, NLD) and van Osch (ErasmusMC, NLD) as postdoc. The project (RegMed4D) focused on the development of new technology known as 4D Bioprinting for cartilage repair. I was involved in several high impact publications including Biofabrication (IF 9), Adv Healthc Mater (first author; IF: 11.1), Materials Today Bio (IF: 10.2) and Nature Comm (IF: 14.9); as well as the co-direction of 4 MSc theses and supervision of 3 PhDs, resulting in 6 publications (3 first author). During this time, I was elected Secretary of the young section (SYIS) in the EU Chapter of the Tissue Engineering and Regenerative Medicine Society (TERMIS), where I co-organized 2 world webinars and mentoring activities for SYIS members. From 2023 I serve as member of the Mary-Ann Liebert (MAL) Liaison Committee to strengthen the collaboration between the scientists of TERMIS and the editorial board of the Tissue Engineering journals. In 2020 I acted as reviewer for 10 applications of the Dutch NWA-Idea Generator 2019 funding (grants of 50k for 1 year). Then, I returned to my home country and worked for 6 months at Laboratorios Farmacéuticos Rovi, S.A. (ESP) as medical advisor to learn how to effectively communicate with clinicians, which is critical to stablish research-clinical collaborations for the advance of the regenerative medicine field. In January 2023, I joined the Biomaterials group, led by Dr. Jennifer Patterson, at IMDEA Materials (ESP) as a postdoctoral research associate to work on the BIOMET4D project, an EU-funded EIC Pathfinder project focusing on biodegradable metal derived shape-morphing implants for craniosynostosis tissue restoration. Besides leading a task on in vitro testing in this project, I was also supervising bachelor, master and PhD students in the lab. In April 2023, I was awarded a MSCA Postdoctoral fellowship that focuses on the development of compliant/dynamic coil-shapped 3D prints together with tissue-specific extracellular matrix (ECM) for cartilage tissue restoration. This recognition has been a step up in my career highligint the quality of my previous work and the beginning to become an independent researcher. I have since stablished strong collaborations with UPM researchers and La Paz Clinicians.

Resumen del Currículum Vitae:

Positions
2023-now MSCA PF, IMDEA Materials, ESP
2023 Postdoc, IMDEA Materials, ESP
2022 Medical advisor, ROVI Pharma, ESP
2019-22 Postdoc, Medical Delta, NLD
2015-19 PhD, TCD, IRE
2013-15 Research assistant, TCD, IRE

Education
2022 Business Strategic Marketing, UAN, ESP
2018 Reflective Teaching Assistantship, TCD, IRE
2016 Lyophylization Technology, BPS, UK
2015 MSc, TCD, IRE
2014 Laboratory Animal Science Training, UTG, IRE
2013 Licenciatura Biotechnology, UFV, ESP
2012 BSc. (ord) Biotechnology, AIT, IRE

Peer reviewed publications: co-author of 32 publications (2 corresp., 7 1st author; 8 without PhD supervisor) Citations >590, h-index 14

Keynote speaker invitations
2023 Un encuentro con by the Francisco de Vitoria University (Madrid, Spain)
2023 ACMiN Seminar, organized by AGH University of Science and Technology (Poland)

Management of societies/conferences
2023-now Leading the creation of the first society in Spain for regenerative medicine and tissue engineering
2023-now Co-organizing the Workshop on Additive Biofabrication (WAB2024)
2023-now Journal club at IMDEA material institute for researchers
2019-23 Co-chair at TERMIS2019, 21-22, EORS2023 conferences
2020, 21 Co-organizer of 2020 and 2021 World Webinars for TERMIS members
2020-21 Journal club organizer at TUDelft for BME researchers

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2019 Symposium coordinator for TCBE talks, TCD (IRE)
2018 Organizing sessions and Q&A at WCB2018

Presenting author in over 20 conferences: EORS, TERMIS, GRC, WCB, MBI, BINI.

Contribution to projects:
2023-now RECoil3D, 2 yr €180k MSCA PF awarded in April 2023 (HORIZON-MSCA-2021-PF-01: 101110000). Preliminary results presented at EORS2023 (Portugal).
2022-23 BIOMET4D working as research associate. Preliminary results presented at Biometal2023 (ITA)
2019-22 RegMed4D working as postdoc developing 4D bioprint tech., co-directing 4 MSc theses leading to 3 high impact first author publications and supervising and training PhDs funded by ERC n° [677575] and ERDF nº [2S04-014] leading to 3 high impact co-author publications including Nat Comm (IF:16.6)
2013-19 Supervising and training PhDs funded by SFI (12/IA/1554 and 12/RC/2278_P2), EI (CF/2014/4325) and ERC (ANCHOR € 779909, StemRepair - 258463 and JointPrinting € 647004), leading to 3 high impact co-author publications
2015-19: IRC €96k PhD scholarship (most prestigious funding body in Ireland). Project ID: GOIPG/2015/2186. This work led to several high impact first author publications including Biomater (IF:15.3) and Acta Biomater (IF:10.63)

Technology transfer: Patent no.US20200188556A1

Reviewing
2017-now: review editor for 7 journals including Acta Biomater or Biofabrication
2019-20: Grant Evaluator for the Dutch NWA-Idea Generator 2019

Awards and peer recognition (Total independent funding = €309,552.96)
2023 ON travel grant (CHF500)
2023 Acta Student Award demonstrates exceptional value and leadership potential ($2k)
2023 Marie Curie PF (€181,152.96)
2023 Public Choice Award for 12th Annual Image Competition at IMDEA Materials, Spain
2023 Two Invited keynotes
2022 Rovi Scholarship to get industry experience (€7,2k)
2018 Poster finalist at IPC hosted at TCD, IRE
2018 Travel Award (€750)
2016 TBSI Image Competition, published as cover of The Irish Times article
2016 €Lab unsung hero€ at TCD, IRE
2015 IRC award (€96k)
2013 MSc. at TCD, IRE (€22k)
2013 Biotech Appl to Medicine award (€70)

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Turno General

Área Temática: **Ciencias y tecnologías medioambientales**

Nombre: MUSTIN CARVALHO, WILLIAM

Referencia: RYC2023-045231-I

Correo Electrónico: wilruoca@hotmail.com

Título: Biodiversity impacts of anthropogenic activities in urban and cultural landscapes

Resumen de la Memoria:

Over the past 15 years I have consolidated my research career in ecology, macroecology, biogeography and conservation. My key contributions have been to: 1) understanding how distribution patterns and ecological processes are structured along environment gradients, and the implications of this for conservation; 2) advancing knowledge about macroecology and island biogeography of terrestrial mammals; 3) conducting science that underpins effective and efficient rescue, rehabilitation, release and monitoring of fauna after human-wildlife impact events; 4) providing scientific evidence of the ecological and conservation importance of the Amazonian savannas; and 5) generating policy impact and contributing to land use planning in the Amazon. My research has generated 63 scientific publications, including 1 book chapter and 1 book. Of these, 50 correspond to articles in JCR journals, in 25 of which I am the first and 7 the last author. In addition to the high number of papers I have published in recent years (37 papers in the last 5 years), one way to verify may independence and leadership is through the amount of resources acquired for developing these projects and the number of people trained. So far, I have secured funding as PI exceeding 150.000, allowing me to consolidate my research in recent years. I have participated in 12 research projects (2 as PI), supervised and co-supervised 5 BSc, 7 MSc, and 2 PhD students. I supervise 6 MSc and 2 PhD students and a postdoctoral researcher. I now plan to further consolidate my research into the impacts of human-made landscapes on biodiversity in Brazil and translate this type of research to Spain. I specifically aim to understand how biodiversity (mainly birds, mammals, reptiles, and amphibians) is affected by urbanization, fire and plantation of commodities. If awarded an Ayuda Ramon y Cajal, I will use the five-year security as an opportunity to apply for funding via "Proyectos de Generación de Conocimiento" or "Consolidación Investigadora" in 2025. Furthermore, as I have done in recent years, I will also be able to apply for resources from foreign bodies and institutions, such as the National Geographic Society. In Spain, I will expand my research to evaluate how urbanisation affects biodiversity, focusing on developing a multi-taxa project, including assessing the effect of exotic species along an urban-periurban-rural gradient in the Comunidad de Madrid. Given the well-established links between urban biodiversity and human health and well-being benefits, I would also aim to involve people in this project to understand the attitudes and perceptions of residents of large cities (like Madrid) about fauna and flora. Therefore, the Ramon y Cajal fellowship represents a unique opportunity to further improve these skills in a new field, which is research in urban ecology and cultural landscapes, in addition to being able to train people (master's and PhD students), acquire financial resources and provide results to support public policies.

Resumen del Currículum Vitae:

I am a passionate and experienced mammal biologist who has dedicated the past 15 years to advancing my career by building a strong portfolio of skills in natural history, zoology, ecology, macroecology, biogeography and conservation research of mammals. Currently, I am a Research Fellow at the Autonomous University of Madrid, Madrid, Spain, and maintain an unpaid permanent position as a lecturer in the Programa de Pós-Graduação em Biodiversiade Tropical (PPGBIO) at Federal University of Amapá (UNIFAP), Brazil. My research career began with my first degree in Animal Science (2004-2009) at Federal Rural University of Rio de Janeiro (UFRRJ), Brazil. Later, I did an MSc (2009-2011) and a PhD (2011-2016) in Animal Biology (UFRRJ). During my PhD, I also spent a year (2014-2015) at the Center for Ecology, Evolution and Environmental Changes (cE3c) of the University of Lisbon, Portugal. While completing my MSc and PhD, I also completed a second undergraduate degree in Biological Sciences (UFRRJ - 2011-2015). Between 2016 and 2020, I worked as a postdoctoral researcher in the PPGBIO at UNIFAP. Furthermore, between 2017 and 2018 I also spent time (6 months) as a visiting researcher at the University of Aberdeen, Scotland. After, between 2020 and 2022, I worked as a visiting lecturer in the Programa de Pós-Graduação em Biodiversidade e Meio Ambiente at Universidade Federal da Grande Dourados, Brazil. I have participated in 12 research projects (2 as PI), supervised and co-supervised 5 BSc, 7 MSc, and 2 PhD students. I currently supervise 6 MSc and 2 PhD students and a postdoctoral researcher. I have won grants as PI from the following funders: Rufford Foundation, National Geographic Society, Neotropical Grassland Conservancy, Bat Biology Foundation and Bat Conservation International, with total funds exceeding 150,000.00. Finally, in 2023 I was awarded a grant from the National Geographic Society totalling 135,000.00 to develop the project entitled "Effective and equitable conservation: balancing biodiversity outcomes and human well-being in a shared savanna landscape". This project's main goal is to use participatory research methods to work with key stakeholders, including traditional populations living in the Savannas of Amapá, Brazilian Amazonia, and agribusiness producers, to explore pathways for sustainable development. I expect this project's results will directly impact local conservation, helping to identify collaborative pathways through which conservation scientists, local communities, and the productive sector can work together to benefit biodiversity and human wellbeing. In 2023, I won the Journal of Biogeography Innovation (JBI) Awards for young researchers. In January 2024, I achieved the R3 Certificate as an established researcher in Spain, considered one of this country's most relevant recognitions of research excellence. As a researcher and teacher, I have consolidated my research lines and skills in macroecology and biogeography. Specifically, I am interested in understanding 1) the ecology and conservation of Amazonian savannas and 2) the macroecology and biogeography of bats and medium- and large-sized terrestrial mammals.

