Newsletter Number 1
Dec 2019

Attracting and Encouraging Triple I Talent Mobility– Athenea3i

Athenea3i is a research fellowship programme focused on **attracting highly talented researchers** to the University of Granada (UGR) in order to benefit their research career with **International, Interdisciplinary and Intersectoral opportunities**.
This programme is enclosed within the Marie Skłodowska-Curie Co-funding of Regional, National and International Programmes (**MSCA-Cofund**) category and is 50% co-funded between the European Commission and the University of Granada, being the total budget **4.248.000 euros**.

Currently, a total of **20 researchers** are hired by the UGR via Athenea3i programme. A brief overview of each research project is presented in this Newsletter.

RELEVANT NEWS

The UGR recruits 20 top researchers from foreign institutions – El Ideal (Spanish Newspaper)

The UGR will encourage the arrival of talent with financial support – Granada Hoy (Spanish Newspaper)

Catalytic agents are introduced as 'Trojan horses' to kill tumour cells from within – El Ideal (Spanish Newspaper)

The UGR is leading a European project that will examine the mechanisms of gustatory learning in patients with anorexia and bulimia nervosa – Canal UGR (Spanish news website)

The University of Granada announces 10 fellowships to attract excellent postdoctoral researchers – Aula Magna (Spanish news website)

Juani Bermejo-Vega explains what quantum physics is and what it is used for in RNE-'s 1 "Solamente una vez" – Canal UGR (Spanish news website)

LIVEMETRICS - Young Researchers – Livemetrics (Spanish research news website)

Athenea3i Fellows CV

FIRST CALL

María Bermúdez Pita – FLOWPLAN

I studied Civil Engineering and completed a Ph.D. in hydraulic engineering at the University of A Coruña (Spain) in 2013, with research secondments at Delft University of Technology (The Netherlands) and Cardiff University (United Kingdom). My dissertation, in the field of environmental hydraulics, received the Cum Laude distinction and the Outstanding Doctoral Research Award from the University of A Coruña. As a postdoctoral scholar, I have worked at the University of Bristol (United Kingdom) and the University of Leuven (Belgium). My research has been funded by several grants, including a personal 4-year Ph.D. fellowship from the Spanish Ministry of Education (FPU grant) and two postdoctoral fellowships from the Spanish Regional Government of Galicia (3+2 years). In 2018 I moved to Granada to embark on the MSCA fellowship project.

@mbermudezpita

Flood risk analysis under global warming for long-term coastal cities planning

Global warming is changing the magnitude and frequency of extreme precipitation and sea-level events. Coastal urban areas are becoming more vulnerable to flooding from sea-level rise, storm surges and increased precipitation. Vulnerability is aggravated by the concentration of population and economic activity in these areas, which results in degradation of the geomorphic systems that offer natural protection. It is not sufficient to implement short-term mitigation measures to prepare and respond to flood emergencies. Coastal cities must adapt to future flood risk conditions, which requires knowledge-based long term planning.

This project will develop methods for planning and development of coastal cities in the context of concurrent global warming and increased human-induced pressures. Risks will be evaluated in a holistic manner, considering the potential joint occurrence of various types of flooding, and the spatial and temporal gradients of concomitant and interacting atmospheric and marine agents at the coast. A novel integrated hydrologic-hydraulic-coastal modelling framework for flood hazard assessment will enable the combined modelling of fluvial and pluvial flows, tides, surges and waves. In addition to traditional structural measures, such as dams, levees or pumping stations, nature-based flood defence solutions will be integrated into the planning process. Planning alternatives will be assessed considering a multi-objective approach that coordinates flood risk reduction and natural resources protection with economic and social criteria. Given the stochastic nature of climate and economic agents, the uncertainty in the prediction of the flood risks will be assessed, allowing for robust decision-making. This project will bring together scientific and technical approaches from different disciplines such as spatial planning, coastal engineering and socio-economics, to address flood risks from an integrated perspective.

The first results of this project have been published this year in the journal Stochastic Environmental Research and Risk Assessment [1]. In this paper, we explore the individual role of astronomical tide, storm surge and river discharge in the extreme flood levels of a coastal river reach in Northwest Spain. The proposed methodology can give a better understanding of the flooding processes in these environments, and can provide guidance on where to focus modelling efforts when developing flood hazard assessments in such areas.