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Turno General

Área Temática: **Ciencias y tecnologías químicas**

Nombre: LÓPEZ LINARES, JUAN CARLOS

Referencia: RYC2023-043152-I

Correo Electrónico: clinares@ujaen.es

Título: Biorefinerias y valorización de residuos agrícolas y agro-industriales

Resumen de la Memoria:

I have 19 h-index, with 44 publications in JCR-type indexed journals (28 in Q1), 3 publications in not indexed journals and 17 book chapters, being 1105 total citations (SCOPUS, 23/01/2024). I have attended 7 international congresses. I have a great variety of contributions (75) (posters and communications) to national and international congresses.

On the other hand, I can highlight the obtaining of several grants, i.e. Predoctoral Grant by University of Jaén to carry out my PhD studies. I have different awards during my career as researcher: i.e., award to better Master Thesis from Univ. Jaén; Extraordinary Doctorate Award and mentions "Cum Laude" and "International Doctorate".

Regarding my postdoctoral experience, I have enjoyed several contracts in research projects, Postdoctoral contracts, Young and Senior Researcher contracts, and Technical staff in Univ. Jaén and Valladolid (2015-2022). Nowadays, I have a Postdoctoral Grant funded by University of Valladolid (2022-2027) with stabilization commitment.

I carried out several pre and postdoctoral stays in prestigious research centers: Centre for Energetic, Environment and Technology Researches (CIEMAT), Madrid, Spain (2013, 1 month); Centre of Biological Engineering, University of Minho, Braga, Portugal (2014, 3 months); Institute of Sustainable Processes, University of Valladolid, Spain (2018-2020, 2.5 years; 2022-at the moment, 2 years (at the moment)); Department of Biotechnology and Biomedicine, Technical University of Denmark (DTU), Copenhague, Dinamarca (2022, 3 months; 2023, 4 months).

I have participated in 10 competitive R+D+i projects (1 as IP; 1 in collaboration with international groups), 2 contracts with companies (Société des Produits Nestlé S.A. and Iberia Bioenergy S.L.) and 1 Research Net.

I have also been supervisor of Degree (11) and Master (9) Thesis, business internship tutor (Veolia Servicio LECAM S.A.U.) and research task tutor (Scholarship program from Social Collaboration Council to develop research tasks in Research Institutes 2023-2024 Univ. Valladolid). I am guest-editor in Bioengineering journal and reviewer of scientific journals. Nowadays, I am supervisor of 1 doctoral thesis in Univ. Valladolid. I have participated in the Organization of scientific events (i.e.,II Ibero-American Congress on Biorefineries). I also have recognized one research six-year period (SEXENIO) (2013-2018).

It is also worth mentioning my participation in Press (e.g: UVA-DIVULGA, El Norte de Castilla, El Día de Valladolid, europapress, 20 minutos) and interviews of radio (Onda Cero) and television (rtvcyl) for my research career in order to disseminate the research work carried out.

The main research lines developed for my career as researcher are:

- Biorefineries and valorization of agricultural and agro-industrial residues: design of biorefineries, simulation software and technoeconomic analysis.
- Study of different pretreatments in lignocellulosic biomass.
- Bioprocess development to production of advanced second-generation biofuels (bioethanol and biobutanol), 2,3-butanediol, xylitol and other high added value biocompounds (e.g., arabinoxylans and antioxidant compounds) in a biorefinery context: study of different process configurations.
- Carbon recovery through fermentation of greenhouse gases to produce biofuels and bioproducts (new line opened by me in Univ.Valladolid)

Resumen del Currículum Vitae:

After finishing my degree in Chemistry (2010) and starting my Official Master of Renewable Energies (2010), I started my career as researcher in 2011 carrying out my Master Thesis (titled Olive tree pruning as a source of Bioethanol: optimization of pretreatment with iron trichloride) in the Department of Chemical, Environmental and Materials Engineering of the University of Jaén, which got an award from this university. After, in 2011, I was awarded with a Predoctoral Grant funded by University of Jaén, starting in this way my PhD studies. The title of the Thesis was "Fractionation of rapeseed straw into its components", getting an outstanding qualification and the mentions "Cum Laude" and "International Doctorate" (2015), as well as an Extraordinary Doctorate Award granted by the University of Jaén (2019). The Thesis addressed the potential of rapeseed straw for its biological conversion to ethanol and xylitol, according to its carbohydrate content.

Moreover, I carried out several pre and postdoctoral stays in prestigious research centers: Centre for Energetic, Environment and Technology Researches (CIEMAT), Madrid, Spain (2013, 1 month); Centre of Biological Engineering, University of Minho, Braga, Portugal (2014, 3 months); School of Industrial Engineering, Institute of Sustainable Processes, University of Valladolid, Spain (2018-2020, 2.5 years; 2022-at the moment, 2 years (at the moment)); Department of Biotechnology and Biomedicine, Technical University of Denmark (DTU), Copenhague, Dinamarca (2022, 3 months; 2023, 4 months). Regarding my postdoctoral experience, I have enjoyed several contracts in research projects, Postdoctoral contracts, Young and Senior Researcher contracts, Technical staff and Interim Substitute and associate Professor, in Univ. of Jaén and Valladolid (2015-2022). Nowadays, I am carrying out a Postdoctoral Grant funded by University of Valladolid, which will have a duration of five years (2022-2027) and stabilization commitment. I also have the B2 level certificate in English (FCE1).

On the other hand, I have 19 h-index, with 44 publications in JCR-type indexed journals (28 in Q1), 3 publications in not indexed journals and 17 book chapters, being 1105 total citations (SCOPUS, 23/01/2024). I have attended 7 international congresses (i.e., 14th European Congress of Chemical Engineering and 7th European Congress of Applied Biotechnology in last year (September 2023)), and I have a great variety of contributions (75) (posters and communications) to national and international congresses. I have participated in 10 competitive R+D+i projects (1 as IP (2022-2024): TED2021-129826A-I00, funded by the Ministry of Science and Innovation), 2 contracts with companies (Société des Produits Nestlé S.A. and Iberia Bioenergy, S.L.) and 1 Research Net. I have also been supervisor of Degree (11) and Master (9) Thesis, guest-editor in the journal Bioengineering and reviewer of scientific journals. Nowadays, I am supervisor of 1 doctoral thesis in University of Valladolid. I also have recognized one research six-year period (SEXENIO) (2013-2018).

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It is also worth mentioning my participation in Press (e.g: UVA-DIVULGA, El Norte de Castilla, El Día de Valladolid, europapress, or 20 minutos) and interviews of radio (Onda Cero) and television (rtvcyl) for my research career in order to disseminate the research work carried out.

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Turno General

Área Temática: **Ciencias y tecnologías químicas**

Nombre: SOLÉ DAURA, ALBERT

Referencia: RYC2023-043456-I

Correo Electrónico: albertsoledaura@yahoo.es

Título: Understanding physicochemical processes through in-silico exploration of free-energy landscapes

Resumen de la Memoria:

Being a computational chemist by training, I specialize in applying of computational methods to explore reaction mechanisms underlying energy- and sustainability-related catalytic processes, as well as the dynamic properties of supramolecular systems in solution.

During my Ph.D., I extensively applied classical Molecular Dynamics (MD) and DFT methods to model the dynamic properties and reactivity of polyoxometalate systems across sustainable catalysis, biochemistry, and energy storage. I gained experience in biomodeling techniques, including multi-scale QM/MM methods and QSAR modeling through a secondment with Prof. J. D. Hirst at the University of Nottingham (U.K.).

In my postdoctoral research at Collège de France, under the supervision of Dr. C. Mellot-Draznieks, I expanded my knowledge in computational catalysis, focusing on characterizing photo- and electro-catalytic mechanisms, primarily promoted by Metal-Organic Frameworks, for CO2 reduction purposes. These projects enriched my computational toolkit with periodic DFT, microkinetic modeling, and Monte-Carlo techniques. Being self-funded, I joined the group of Dr. B. Ensing at the University of Amsterdam, where I received extensive training in DFT-MD and Path-Metadynamics (PMD). I applied these techniques to the atomistic simulation of complex mechanisms involving proton-transfer events in solution. After a brief period at Universitat Rovira i Virgili, I joined the group of Prof. F. Maseras at the ICIQ, where I investigate photocatalytic mechanisms and electron-transfer events.

In response to the emerging field of Energy Transfer (EnT) photocatalysis, my proposal outlines a novel research direction leveraging my expertise in photocatalysis and the methodological skills that I acquired throughout my career. Despite the promising applications of EnT, it still represents a largely unexplored area for computational chemistry. My proposed research aims to fill this gap by unraveling the mechanistic details of EnT processes and the electronic structure and supramolecular factors that govern them. To do so, I will explore the application of the Marcus theory to estimate EnT kinetics, but also that of PMD simulations to provide an atomically-resolved simulation of EnT processes within an explicit environment, offering unique insights into solute and solvent reorganizations.

I will also investigate the reactivity following EnT, which involves spin-forbidden events whereby sensitized substrates on a triplet state undergo chemical transformations throughout their relaxation to the singlet ground state. As these events pose a significant challenge to current state-of-the-art computational methods, I propose the development of a cost-effective computational strategy, utilizing a new collective variable that allows biasing between electronic states through a minimum-energy crossing point.

Initial studies will focus on selective alkene isomerization, progressing to more sophisticated processes. Moreover, this proposal holds promise for future applications in smart materials such as photo-switches or magnets, and sustainable catalytic processes involving spin-state variations, thus signifying a forward-looking trajectory with long-term potential in advancing the understanding not only of EnT photocatalysis but also of other compelling fields that leverage spin-forbidden events.

Resumen del Currículum Vitae:

Albert Solé-Daura completed his PhD at the Universitat Rovira i Virgili (URV, Spain) in January of 2020, under the supervision of Prof. Jorge J. Carbó and Prof. Josep M. Poblet (Excellent-Cum Laude, maximum distinction). His doctoral studies included four months as a visitor in the group of Prof. Jonathan D. Hirst at the University of Nottingham (UK). He received recognition with an Extraordinary Thesis Award.

Following a brief postdoctoral period at URV, he joined Dr. Caroline Mellot-Draznieks research team at Collège de France (Paris, France), where he spent 18 months as a Postdoctoral Researcher. During this time, he participated as a co-applicant in a funded project (code: ANR-21-CE07-0028), which allowed recruiting a PhD student (F. Penas-Hidalgo), whom he currently co-supervises with Dr. Mellot-Draznieks.

In 2022, he was awarded a Margarita Salas Grant, funded by the European NextGenerationEU program (code: 2021URV-MS-18), which financed his postdoctoral research for a two-years period. He spent the first year at the University of Amsterdam (UvA, The Netherlands), collaborating with Dr. Bernd Ensing; and the second year was developed at URV. During this period, he successfully applied for two projects (one of them as a PI) that secured over 70 million CPU hours between both Dutch and Spanish national supercomputing facilities. (codes: 2022.036, NWO; and QH-2023-3-0007, RES).

In 2024, he joined the group of Prof. Feliu Maseras at Institut Català d Investigació Química (ICIQ, Spain) as a Postdoctoral Researcher. Additionally, he is awaiting the resolution of the prestigious Junior Leader grant by La Caixa Foundation.

His research primarily concerns the application of computational methods to explore the mechanisms underlying catalytic and energy-related processes, with particular emphasis on Polyoxometalates and Metal-Organic Frameworks. Throughout his career, he has co-authored 33 articles (h-index of 16, ~550 citations, average I.F. of 10.28), being corresponding author of three of them, and including two without his PhD or Postdoc advisors. He actively disseminated this research through Invited Lectures/Keynotes (4) in the UK, Spain, and France; oral (7) and poster (8) presentations at conferences and via social media.

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He has also participated in the teaching tasks of his host groups, co-organized an INPOMs computational chemistry workshop with researchers from the UK, and engaged in outreach activities. He has supervised and mentored six PhD students, being thesis co-directior of one of them, four Master and four undergraduate students, and hosted two visiting PhD students at UvA and URV.

He has been strongly committed to management tasks, serving as a member of the Internal Evaluation Committee of the Doctoral program in Chemical Science and Technology of the URV, a member of the Evaluation Committee for three Bachelor's Theses, a substitute Member of the Evaluation Committee for one PhD thesis, an external reporter for two PhD theses and a PI for two funded competitive projects. He also participated as an external reviewer for leading journals in their areas: Nature Catal. (1), ACS Catal. (3); J. Phys. Chem. (1); ChemistrySelect (1), and JACS (1).

He received a Tenure-Track Lecturer accreditation from AQU Catalunya in 2022 and was appointed "Ambassador for the Faculty of Chemistry" at URV.

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Turno General

Área Temática: **Cultura: filología, literatura y arte**

Nombre: RIGAUX , MAXIM

Referencia: RYC2023-043774-I

Correo Electrónico: maximrigaux@hotmail.com

Título: Postdoctoral researcher

Resumen de la Memoria:

For my project FESTIBE ("Festive Iberia: The Poetics of Race, Gender, and Genre in Early Modern Ceremonial Literature"), I seek to locate, identify, and examine a corpus of texts that narrate festivities of different types across the global empires of Spain and Portugal in the early modern period (the sixteenth and seventeenth centuries). The main objective is to analyse the hitherto overlooked poetics of festive culture from the perspective of trans-genre writing, paying close attention to the involvement of, on the one hand, women (either as authors of poetic chronicles or as represented figures, which held a special appeal for female audiences), and, on the other hand, minorities (afrodescendants, Moriscos, gypsies, or Indians). The focus on trans-genre writing seeks to go beyond the close genre types. A gender and critical race approach to festive writing urges us to look at women□s, and other marginalized groups□, engagement with important aspects of the cultural history of early modern Iberia. The aim of this project is to include material in the majority of the languages of the Iberian empires, with a specific focus on the role of Latin, given the often cosmopolitan character of the festivities, even if they were organised at a local level (a proof of the so-called glocal effect).

This project argues that there is a complete tradition of festive writing of which the poetics has yet to be uncovered and examined. In addition, it seeks to show the important contributions to this tradition by both women and minority groups.

Resumen del Currículum Vitae:

After my BA in Linguistics and Literature: Latin-Spanish (2012), I obtained a MA in Historical Linguistics and Literature (2013) at Ghent and an Advanced MA in Medieval and Renaissance Studies (2014) at Leuven. I began my PhD research, funded by the Research Foundation Flanders, in October 2014 and defended my thesis "Fictions of Lepanto" on 24 September 2018.

Subsequently, I spent a year as a Fulbright and B.A.E.F. visiting postdoctoral fellow at The University of Chicago. I have lectured at Ghent (Latin and Hispanic Philology) and Chicago (Romance Languages). Currently, I pursue my research with a double affiliation as a Doctor Assistant at Ghent University and at UAB, where I have been involved in the ERC-project "WINK" since October 2019.

My specialisation is the area of Early Modern Iberian Literature, with a special focus on its Neo-Latin tradition. The results of my research have been published as peer-reviewed articles in prestigious journals (Handelingen, Hispanic Review, Women□s Writing, eHumanista, Millars, □) and as book chapters (Brill, Routledge). Currently, I am finalising the revision of my dissertation into a monograph, for which I have submitted a book proposal to the Toronto Iberic series.

A significant achievement has been the award of two research fellowships as a visiting scholar (University of Chicago) by the Fulbright programme and the Belgian American Educational Foundation for my project on the Neo-Latin poetry of Juan Latino. I elaborate on this work in my forthcoming monograph "Latinity in the Early Modern Iberian World" (Brill).

The insights from my research on epic poetry and the festive context of Juan Latino□s two book volumes led me to the start of a pioneering research project: "Calliope□s Daughters: Women, Epic, and Occasional Poetry in the Early Modern Ibero-American World" for which I was awarded a postdoctoral fellowship at Ghent.

This focus on women□s writing as a form of trans-genre literature within the context of Iberian festivities was given an extra push when I was invited to become a postdoctoral fellow in the ERC-project WINK, hosted at UAB by Prof. Carme Font. In October 2022, I was able to consult during a one-month period of intensive research the Women of the Book Collection (WOTB) at Johns Hopkins University thanks to a generous and competitive RSA□Virginia Fox Stern Center Fellowship.

I have participated in several research groups in different subfields. At Ghent University, I am an active member of GEMS, HPIMS and GIKS. I am also a co-founder of RELICS, which has it own online journal since 2019: JOLCEL. In addition, I serve as an editor for the journal Neophilologus. At UAB, I form part of the Seminario de Estudios sobre el Renacimiento and the research unit Cos i Textualitats.

From 2020 to 2023, I have taught various courses as a head lecturer at Ghent in the Department of Literary Studies. Moreover, I have been a director of Bachelor and Master□s theses at Ghent, as well as several TFGs at UAB.

Finally, I have been involved in outreach activities, both in Ghent and Barcelona. I have served on the committee of a PhD thesis (Ghent) and on the board of admissions for new faculty. Also, as an external reviewer, I have carried out evaluations for research projects of the National Science Centre of Poland.

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Turno General

Área Temática: **Estudios del pasado: historia y arqueología**

Nombre: ZUPANCICH , ANDREA

Referencia: RYC2023-044534-I

Correo Electrónico: a.zupancich@gmail.com

Título: Pulse domestication and its impact in the diffusion of Neolithic lifeways in the Near East and beyond

Resumen de la Memoria:

My research aims to explore the technological, lifestyle, and dietary practices of prehistoric populations in Europe and Southwest Asia through a comprehensive analysis that integrates the examination of material culture and bioarchaeological evidence. Specifically, I explore the complex use of ancient stone tools to reconstruct the lifeways, socio-economic factors, and technological behaviours of Palaeolithic and Neolithic communities. Employing a pioneering approach, I apply multidisciplinary qualitative and quantitative techniques to study use wear and residues. This allows me to investigate the dynamics of human-plant interaction and how these interactions evolved temporally and spatially from the Palaeolithic to the Neolithic in Europe and the Near East.

I am one of the few archaeologists specialised in the functional analysis of both knapped stone tools and non-flaked stone tools, and throughout my research career, I have actively participated in national and international projects, assuming roles as a Principal Investigator or research collaborator, thereby cultivating significant research independence, leadership, and an extensive international network. In recent years, my involvement as a research assistant and postdoc in an ERC StG project (HIDDEN FOODS) has nourished my interest in plant food processing and consumption among early societies. Having received a Marie Skłodowska-Curie Individual Fellowship in 2021, I applied my scientific approach to comprehend the role of wild plants at the advent of agriculture among the first farming communities in the Neolithic of the Near East. I developed a new method for studying plant food technology based on the systematic use of confocal microscopy coupled with examining plant micro residues integrated with the analysis of ancient dental calculus. In this way, I can assess strategies in the exploitation of plant foods, providing evidence for their processing and consumption. This innovative research allowed me to propose new perspectives on the lifeways of early Neolithic farmers, emphasising the significance of pulse domestication and consumption. My ongoing research focuses on unveiling the relevance of legumes in the development and spread of agriculture across the Fertile Crescent of the Levant. Through this, I aim to establish a novel interdisciplinary and cross-disciplinary methodological framework for exploring pulse domestication, contributing to and potentially reshaping the current narrative on the origins of agriculture.