[1] Bermúdez, M., Cea, L., & Sopelana, J. 2019. Quantifying the role of individual flood drivers and their correlations in flooding of coastal river reaches. Stochastic Environmental Research and Risk Assessment 33: 1851-1861. DOI: https://doi.org/10.1007/s00477-019-01733-8

Juan Antonio Bravo Aranda began his PhD in 2009 at the University of Granada (UGR) with a predoctoral scholarship funded by the University of Granada (1 year) and then a national predoctoral FPU scholarship (obtained through a national competitive process) on 2010. He conducted two predoctoral research stays at the Ludwig-Maximiliam Universität (Germany) and at the 3D Atmosphere Observatory of Romania (Romania) in 2012 and 2013, respectively. During the predoctoral period, he was awarded the Prize for the Best Poster at RICTA2013 and the Award for Excellence at the ITARS Summer School in 2013. As a first postdoctoral position, he had a research contract at the UGR (December 2014 to January from 2015). He worked as a postdoc at the National Centre for Scientific Research (France), funded by ICOS-INWIRE (2015) and by ACTRIS-2 (2016), both European projects. In 2017, he worked as a researcher hired by École Polytechnique (France). He is currently Principal Investigator of the Marie Curie Cofund project, called POLARICE, until 2021.

@polarice_ugr

Juan Antonio Bravo Aranda – POLARICE

Lidar and radar POLARization and ancillary data for ICE nuclei formation research

The scientific goal of this project is to go beyond the state of the art of the Aerosol-Cloud Interaction, particularly on Ice Nuclei formation, creating a long-term concurrent aerosol- and cloud-property database —called DBIce— and exploiting its scientific potential. To this aim, DBIce will be created from in-situ and remote-sensing instrumentation deployed in a valley and in a high mountain. It is really appropriate to use in-situ approaches in high mountain sites where it is possible to develop in-cloud measurements at a reliable cost. The information retrieved from in-situ measurements has a double benefit: i) providing aerosol optical and microphysical properties and chemical composition, and ii) a cross-check for validating the assumptions required to derive vertically-resolved aerosol and cloud properties from remote-sensing instrumentation.

The lidar and radar depolarization measurements provide crucial information about the particle shape (aerosol, droplets and ice), being perhaps the most well-known method to detect cloud-particle phase remotely. The recent improvements on lidar depolarization technique, in which the fellow has participated, will allow more accurate measurements for a better investigation on Ice Nuclei formation.

Then; the Weather and Research Forecasting Model will be run with different Ice Nuclei Parameterizations to simulate cloud properties and thermodynamic conditions for several experimental study cases. This exercise will allow a model-observation comparison to evaluate the parameterization performance, suggesting possible improvements.

The climate change has gained a great interest all around the world, particularly in the European Union, due to its socio-economic impact. For better understanding of future effects, climate projections are required. To do so, the physical processes occurred in the atmosphere as well as the atmospheric-earth energy balance have been in deeply investigated in the last decades. Particularly, the influence of aerosol particles in the cloud formation and microphysical properties, commonly named aerosol-cloud interaction (ACI), has emerged as a research field of special interest since the low-level knowledge causes the largest uncertainties in the climate projections[1]. Despite in-situ experimental approaches have been already widely used with promising results, these techniques are very intrusive and thus, remote-sensing techniques can help to study ACI in real atmospheric conditions by means of synergistic combinations of lidar, radar and microwave radiometer measurements. However, special atmospheric conditions are required in order to disentangle the aerosol influence on cloud formation and microphysical from others variables such as temperature or water-vapor content. Only few studies using this approach have been found in the literature, showing very low correlations between aerosol and cloud proxies. Thus, the present study aims to simulate the lidar and radar signals of a cloud formation process by means of the Hanel and Köhler theories that describe the aerosol-particle hygroscopic growth and activation, respectively (see Figure 1).

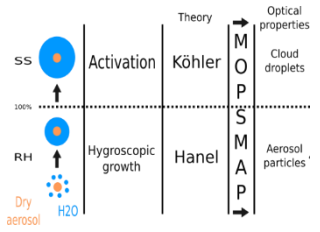


Figure 1: Physical-process scheme from aerosol hygroscopic growth to cloud droplet activation.