Resumen del Currículum Vitae:

My research focuses on comprehensively reconstructing prehistoric communities lifestyles, dietary practices, and technological know-how in Western Europe and Southwest Asia, explored combining the analysis of material culture and bioarchaeological evidence. I obtained my first degree in Archaeological Science at Sapienza University of Rome in 2010. Soon after, in 2011 I graduated with a Master s in Science in Palaeoanthropology and Palaeolithic Archaeology at the Institute of Archaeology at University College London. Subsequently, in 2020, I successfully defended my doctoral dissertation in Archaeology at Tel Aviv University, focusing on the technology and function of Quina scrapers at the lower Palaeolithic site of Qesem Cave, dating back approximately 450,000 years. I obtained my first postdoctoral position at Sapienza University of Rome under the ERC StG project HIDDEN FOODS. Here, my research expertise expanded to include the analysis of non-flaked tools, residue and human ancient dental calculus. Simultaneously, I focused into systematically implementing quantitative analytical techniques for studying ancient stone tools. In 2021, I was awarded a Marie Skłodowska-Curie Individual Fellowship, which allowed me to join the Archaeology of Social Dynamics - ASD group from 2022 to 2024 at the Institución Milá y Fontanals (IMF-CSIC) in Barcelona, Spain. Here, under the supervision of Dr Dr. J.J. Ibáñez, I pioneered a novel method utilising confocal microscopy and 3D surface texture analysis to investigate groundstone tools employed in plant-related activities. This innovative approach yielded significant insights into the interaction between humans and plants during the Neolithic era in the Levant. My research trajectory includes active participation in various international archaeological projects, establishing a robust network of collaborations across Europe, the Near East, Africa, and the United States. My scholarly contributions are evident in 27 scientific papers, with roles ranging from first author to last author and co-author, published in esteemed international peer-reviewed journals. Notably, these publications have garnered 761 citations, with an h-index of 15.
Furthermore, I have served as a Guest Editor for two Special Issues in the Journal of Archaeological Science: Reports. Finally, my scientific dissemination includes the presentation of my research findings at numerous international conferences and workshops. The recognition of my expertise and knowledge is underscored by my role as a reviewer for esteemed scientific journals such as PlosONE, Scientific Reports, and Journal of Human Evolution. Additionally, I have contributed as an expert evaluator for funding bodies, including CIVIS3i MSCA-H2020-COFUND and the European Research Council ERC Advanced Grants.

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Turno General

Área Temática: **Estudios del pasado: historia y arqueología**

Nombre: MUÑOZ ENCINAR, LAURA

Referencia: RYC2023-045576-I

Correo Electrónico: laura.munoz.encinar@gmail.com

Título: The Material Culture of Contemporary Conflicts

Resumen de la Memoria:

The 20th century was characterised by mass violence, genocide and human rights violations worldwide. During the last decade, conflict archaeology has played a key contribution in understanding the repressive strategies of totalitarian and dictatorial regimes. The combination of conventional excavation techniques and new geophysical survey methods has provided a better understanding of conflict past. The systematic use of forensic science for criminal investigations and its utilization by law defined as the forensic turn has also been essential and has opened up a new window of opportunity for identifying the victims and reconstructing the hidden past. Advanced methods based on the interaction of archaeological and forensic sciences are revealing hitherto invisible traces of exclusion and annihilation in Europe and elsewhere. This research line has the potential to achieve ground-breaking results in the field of mass violence, contemporary history and gender studies. Two research areas will be developed within my research line: 1. Archaeology of mass violence of repression 2. The material traces of gender-based violence.

I have a long trajectory in the study of the repression processes conducted in 20th-century wars in Europe. I have more than nineteen years of archaeological experience in forensic archaeology research, fieldwork, laboratory management, and coordination of projects. My research is producing new narratives surrounding contemporary history. I will investigate the repressive spaces together with the mass graves of victims. My innovative interdisciplinary approach will unearth missing narratives from European contemporary history. Specific methodologies scarcely used will be applied to record and digitally preserve materialities of violence. It will innovatively analyse the sites by combining micro- and macro-methods of archaeological excavation with non-invasive methods and forensic archaeology methods. On an analytical level, I will use specific studies of archaeometry to answer specific queries and expand the production of historical knowledge. My scientific approach is also based on the concept of Landscape of Conflict, exploring questions such as memory, power and resistance.

My intention is to establish the first specific forensic archaeology laboratory in Spain and position it in an international sphere. I would establish an interdisciplinary research team onboarding MA students, PhD candidates, and postdoc fellows. I would develop my research line within the framework of my R&D project DES-ALAMBRAR and the Cost Action TRACTS. Using the knowledge derived from my ERC StG application in 2022, I would apply for an ERC Consolidator Grant in 2025. I will grow new ideas in science and technology about forensic archaeology, and share them within my networks. The potential result of my research line will shed light on mechanisms of repression and exclusion suffered by society and will seed an awareness of the critical rejection of violence to promote social cohesion. I will also provide an innovative methodology and conceptual framework that could be used to study conflicts worldwide and to prevent exclusion dynamics in the present and future everywhere. I will also explore to what extent the exclusion dynamics that have emerged in the past could be latent risks for the present and future worldwide.

Resumen del Currículum Vitae:

Dr. Muñoz-Encinar is a Serra Húnter Lecturer at the University of Barcelona (UB) since December 2023, after working as a postdoctoral researcher Juan de la Cierva Incorporación at INCIPIT-CSIC (2021-2023). Previously, she was a staff researcher at the University of Amsterdam (2018-2020), and beneficiary of a competitive postdoctoral fellowship (2020-2021) funded by the Government of Extremadura. She carried out her PhD in History at the University of Extremadura (2011-2016), extraordinary doctoral prize, and a Master Erasmus Mundus in Quaternary Archaeology and Human Evolution-specialty in Physical Anthropology- at the University Rovira i Virgili (2006).

She is a lead specialist in forensic archaeology in Spain, focusing on repression processes conducted in 20th-century totalitarian and fascist regimes. She has been involved in over 50 projects in Spain, Europe and Western Asia. She has more than nineteen years of experience in leading research projects, fieldwork and laboratory management. She is the Co-PI of the first archaeological R&D project funded by MCIN/AEI which investigates the Francoist concentration camps and contemporary political violence in Spain. She has been a member of 16 competitive research projects uninterruptedly since 2011, as PI in 9 of them with a total amount of more than 484.760 and has coordinated 5 research contracts (150.000), which means a total amount of more than 634.760. Currently, she is the PI of 3 projects (78.450), researcher of 2 projects (688.536), and coordinator of 2 research contracts (48.000). She is co-managing the European project "TRACTS"(COST ACTION) (600.000).

She has a strong track record of publications with 13 peer-reviewed articles in leading journals in the field of archaeology (World Archaeology, Forensic Science International, etc), 1 single-authored monograph, 1 co-authored book, 1 edited book and 18 book chapters in national and international publishers (Springer, Palgrave, etc.). She has given more than 60 oral presentations at national and international conferences (CHAT, ALA, INoGS, EAA, etc.), including keynotes at Freie Universität Berlin, Wiesenthal Institute for Holocaust Studies, and research centers such as New York University in Madrid. According to Google Scholar, she is the author of 34 indexed publications (JCR), with a total of 288 citations, 180 during the last five years with an h-index of 10 (Google-Scholar).

She has long-term and highly qualified expertise in managing facilities and scientific/technical resources and organizing academic events. She collaborates as a reviewer with journals such as the Journal of Contemporary Archaeology and Palgrave Publisher among others. She is accredited as Assistant Prof by ANECA, has taught at the University of Amsterdam, West Bohemia, New York University in Madrid and coordinated international training schools. She supervised 4 Thesis of Master (TFM) and 1 Thesis of Degree (TFG). She is co-supervising a PhD, supervising an international predoctoral fellowship, a CSIC JAE Intro program, two TFM and 8 TFG. She has been involved in thesis tribunals and committees. She has collaborated with public institutions, private entities, and non-governmental organizations. She has made more than 100 activities of dissemination. Her research has received national and international media attention (Jungle.World; El diario.es) and she is member of scientific committees, international networks and scientific societies

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Turno General

Área Temática: **Mente, lenguaje y pensamiento**

Nombre: MURANO , MARIA CRISTINA

Referencia: RYC2023-044160-I

Correo Electrónico: maricri88@gmail.com

Título: Bioethics and Childhood

Resumen de la Memoria:

My research situates itself within the field of bioethics. While I contributed more broadly to philosophical, scientific, and societal debates on fundamental ethical questions about the experiences of illness, disability, non-conforming bodies, and vulnerable ages of life, I specialized in pediatrics and childhood ethics. Through the lenses of philosophy and epistemology of medicine, I engage with critical studies in the social sciences and qualitative methods to increase the impact of my research both on theoretical contributions and medical research and practice. Strong interdisciplinarity and internationalization characterize my education, my lines of research and the global networks that I have built over the years. After obtaining education in several EU countries, I have worked in 4 EU countries and one State in the USA, both for universities and hospitals as well as one international organization devoted to human rights and democracy (The Council of Europe). So far, I have covered four research subjects: the use of growth hormone treatment for short children, biomedical research involving children, epistemological and methodological issues within bioethics, and the medical and social care of elderly people. I independently worked on and obtained 4 EU and US prestigious fellowships (Erasmus Plus PhD, H2020 MSCA, the Pediatric Ethics and Genomics Fellowship at CMH Kansas City, and the Fellowship in Humanities and Ethics in Healthcare at the University of Texas). I also joined the French multicenter study COVIDEHPAD as research responsible for the Paris region. I was the leader of two research groups in philosophy, one in Kansas City (on pediatric bioethics) and one in Paris (on fieldwork in philosophy). I published 10 scientific articles (among which 7 in Q1 (SJR) journals in philosophy, ethics and pediatrics), 3 books, 1 book chapter and 1 open access study report. I am only author or first author of 12 of my 15 publications. I was invited as speaker to the most prestigious international and interdisciplinary conferences. As teaching assistant at Sciences Po Paris in 2017, I offered tutoring to Master students. Since 2021, I provide informal mentorship to two PhD students within the Doctoral Program of the Pharmacology Department at the UAM. My future work aims to study often neglected but increasingly urgent subjects related to children□s and young people active involvement in health care, pediatric governance, as well as epistemological and methodological issues in bioethics.

Resumen del Currículum Vitae:

I am a researcher in bioethics at Hospital La Paz Institute for Health Research (IdiPAZ). I first joined IdiPAZ in 2021 with the MSCA fellowship, and in 2023 I was offered a contract to develop the line of research in bioethics within the Pharmacology Department. I obtained an Erasmus Plus PhD in Dynamics of Health and Welfare in 2019 issued by four universities (EHESS Paris, Linköping University, Évora University and the National School of Public Health of Nova University In Lisbon). Besides, I was Visiting Scholar at the Department of Health, Ethics & Society, Maastricht University, Netherlands (2016). I later conducted post-doctoral research at both universities and hospitals in France and in the USA, and I served as clinical ethics consultant. In 2019, I was awarded the K Endowed Fund for Graduation Medical Education at CMH Kansas City, where I was the leader of a research group in philosophy. In 2020, I obtained the French Habilitation to work as assistant professor in Philosophy and in Epistemology, History of Sciences and Technology. In 2023, I ranked first on the reserve list of the Ramón y Cajal (call 2022).

Since 2018, I wrote 10 scientific articles (2 in press), among which 7 in Q1 journals: 6 in Q1 (SJR) journals in philosophy, pediatric and child health journal, or issues, ethics and legal aspects and 1 in a Q1 (REDIB) in philosophy. I also published 1 open access book (by Linköping University Press), 1 open access study report, and have 1 book chapter and 2 edited volumes in press (by EAC, éditions des archives contemporaines, forthcoming in 2024 and by ÉRÈS éditions, forthcoming in 2025). I am only author or first author of 12 of my 15 publications.

I regularly established external collaborations to do teaching. I presented my work at several international and interdisciplinary conferences, and I served as reviewer for several leading journal in the field, for the American Society for Bioethics and Humanities, and the Agencia Estatal de Investigación. I did an internship at the Committee on Bioethics of the Council of Europe (2013) and engaged in volunteer work on themes related to bioethics and pediatrics. I am the co-founder of the Atlas Bioethics Center which is currently under evaluation for institutional ascription to the University of Granada.

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Área Temática: **Mente, lenguaje y pensamiento**

Nombre: COSTELLO ., BRENDAN

Referencia: RYC2023-044288-I

Correo Electrónico: b.costello@bcbl.eu

Título: Neurocognition of language in the context of deafness

Resumen de la Memoria:

Dr Costello s consolidated research program into the neurocognition of language in the context of deafness has two main lines: the processing of sign language and reading in deaf individuals.

He has created and manages a lexical database of Spanish Sign Language (LSE) that is freely available on-line and makes it possible to carry out carefully controlled pyscholinguistic studies of this language. He has conducted studies using a variety of techniques to probe the cognitive underpinnings of sign language processing including: an fMRI study on the impact of modality on the language network; an eye-tracking study that showed cross-modal cross-language co-activation in bimodal bilinguals; a language switching study that revealed that bimodal bilinguals show the same asymmetric switching cost that unimodal bilinguals; and an MEG study that provides evidence of brain-language entrainment for sign language and shows that this entrainment is linked to familiarity with the language and not just a result of perceiving linguistic input. These studies expand our understanding of language by including sign language data; taken together, the findings show that the language network and processes in the brain are largely amodal, but there are divergences that merit further exploration.

Dr Costello s second major research line looks into another aspect of language processing in the context of deafness: reading in deaf individuals. Deaf individuals tend to have lower reading proficiency compared to hearing peers; some deaf individuals achieve competent reading skills. This research line focuses on this population to answer a theoretically important question (how do individuals read efficiently in the absence of phonological representations?) and to provide insight into how to improve literacy in deaf individuals. This work used EEG to examine the role of orthographic and phonological encoding during reading and demonstrated that, contrary to previous claims about reading in a transparent orthography (like that of Spanish), deaf readers do not need to activate phonological representations to arrive at a word s meaning. This research line is being continued with a series of neuroimaging (fMRI and MEG) and eyetracking studies to identify the neural substrates and the time-course of the cognitive processes of reading in this population.

Dr Costello s research has broad international projection: he has an extensive network of collaborators, he works with international journals and research bodies, and he teaches on an international postgraduate program. His ability to secure funding, to lead his own research projects and to train junior researchers testify to his independence and maturity as a researcher. A key actor in building knowledge, tools and databases for one of Spain s officially recognised languages, his research furthers the scientific documentation of LSE, advances sign language studies, in which there is a scarcity of neurocognitive work, and contributes to our understanding of the cognition of language. He plans to continue both lines of his research work and to embark on a major project to map the semantics of the LSE lexicon. The resulting data will reveal how iconicity shapes signs and their representation in the brain, and have further applications for documenting the language and creating new language technologies.

Resumen del Currículum Vitae:

Dr Costello is a Juan de la Cierva Research Fellow at the Basque Center on Cognition, Brain and Language, where he leads the research line on sign language and deafness. He has a strong international multidisciplinary scientific background, having studied diverse areas of the cognitive sciences at the universities of Cambridge, Sussex, the Basque Country and Amsterdam, and an extensive collaboration network bolstered by his participation in various international projects.

His main interest is language as a human phenomenon. Sign languages are one more manifestation of that linguistic ability and offer a different way of looking at and investigating this uniquely human skill. His work investigates how modality shapes language structure and processing. He has been PI on 3 three-year projects (funded by the Ministry of Science and Innovation) and has participated in large, multi-centre international projects. He has published the results of these studies in relevant international journals, presented at international conferences and given invited talks to research groups around the world.

Dr Costello has a broad network of collaborators, including researchers from Boston University, San Diego State University, Universidade do Algarve, Vanderbilt University, MPI for Psycholinguistics and Donders Institute, Modena University, Hamburg Univeristy and the National Sign Language Centre (CNLSE).

Dr Costello is committed to Open Science: his publications are open access and he makes data and code available on public repositories (so far as ethical considerations allow) and teaches these practices in his mentoring.

Dr Costello s three former doctoral supervisees have gone on to have productive research careers. As leader of the sign language and deafness research line, he has coordinated the work of 8 different PhD students, 5 postdoctoral researchers and 4 dedicated research assistants. He has supervised 4 Masters theses, and tutored undergraduate and graduate internships. He has experience teaching at undergraduate and postgraduate levels and is a visiting lecturer on the multi-centre Erasmus+ Clinical Linguistics Masters Program (Universities of Groningen, Ghent and Eastern Finland).

Dr Costello serves on the editorial board of various journals and has reviewed for many international journals, for international conferences and for European national research agencies.

His academic training is complemented by years of professional engagement. He is a qualified LSE interpreter and has worked for various organizations at the local, national and international levels, including the World Federation of the Deaf, the World Association of Sign Language Interpreters and the European Forum of Sign Language Interpreters. This practical experience provides strong links to the community of sign language users, as well as expert knowledge of LSE and other sign languages. The combination of theoretical and technical expertise together with a close working relationship with the language users puts Dr Costello in an ideal position to study sign language. He firmly believes in the need for and the importance of scientific

outreach; he has participated in dozens of events designed to connect researchers and society, whether aimed at the general public or specific stakeholders, such as the deaf community or trainee interpreters.

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023

Turno General

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

Nombre: GARCÍA GUIMAREY, MARÍA JESÚS

Referencia: RYC2023-044120-I

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Título: Use of nanomaterials for tribological improvement of lubricants and coatings

Resumen de la Memoria:

I have eight years (including four and a half years as a postdoc) of research experience in the field of tribology and nanotechnology. My research work is focused on the study of phenomena taking place when nanomaterials (carbon-based and metal oxide-based nanoparticles) are used for tribological purposes. During my Ph.D. studies at USC (Spain) (2016-2019), my work was focused on the use of nanomaterials as anti-friction and anti-wear additives in lubricating oils. During my postdoctoral stage at Bournemouth University (UK) (2019-2022), I continued this research line and started up a new one as a research leader in the design of multifunctional nano-coatings for steel surfaces, in the framework of the NanoGeoVe National Project. After my return to USC, I am leading as PI a line on the development of environmentally friendly nanolubricants with anti-friction and anti-wear potential.

The preparation and stability of the nanolubricants (lubricant+nanoparticles) and their thermophysical and tribological properties (friction and wear-reducing properties) in steel-steel contacts, were studied in my Ph.D. thesis. The main challenge for these systems is to improve their stability, so I considered surfactants, ionic liquids, and surface modifications of the nanomaterials. During my Ph.D. I completed two short-term Ph.D. stays at the University of Vigo (Spain) and at the University of Porto (Portugal), this last was funded in a competitive program. I participated in a European Regional Development Fund project, 2 national and 3 regional projects, as well as in 4 knowledge transfers with international companies. The results of my Ph.D. thesis were published through 7 papers (3 as first author) in international journals and 17 communications presented in conferences.

Thanks to a postdoctoral grant from Xunta de Galicia (Spain, 2019), I joined the Advanced Materials Laboratory (Bournemouth University, UK) for 2.5 years to research the use of 2D nanomaterials in multifunctional nano-coatings for steel surfaces to improve their tribological properties and corrosion resistance. As a result, 4 papers have been published in international journals indexed in the JRC, one of which has been published in one of the reference journals in the field of tribology, Tribology International (JIF: 6.2 (2022), D1(12/136) in the category of mechanical engineering). I have also carried out 2 short post-doctoral stays of one month each at the LuSuTec group (Spain). I have been awarded a grant from the IACOBUS programme for a one-month stay at INEGI (Portugal). As a postdoc researcher, I participated in 1 European, 1 national and 1 regional project as well as in 4 knowledge transfers with international companies. I am PI of a regional project and a knowledge transfer contract. Currently, my postdoctoral research has resulted in 14 new papers (5 of them as first and corresponding author) and 13 conference participations. I have established collaborations with national and international research groups at the University of Oviedo (Spain), University of Manchester (UK) and Northeastern University (China). I have participated as session chair at 2 international conferences. I have been awarded for 2 consecutive years with the Jost Travel Fund and Iacobus Paper Award. I have co-supervised 2 Ph.D., 4 MSc, 1 MEng and 2 BSc theses and external and collaborative internship.