[1] http://www.ipcc.ch/report/ar5/wg1/

Antonio Manuel Espín Martín – ROM BENETKIN

Romani people: behavioral strategies, social networks and kinship

This research proposal aims to shed light on key aspects of human nature through the study of a unique cultural group: the Romani people from Southern Spain ("Gitanos"). In particular, we are interested in how humans' social interactions are built and which are the variables that shape their evolution and dynamics. From this perspective, the characteristics of the Gitano minority that make them an attractive test case can be separated in two main groups. First, kinship is at the core of the Gitano social life and organization even if they live a "modern" life, which in many other aspects resembles that of their non-Romani neighbours (i.e. the majority Spanish population). Indeed, consanguinity rates within Gitano communities in the study area are among the highest ever reported in Europe, at the upper bound of the range observed in traditional small-scale societies of hunter-gatherers and horticulturalists which are considered to resemble the living conditions of ancestral humans. The second group of unique characteristics refers to the Gitano strong sense of group identity. Although in many ways they share a bicultural identity as they mostly speak the majorities' languages and have adopted the religion, languages and even a number of mores of their neighbours, they also maintain a strong and vibrant sense of themselves as a separate people. Both kinship and intergroup processes are thought to represent key elements underlying human social behavior. The objective of this proposal is to analyze the social networks of the Gitano population at the mentioned area, and relate the aggregate and individual information gathered with (i) kinship relationships (common ancestors, consanguinity rates, etc.) and (ii) the individuals' social behavior. The method to accomplish this objective combines face-to-face interviews to elicit social networks, behavioral experiments using economic games that measure social behavior, and genealogical data from our previous research.

We are now performing the first Phase, focused on personal interviews to elicit the social networks of both Gitano and non-Gitano people in a town at the North of Granada province.

Antonio M. Espín is an Athenea3i Fellow at the Department of Social Anthropology (UGR). Prior to this position, he was post-doctoral researcher at Middlesex University London. He obtained his PhD in Behavioural Economics from the University of Granada, under the supervision of Pablo Brañas-Garza, and was visiting PhD student at Universitat Pompeu Fabra (superv.: Rosemarie Nagel) and University of Nottingham (superv.: Simon Gächter). He has published his (eminently multidisciplinary) work in journals such as Proceedings of the Royal Society B, Journal of Happiness Studies, Biology Letters, Evolution and Human Behaviour, Nature Scientific Reports, Psychoneuroendocrinology, and Perspectives on Psychological Science. He is board member of the Society for the Advancement of Judgment and Decision-making Studies (SEJyD) and Associate Editor of the Journal of Behavioural Economics for Policy.
Webpage: https://sites.google.com/view/antonioespin

@A_M_Espin

http://sl.ugr.es/0aHU

David García Burgos – CogniTastED

Mapping cognitive-mediated taste learning mechanisms in eating disorders: Toward novel translational frontiers

In response to the high prevalence of unhealthy eating habits (e.g., fasting or strenuous diet) and increased incidence of eating disorders (EDs) especially among women, the CognitTastED project is an effort to understand the mechanisms that motivate the restriction of food intake in both healthy women and patients with anorexia (AN)and bulimia(BN)nervosa. In particular, it aims to shed light on how what we think about certain types of food can diminish or enhance their flavour; in terms of fear learning and taste aversion learning mediated by cognitions. Using translational and experimental psychopathological approaches, it will explore how food learning phenomena can lead to extreme loss of appetite and weight, as well as to compulsive eating habits, among those suffering from eating disorders.

The results will boost evidence-based extinction treatments and provide a cost-effective diagnostic tool in differentiating ED disorders, as well as the development of new sweet-taste inhibitor additives that will help in nutrition management of life-threatening caloric food avoidance. The achievement of these objectives are facilitated by the experience and skills of the candidate, the role of the host Institute of Neurosciences (University of Granada [UGR]) as a leading research centre in Europe and the strategic partnership network formed by Hospitals (San Cecilio and Vithas), international institutions (INSIDE and UNIFR) and private agro-food companies(CIDAF).Once consolidated, the Granada EDs research pole, network and associated specialist researchers will not only render the UGR a pioneering institution in this field, but also should contribute to generating wealth, employment and help make progress with the social challenges of Andalucia2020 and Europe2020.

I am a Marie Sklodowska-Curie Cofound Athenea3i fellow at the Department of Psychobiology and Institute of Neurosciences (University of Granada). I have been a postdoc researcher at the Department of Psychology (University of Fribourg, Switzerland, 2013-2018). I received my PhD in Psychology with European Doctorate Mention (2011). I was studying biomedicine at the University of Bordeaux II (France). I have shown international mobility, e.g., the Behavioural Neuroscience Laboratory, University of York (UK) or the Eye and Brain Mapping Laboratory, University of Fribourg. I have opened new directions on eating/weight-related problems with funded projects, e.g., by the Argentinean National Council of Scientific Research (2015-2017) or the Swiss Anorexia Nervosa Foundation (2017-2019). I have received the Swiss-European Mobility Programme grant, the Swiss Government Excellence Scholarship and the IberoAmerica Young Teachers. I am accredited as PhD lecturer (National Agency for Quality Assessment and Accreditation of Spain).