Resumen del Currículum Vitae:

I hold a degree in Chemical Engineering (BEng) from the University of Santiago de Compostela (USC) in 2014 (5-year Degree; Average grade: 7.42/10). I also obtained a MSc in Renewable Energies (2015 – grade point: 7.92/10), at the University of San Pablo CEU (Madrid, Spain). I joined as a researcher in training, within the NanoLuTer project "ENE2014-55489-C2-1-R" in the Thermophysical Properties Laboratory, LPT, at the Faculty of Physics of the USC. During my Ph.D. I was awarded a stay grant from IACOBUS Programme 2016-2017 - European Grouping of Territorial Cooperation Galicia-North Portugal (GNP-ECT) for three months at the University of Porto (Portugal). In 2019, after achieving my PhD degree in Materials Science (International Doctor with Cum Laude and Extraordinary Ph.D. Award), I moved to UK to join the AML research Group (Bournemouth University, BU) with a competitive post-doctoral grant (ED481B-2019-015) from Xunta de Galicia (Spain). In 2022, I returned to the USC and was granted with my second competitive post-doctoral grant (ED481D 2023/016). Currently, I am a member of NaFoMat Group and iMATUS Institute of Materials, both founded by Xunta de Galicia and Visiting Research Fellow at Bournemouth University (UK).

I have collaborated with national research groups (Group of Advanced Materials for Energy - GAME, CINBIO, University of Vigo, and Lubrication, Surface Technology research group - LuSuTec, University of Oviedo and Plasma Coating Technologies Unit, Tekniker) and international research groups (Thermophysical Properties Laboratory & Environmental Processes - LTPEP, Aristotle University of Thessaloniki (Greece); Department of Mechanical Engineering, Universidade do Porto (Portugal); Institute of Construction Technologies, National Research Council (Italy); Advanced Materials Laboratory – AML, Bournemouth University (UK), Cambridge Graphene Centre, University of Cambridge (UK), Department of Material and Department of Chemistry, University of Manchester (UK), and Energy and Environmental Materials Research Centre (E2MC), Northeastern University (China)).

I am the author (h-index 10) of 21 articles (14 in Open Access and 29% without Ph.D. supervisor) in international journals indexed in the JCR (13 in Q1 and 8 in Q2), being first author in 8 of them and corresponding author in 5 of them. I am also the author of 4 scientific-technical reports for national and international companies, one book chapter and conference proceeding. I also have made 30 contributions presented at 8 national and 11 international scientific conferences (13 as first author and 2 as chair) and taken part in scientific dissemination conferences and activities. I am Principal Investigator of a regional project (25.000€) and of a research contract. I am a working member of the European network COST Action MecaNano CA21121. I have participated in 8 research projects (1.746.510 €) at european, national, and regional levels. From these projects, I have published 14 articles in journals indexed in the JCR with researchers from Spain, Greece, Portugal, Italy, UK, and China. I have taught 120 hours as a lecturer at USC (Degree and Master level). I have the accreditations of assistant and associate professors by ANECA. I have been placed in the reserve in the R&C 2022 (position 34 in Industrial Production, Civil Engineering and Engineering for Society area).

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023

Turno General

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

Nombre: GONZÁLEZ FERRERAS, ALEXIA MARÍA

Referencia: RYC2023-045780-I

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Título: Spatial-temporal patterns of biophysical characteristics in river networks

Resumen de la Memoria:

The research carried out by Dra. Alexia M. González Ferreras is focused on the study of spatial-temporal patterns of biophysical characteristics in river networks, connecting aquatic and adjacent terrestrial ecosystems. During her predoctoral stage, the research carried out by her was focused on the role of connectivity and the niche through the determination and modelling of spatial patterns in metapopulations on river networks, extending this research line during her postdoctoral stage to higher levels of organization to analyse the effects of hydrological-thermal alterations, connectivity and other anthropogenic impacts on the structure and function of riverine ecosystems. Her line of research arises from the integration of several areas of work developed by the candidate throughout her professional career. Thus, her research has a multidisciplinary approach including fields as water and land management, ecohydrology, ecohydraulics or river ecology. The line of research to be developed for Dra. Alexia M. González Ferreras in the future is focus on Nature-Based solutions for salmonids conservation and management in a changing world following a metaecosystem approach. The line of research arises from the integration of several areas of work developed by her throughout her professional career and is central to the future candidate□s research development, reinforcing her interdisciplinary approach and the research in most of the projects that she is currently working on.

Salmonids populations have a great value cultural, economic and ecologic value, but in many areas of their native ranges are experiencing populations declines or even extinction due to human activities. Actions and policies aimed at their conservation and management are failing or not being effective in many areas. Therefore, a metaecosystem approach and more coherent methods to tackling global challenges in a changing world are needed for a proper management and conservation of these specie. Nature-based solution have shown to be a solution to address several economic, social and environmental changes. In this regard, Nature-based solution can be potentially an efficient tool for the conservation and management of salmonids recognizing the fundamental role they play in supporting human well- being, but its understanding at larger scales is still quite limited and it requires scientific research through integrated basin and sea management. This innovative and integrative approach will identify the benefits and co-benefits of Nature-based solution implementation by combining empirical data and modelling framework to simulate different scenarios, as well as the use of participatory approaches and local stakeholders. Lastly, main differences of the research line to be develop with respect to the previous trajectory of Dra. Alexia M. González Ferreras lie in the inclusion of an integrated basin and sea management, not only limiting its research to distribution, migration and survival of salmonids in the freshwater area, as well as the deepening on Nature-based solution and metaecosystems. Moreover, she will develop a more active inclusion of the social, economic and environmental characteristics to further deepen the line of sustainability.

Resumen del Currículum Vitae:

Alexia M. González-Ferreras is PhD in Coastal Engineering, Hydrobiology and Management of Aquatic Systems from the University of Cantabria (UC, 2019), with an International PhD mention and Cum Laude mention. Additionally, she is Bachelor in Environmental Sciences from the University of León (ULE, 2010) and Master in Environmental Management of Water Systems from the UC (2012). Currently she is a researcher in the Freshwater Ecosystems group in the Fundación Instituto de Hidraulica Ambiental de Cantabria. Her research is focused on the study of spatial-temporal patterns of biophysical characteristics in river networks, connecting aquatic and adjacent terrestrial ecosystems.

In 2014, she obtained a FPI predoctoral grant funded by the Spanish Ministry of Economy and Competitiveness (Ref.: BES-2013-065770) to carry out her doctoral thesis at the Institute of Environmental Hydraulics of the UC. During her predoctoral stage she was 4 months at the Laboratory of Ecohydrology at EPFL (Switzerland) through the pre-doctoral mobility grants for short stays in Spanish and foreign R&D centres (Spanish Ministry of Economy and Competitiveness. Ref.: EEBB-I-15-10186). In 2021, she obtained a postdoctoral research grant from the FENIX Programme, financed by the Government of Cantabria (Spain) to carry out a 2-year research-stay at the University of Essex (UK). As a direct consequence of her research carried out in UK, a study has recently been published in Nature Communications.

Dra. González-Ferreras (H-index=8; Scopus) has published 14 SCI articles (Q1=9;D1=5) and 2 book chapter/scientific monographs, of which she is 1st author (and CA) in 5 SCI articles (Q1=3;D1=3). Her articles have a total of 200/284 citations (Scopus/Google Scholar). She has also participated as a reviewer in several SCI journals (Water, Divers. Distrib., Aquat. Conserv. and J. Fish Biol.). She has participated in 45 contributions to national (4) and international (41) congresses and scientific dissemination events, being the 1st author (and speaker) in 12 oral presentations. During her career, she has also collaborated in a total of 27 research projects and 16 contracts of special relevance with companies and/or administrations, both national and international. She is currently member of the following scientific societies: BES, FSBI, AIL and SIBECOL. She also obtained a mobility grant from the AIL to attend the international conference Aquatic Sciences Meeting of the ASLO (2015).

She has carried out a training activity supervising 2 Master thesis (Master Gestion Integrada de Sistemas Hidricos □UC□ and Master Inland Water Quality Assesment □UAM□) and giving 2 conferences on the Assessment of Ecosystem Good and Services subject in the Master Geoinformatica para la Gestion de Recursos Naturales □ULE□). The candidate will co-supervise a thesis in collaboration with Essex University (UK) titled □Nature-based solutions for warming impacts on river ecosystems□ that is currently in the process of candidate selection funded by ARIES NERC DTP (UK). She has participated at a speaker in the UC science week (2023). She participated in the organizing and scientific committee of the final online congress (2021) of the international ALICE project and she is currently participating as a member of the scientific committee of the FSBI 2024 Annual Symposium.

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023

Turno General

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

Nombre: LÓPEZ VARO, PILAR

Referencia: RYC2023-045509-I

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Título: Modelado, Simulación y Caracterización Optoelectrónica de Células Solares

Resumen de la Memoria:

My line of research focuses on device modelling and characterization of perovskite solar cells and tandem devices under realistic conditions, focusing on the study the ion migration, aiming to jump the barrier of working operational mode from lab to field.

I started my research on the field of modelling and simulation of thin film electronic devices thanks to the grant of Formación del Profesorado Universitario FPU in the University of Granada (UGR). During my PhD thesis, I was focusing on the development of home-made simulators of different optoelectronic devices: phototransistors, and organic-, ferroelectric- and perovskite solar cells (PSCs). These simulators stand out for the inclusion of robust physical models at the interfaces which are the main parts that limit the performance of these devices, and the ion migration for PSCs. Throughout my thesis, I did several stays at McMaster University (Prof. Deen) and at Universidad Jaume I (Prof. Juan Bisquert) which led to the development of the numerical simulator which allow the interpretation of different experimental results, highlighting to be pioneers on the interpretation of the additional voltage due to the ions in the perovskite. From these collaborations important contributions were obtained. After my PhD Thesis, I received two national PostDoc contracts, in which I stressed my research on physical modelling of PSCs. Late in 2018, I moved to Institute Photovoltaïque d'Île-de-France (IPVF), a private institute-enterprise, in which I stayed during the last 5 years. Our main goal is the transference of knowledge from the research to the industry. I have been working on device modelling and characterization of PSCs and tandem devices under realistic conditions. Recently, I have played as Principal Investigator in 4 projects to characterize ion migration by means of X-ray photoemission spectroscopy XPS on perovskite-based devices in Synchrotron SOLEIL (Paris) and BESSY (HZB-Berlin); and coordinating the collaboration between different labs. One of the main results from these projects, was starting up operando-XPS allowing to improve the performance of lateral PSCs. I have co-supervised 5 B.Sc. Students at UGR, 12 master students at IPVF, one PhD thesis at UGR and I am currently co-supervising one PhD thesis at IPVF. So far, I have published 28 papers (Citations: 1222), most of them published in high impact papers, highlighting two reviews in Physics Report and Advanced Energy Materials. I have personally participated in 31 national and international conferences (7 Invited talks). I have been reviewer for the PVSC-IEEE conference and different journals, such as ACS Applied Materials & Interfaces and J. Phys. Chem. C.

In this grant, I propose to continuous very close to my actual research line, doing modelling and characterization of ion migration on a new architecture of perovskite-silicon tandem solar-battery cells (PSTSBCs). Some studies have pointed out the interest of using ion migration to implement perovskite-based batteries. This fact brings the opportunity to develop perovskite-silicon tandem-battery structures in which the perovskite layer works not only as a solar cell, but also as a battery saving space on the energy storage. To achieve this goal different experimental characterization techniques combined with numerical simulation and machine learning will be used.

Resumen del Currículum Vitae:

Pilar López Varo is permanent Senior Researcher at the Institut Photovoltaïque d'Ile-de-France (IPVF). She completed a B.Sc. degree in Electronic Engineering in 2011 (receiving the Best Mark Award); a M.S. degree in Physics in 2012; and an International Ph.D. degree in Physics in 2017 (with Cum Laude qualification and awarded as Best PhD in Science) at the University of Granada (UGR), Granada, Spain. Her PhD dissertation was on the "Compact Modelling of Physical Mechanisms in Organic Solar Cells". The main contribution was the development of a numerical simulator for multilayer solar cells including ion migration that allowed to explain the performance of organic- and perovskite- solar cells and define ways of device optimization. Her PhD was supported by the grant "Formación del Profesorado Universitario FPU-13" from the Ministerio de Educación del Gobierno de España (MINECO). During this doctoral period, she did stays in two excellent research groups, one led by Prof. Jamal Deen (PhD co-director together with Prof. J.A. Jimenez-Tejada) at the University of McMaster (Canada) (6 months); and the other group led by Prof. Juan Bisquert at the Universidad Jaume I (Castellón, Spain) (3 months). Just after her PhD Thesis, she received two national PostDoc contracts: "Contrato-Puente 2017-18" from UGR and PEREST Project from MINECO. During this period, she stressed her research on physical modelling of perovskite solar cells (PSCs).

Late in 2018, she moved to IPVF, a private institute-enterprise, in which she has stayed during the last 5 years. Hers and this enterprise main goal is the transference of knowledge from the research to the industry. At IPVF, she works with Dr. Philip Schulz. She has been working on device modelling and characterization of PSCs and tandem devices under realistic conditions, aiming to jump the barrier of working operational mode from lab to field. Her work has been supported by international and national projects. Recently, she has played as Principal Investigator in 4 projects to characterize ion migration by means of X-ray photoemission spectroscopy XPS on perovskite-based devices in Synchrotron SOLEIL (Paris) and BESSY (HZB-Berlin); and coordinating the collaboration between different labs. During this period, she has collaborated with researchers from CNRS, Total-Energies, NREL, INAM, UPO and EPFL.

From the academic perspective, she was teaching assistant at UGR (2014-18), receiving in 2018 the ANECA Certificate enabling her to be "Profesor Contratado Doctor". From 2018, she has been teaching Physics in the Master of Renewable Energies in ENSTA and in l'École Polytechnique (France). She has co-supervised five B.Sc. Students at UGR and twelve master students at IPVF. She has co-supervised one PhD thesis at the UGR and is currently co-supervising one PhD thesis at IPVF.

So far, she has published 28 papers (Cites: 1222, h-index: 15, i10:18, Google Scholar): 11 as first author, 4 as corresponding author and 2 as last author, most of them published in high impact papers, highlighting a review in Physics Report and Advanced Energy Materials. She has personally participated in 31 national and international conferences (16 talks, 7 Invited talks). She was session-chair at 46th IEEE Photovoltaic Specialists Conference in 2021. She has been reviewer for the PVSC-IEEE conference and different journals, such as ACS Applied Materials & Interfaces and J. Phys. Chem. C.

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
Turno General

Área Temática: **Psicología**
Nombre: SOLIS URRA, PATRICIO
Referencia: RYC2023-042734-I
Correo Electrónico: patricio.solis.u@gmail.com
Título: Lifestyles, exercise and brain health through lifespan

Resumen de la Memoria:

As an autonomous Principal Investigator, my primary objective is to propel the exploration of mechanisms associated with age-related cognitive decline through the lens of exercise. My focus is on unraveling how engagement in physical activity can effectively delay or prevent cognitive deterioration linked to Alzheimer's disease or other forms of dementia, particularly by investigating the intricate interplay of three core mechanisms, shoed graphically in figure 1. My primary area of research is to unraveling the brain mechanisms, assessed through neuroimaging, that underpin cognitive performance and lifestyle, with a predominant but not exclusive emphasis on exercise. Additional collaboration in which have been participated related to a range of factors including physical activity levels, sleep patterns, sedentary behavior, and body composition. This work is supported by evidence highlighted in PMID: 31876665.

As an independent researcher I am particularly interested in exploring the impact of these lifestyle factors on older adults. Specifically, I am driven to (I) identify new key risk factors linked to cognitive decline and (II) uncover critical factors that influence cognitive changes and responses to exercise interventions. The ultimate goal is to create customized interventions that enhance cognitive benefits through exercise. As such, a crucial aspect of my research is incorporating advanced neuroimaging techniques to precisely identify and describe these unique traits. Additionally, I interested into the complex interplay between neuroimaging markers triggered by exercise (specifically cerebral blood flow, an early marker of cognitive decline) and novel blood-based biomarkers like Aβ42/40, p-tau181, p-tau231, and p-tau217. By examining these connections, I aim to gain a deeper insight into the impact of exercise on these crucial biomarkers and their potential contribution to cognitive well-being and the dementia prevention or the management of Alzheimer disease. In order to close to this collaboration, I have recently initiated research collaboration with Dr. Thomas Karikaki a top leader in the field of biomarkers. Thus, Dr. Karikari is in charge of analyzing and determine the novel blood-brain based biomarkers from the current exercise project that I am available (AGUEDA project). The manuscripts pertaining to these objectives are currently in their early stages, with the anticipation of delivering distinctive and novel contributions to the understanding of the impact of exercise interventions on the brain cerebral blood flow.

Furthermore, my third main focus is to start to investigating the interaction between exercise-induced neuroimaging and the brain-gut axis, specifically through the lens of the microbiome. In this pioneering area of research I have been collaborate in valuable contributions (not related to the study of the brain), with studies examining the link between the microbiome and exercise (see PMID: 34836254), physical activity (see PMID: 36553278), as well as its impact on various health conditions such as autism (refer to PMID: 30764497) and liver disease (evidenced in PMID: 33546191 and 33171747). Thus, my endeavors are to contribute to comprehending the multifaceted influence of exercise on the brain, encompassing both biochemical and gut-related dimensions.

Resumen del Currículum Vitae:

Patricio is a highly skilled and accomplished researcher with a strong background in the field of lifestyles, sports sciences and neuroimaging. He completed his international Ph.D. in Biomedicine at the University of Granada, Spain, in 2021 (Cum-Laude). After his Ph.D., he joined the at the University of Granada and the Medicine Nuclear Service of the Virgen de las Nieves Hospital as a Margarita Salas fellow, and he currently holds the position of postdoctoral researcher at University of Granada.

Scientific contribution: Patricio's research focuses on the study of lifestyle markers and the brain health, and the effects of exercise on cognitive and brain function. Patricio has made significant contributions to the field, showing the association of lifestyles markers in the first stage of life and the brain development. In addition, Patricios works demonstrate the effect of exercise on structural and functional brain measures and cognition. He has made contributions in several other project with the focus on understanding the role of lifestyles, including physical activity, sleep, nutrition on cognition. His work has been published in 5 book chapters and 46 scientific articles (>70 % 1st quartile, 70% open access), being cited more than 800 times. Patricio has an h-index of 19 and an i10-index of 26 in google scholar.

Patricio's research has been developed with several grants, including the Becas Chile fellow from the Chilean government to develop his entire PhD studies, and the "Margarita Salas" postdoctoral fellow. Patricio have high leadership and group management capacity, was the project manager of Cogni-action project, a Chilean project related to the role of lifestyles on brain health in children, and is nowadays the project manager in the AGUEDA project, a randomized controlled trial with the aim to investigate the mechanisms related to improve the brain health and delayed the cognitive decline in older adults through exercise.

Patricio has a close collaboration with one of the most expert in the field of exercise and brain, doing a 3-month research stay (Kirk Erickson, Faculty of Psychology, University of Pittsburgh), has published 14 scientific articles together with him. Additionally, he has been a university lecturer in 15 subjects, in 3 Chilean universities. Patricio has mentored more than 20 undergraduates,1 Master, and is currently supervising 4 PhD students. In addition, he serves as reviewer/editor of several scientific journals (Neuroimage, BMC Public Health, The International Journal of Neuroscience, IJERPH, Children) and project international calls; and has been scientific secretary and is currently the president of the organizing committee of an international congress related to exercise and brain health.

Patricio leaded the activity The exercise awake you brain in the 2022 research night in Granada, and has promoted research project and results in press releases, and television interviews (UGRMedia, Canal Sur). Patricio has participated such as invited speaker in more than 10 international and national congresses. In addition, as project manager Patricio encourage and prepare the open access and propriety intellectual of the AGUEDA exercise intervention (through video recording) and protocols to make all the information available to other researchers and general population.

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AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023

Turno General

Área Temática: **Tecnologías de la información y de las comunicaciones**

Nombre: NOLAN , MÉLANIE
Referencia: RYC2023-044341-I
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Título: Advanced characterization of sound absorbing materials

Resumen de la Memoria:

Sound absorbing materials are essential as a primary means of reducing unwanted sound and enabling the design of healthy acoustic environments. Over the years, I have devoted myself to understanding the mechanisms of dissipation of sound energy in rooms by: characterizing the phenomena of reflection and absorption of sound waves at a room□s boundaries; examining how the morphological characteristics of (porous) materials influence such dissipation mechanisms. I have pioneered several breakthroughs in my field, namely: 1. I provided experimental evidence that standardized measurements of sound absorption in reverberation chambers are poorly reproducible across laboratories; 2. I demonstrated that the reason for the poor inter-laboratory reproducibility was the lack of an isotropic sound field in the test chambers. To this end, I developed the first metric to quantify isotropy in random wave fields, which had been a century-long quest in the field of room acoustics; 3. I pioneered the first holographic reconstruction of the sound field incident on an absorptive surface, enabling to characterize its directional properties; 4. I proposed an experimental method for the measurement of angle-dependent sound absorption which proved highly reproducible and a more reliable measure of absorption than classical methods; 5. I developed a novel experimental framework for determining the morphological properties of anisotropic porous materials.

I have published 9 journal papers in top (Q1) journals in the field (7 of them as first and corresponding author) and 1 narrative review article. I have consistently presented my work at international meetings, resulting in 32 conference papers (54% invited).

I am the recipient of the 2021-2022 award of the F. V. Hunt Postdoctoral Research Fellowship in Acoustics, which is awarded each year by the Acoustical Society of America to one outstanding researcher at the postdoctoral stage. My work has also been recognized by a Young Professional Award from the International Institute for Noise Control Engineering and a Young Scientist Award from the International Commission for Acoustics. Four of my papers have been chosen for the cover of top journals in the field.

I have a fluent collaboration network with industry and national laboratories. A substantial part of my research has found practical application in industry and with standardization bodies, and I have contributed to several technological tools in the form of experimental methods and measurement instrumentation.

I have a highly international profile, as I have spent my entire career in research institutions abroad. After obtaining my PhD from DTU in Denmark, I have worked in France, the USA, Sweden and Australia. I am highly involved in several international scientific societies and serve as Chair of the Technical Committee in Room and Building Acoustics of the European Acoustics Association.

I have been independently funded at every stage of my career, through competitive grants (I am the recipient of >600.000□ as PI).

I see the RyC Fellowship as a unique opportunity to establish an independent academic career in Spain. I am determined to further our ability to characterize and design enhanced materials and noise-control systems. With noise identified as a major cause of health damage, this line of research is of high societal relevance.

Resumen del Currículum Vitae:

I am a postdoctoral researcher in the field of acoustics, internationally recognized for my work on the measurement and characterization of sound absorption in porous media and its application to room acoustics. The backbone of my research is comprised across the areas of architectural acoustics, wave field analysis, measurement techniques and material science.

I began my scientific career at the Technical University of Denmark (DTU), where I obtained a MSc and PhD in Acoustics. After leading a Round Robin Test evidencing the poor inter-laboratory reproducibility of standardized measurements of sound absorption, I was awarded a competitive doctoral fellowship from the William Demant Fund to investigate the reasons for such inter-laboratory variabilities and, more generally, the mechanisms of dissipation of sound energy in rooms.

After completing my PhD in January 2019, I was granted a two-year industrial postdoctoral fellowship from the Innovation Fund Denmark. I held a postdoctoral research position at Saint-Gobain Ecophon (Sweden), where I developed a new experimental method for quantifying the reflection and absorption of sound waves at a room□s boundaries.

In 2021, I was awarded a two-year international postdoctoral grant from the Danish Council for Independent Research to join the Acoustics Laboratory of Le Mans Université (France). There, I examine how the morphological characteristics of sound absorptive materials control the dissipation of sound energy in rooms, with a particular focus on anisotropy in porous media.

In recognition for my research advances, I was selected by the Acoustical Society of America (ASA) to receive the 2021-2022 award of the F. V. Hunt Postdoctoral Research Fellowship in Acoustics. The Fellowship supported a one-year Postdoctoral Research Associate position at the Rensselaer

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Turno General

Polytechnic Institute (RPI) in the USA, where I joined the Graduate Program in Architectural Acoustics in 2022 (interrupting my current position for a year).

Throughout my career, I have demonstrated excellence in research by securing competitive funding and awards. I have published 9 journal papers and 1 narrative review article, out of which 7 as first and corresponding author. I have also presented my work at 19 international meetings, resulting in 32 conference papers (54% of which were invited) and a strong network of international collaborators.

I serve as Chair of the Technical Committee (TC) in Room and Building Acoustics of the European Acoustics Association (EAA). I also contribute to various scientific societies and technical committees, being a member of the Danish Acoustical Society, a member of the ASA, a member of the TC in Acoustic Materials of the EAA, and a member of the TC in Architectural Acoustics of the ASA. I am actively involved in the organization of scientific meetings, organizing one to two special sessions per year in prestigious international conferences.

Over the years, I have actively engaged in teaching and mentoring. I have been a lecturer in various MSc courses in acoustics at DTU, and a guest lecturer for the Graduate Program in Architectural Acoustics at RPI. I have co-supervised 8 MSc students at various institutions (DTU, RPI, Le Mans Université and KTH).

Excluding two maternity leaves (7 and 11 months, respectively), my PhD age at the time of this writing is of 3 years and 6 months.

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Turno General

Área Temática: **Tecnologías de la información y de las comunicaciones**

Nombre: VILA FUNGUEIRIÑO, JOSÉ MANUEL

Referencia: RYC2023-045520-I

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Título: Nanogenerators based on functional oxides integrated on Si by solution chemistry

Resumen de la Memoria:

I propose to integrate novel epitaxial functional oxides in the form of nanowires and thin films on commercial silicon platforms, using a low-cost and large-scale bottom-up approach that is compatible with standard microelectronics technology. The planned approach is expected to (i) develop oxide materials and low cost chemical solution processes that will enable cost-effective manufacturing of energy devices, (ii) to improve the fundamental knowledge by TEM of the crystallization process of nanowires and thin films on silicon as well as the technology to design nanogenerator devices and to (iii) demonstrate a simple and novel prototype that converts mechanical energy into electricity by exclusively chemical solution manufacturing of epitaxial functional nano-oxides on silicon substrates.

My project also aims to explore the development of different types of epitaxial buffer layers on silicon to induce the direct nucleation of certain crystallographic phases, which would open a pathway for designing complex oxide-based nanowires and thin films, of perovskite (ABO3) and hollandite (AxB8O16) structures, to exploit their unique specific properties, such as for energy harvesting (thermoelectricity, piezoelectricity, etc.).

Metal oxides are of considerable importance in the context of diversification since they cover a broad spectrum of physical properties for technological applications. Oxides are robust materials (stable in air) that can exhibit outstanding electric, magnetic, optical, mechanical, and thermic properties.

Currently, the integration of nanostructures on silicon is generally based on high vacuum physical or chemical growth methods: pulsed laser deposition (PLD), molecular beam epitaxy (MBE), chemical vapor deposition (CVD) (bottom-up) or on lithography and etching (top-down) methods. In particular, the controlled synthesis of nanowires and thin films based on complex ternary oxides on silicon is particularly problematic because of the difficulty to control the chemical precursors to transfer the target stoichiometry. In this context, the chemical solution deposition (CSD) method represents a very attractive and complementary approach to conventional but expensive growth techniques (MBE, CVD) for the generation of complex functional oxide nanowires.

The main ambition of this project is to be able to bridge the gap between material development and device fabrication, so that I can offer sustainable, long term autonomy solutions that could be exploited where waste heat or mechanical excitations are present. I want these devices, both harvesters and storage ones, to be built on abundant, non-toxic and environmentally friendly materials (e.g., tellurium-free, lead-free materials), and produced by low-cost and scalable techniques, so that affordable devices can be made available in very large quantities. I also want those devices to be miniaturized to be a good strategy for lowering material and energy fabrication budgets, and to reduce power consumption while operating, small size is enabling when considering wide scale deployment of devices in all sorts of demanding scenarios. Current harvesters, while useful, do not fulfil all those issues, and without them Internet of Things risks do not be developed to its full potential.

Resumen del Currículum Vitae:

My current position since 2022 as Juan de la Cierva-incorporación fellow at the Center for Research in Biological Chemistry and Molecular Materials (CiQUS) of the University of Santiago de Compostela (USC) is devoted to understanding the relationship between the structure and composition of nanomaterials to optimize their properties.

My research activities combine diverse areas at the edge of Materials science, Chemistry and Physics, mainly dedicated to the synthesis and study of functional nanomaterials, from metal oxides and ceramics to carbon-based hybrids and polymers, for applications in energy harvesting, catalysis, piezoelectricity, and magnetic devices. My complete academic education allowed me to tackle different projects and scientific challenges along my career. In most recent years, I gained experience in the field of transmission electron microscopy (TEM) for the structural and physical characterization of functional nanomaterials.

During my training research track, I have been provided mostly with my own funding. I was awarded with the Juan de la Cierva-incorporación grant (3-years postdoctoral grant conferred by the Spanish Ministry of Science and Innovation, MCIN) and I held a 4-years PhD fellowship Formación de Personal Investigador (FPI) conferred by the MCIN. I was also awarded with mobility grants by the Spanish Ministry of Economy and Competitiveness, the Royal Spanish Society of Chemistry (RSEQ) and CiQUS.

My overall scientific activity has led to 25 publications (2 as corresponding author, 10 as first author and 5 as second author). 14 of these publications were achieved in the last 5 years, exclusively during my postdoctoral stage in which the average impact factor is greater than 7. Some of these works have been highlighted in the form of covers (7), 2 of them as front ones (ChemSusChem and Small).

My research work was also disseminated in 42 presentations (12 keynote or invited) in which I was the presenting author in 14 orals (3 invited). I have been giving 2 invited lectures at international leading institutes (Institut des Nanotechnologies de Lyon and Institut de Ciència de Materials de Barcelona). I actively participate in scientific societies as European Materials Research Society (E-MRS, symposium chairman), RSEQ, Sociedad de Microscopía de España and European Microscopy Society and become member of the Editorial Topic Board of the journal Methods and Protocols as well as Guest Associate Editor in Frontiers in Physics. I have reviewed articles in journals such as Physica Status Solidi (RRL) - Rapid Research Letters, Journal of Materials Chemistry C, Applied Surface Science, IEEE Electron Device Letters, Nanoscale Research Letters and ACS Applied Electronic Materials.

I have been participating in 1 patent, 20 regional, national, and European projects that raised over 1.6 M in competitive grant calls, leading 3 grants as Principal Researcher and contributing in 13 as Research Team Member.

I obtained the certificate of Pedagogical Aptitude and performed specific formation for teaching and collaborate in science diffusion for children. I am certified for Associate Professor and Assistant Professor figures. I have supervised degree students, visitor researchers and performed teaching in subjects such as Chemistry Physics, Kinetics and catalysis and Microscopy in both Degree and Master courses.