http://sl.ugr.es/0aHW

http://sl.ugr.es/0aHV

- PhD. U. of Granada (Spain): Nov 2010.
- Postdoc at U. Paris XI, LAL (Orsay, France): Jan 2011 – Dec 2014.
- Research Associate at U. Manchester (UK): Jan 2015 – Oct 2018.
- Researcher Marie Skłodowska-Curie Cofund (Athenea3i) at UGR (Spain): Nov 2018 – Present.
- 106 (78) citable (published) papers, with total number of citations 11367 (9294) and average citations per paper 107.2 (119.2).
- h-index = 52 (45).
- 14 talks in international conferences.
- Supervision of 10 Master students, 2 semester work students.
- Co-supervision of 4 Ph.D. students.
- UK leader of the Anode Planes winding procedure for protoDUNE-SP experiment at CERN.
- Task leader of the Wire Tension Measurements working group for the DUNE Far detector.
- Task leader of the Light Detection Simulation/ Reconstruction and Calibration working group for the Short Baseline Neutrino program at Fermilab.

Diego García Gámez – ISLA

Improved Scintillation Light readout in Argon

Discoveries over the past half-century have put neutrinos, the most abundant matter particles in the universe, in the spotlight for further research into several fundamental questions about the nature of matter and the evolution of the universe. The main physics goals in current and future neutrino experiments are: (i) the confirmation or exclusion of the existence of non-interacting, sterile neutrinos, and (ii) to understand if neutrinos can be the reason that the universe is made of matter rather than antimatter. Answering these questions requires high-precision measurements of neutrino parameters. This means detectors will need large exposures and excellent performance. The proposed project focuses on pushing the Liquid Argon Time Projection Chamber (LArTPC) technology beyond its current limitations, maximizing the physics output by an innovative light detection system (LDS).

The current development of LDS in liquid argon neutrino detectors is geared toward making full use of the capabilities provided by the scintillation light in order to expand their physics reach. A major part of this project will be to demonstrate the enhanced capabilities in terms of energy, position and timing resolution of an innovative light read-out system in the Short Baseline Near Detector (SBND), based at Fermilab, and in an in-house LArTPC prototype at the University of Granada. It is a new and cost effective idea that involves (i) lining the cathode walls of LArTPC with wavelength shifter covered reflector foils, which maximizes and assures uniformity of light collection while allowing the use of a relatively small number of read-out channels, and (ii) using optical detectors able to collect and discriminate between the direct and the reemitted light components, which allows a time resolution in the light signals of a few nanoseconds throughout the whole chamber. Such resolution has never been demonstrated in liquid argon neutrino detectors before.

- Main research lines: induced seismicity, seismic source, inversion methods, seismotectonics and volcanic seismology.
- Author of 16 publications (12 in journals included in the SCI and 1 in Science) that received a total of 127 citations to date (h-index of 5) and author of 42 abstracts, posters and oral contributions in national and international congresses.
- Two funded research project by Marie Sklodowsca-Curie COFUND Athenea3i-UGR (Spain) and DFG program (Germany).
- His postdoctoral stage has been mainly focused on induced seismicity assessment by different hydraulic fracturing experiments in Europe and the seismic source analysis of the largest and most relevant induced earthquakes worldwide.
- Strong participation in international projects (e.g. www.sheerproject.eu).
- Stays in foreign R&D centres: Antarctica, UEA-England, Purdue-USA, GFZ-Germany and KAUST-Saudi Arabia.

José Ángel López Comino – ASPIS

Assessing the Source Properties of Induced Seismicity by fluid injection on different scales through rupture directivity and extended fault inversion.

ASPIS project aims to assess how fluid injection and fracturing operations control the nucleation and growth of seismic rupture processes of induced seismicity. Understanding why uni- or bilateral rupture modes are observed and why earthquake ruptures propagate dominantly along a certain direction is key to forecast how the rupture process of large earthquakes may evolve, their final rupture size and thus their consequences. Technically, the research proposal aims to developed efficient tools to provide detailed and robust information about the seismic source properties of induced seismicity such as rupture geometry, preferred direction of rupture propagation, and the configuration of main slip patches in an earthquake rupture. In addition, a probabilistic discrimination approach among induced, triggered and natural earthquakes can be defined and implemented, taking into account the seismic source geometry, rupture nucleation and rupture propagation. We aim to consider the problem at different magnitude scales, at which induced (micro)seismicity has been observed. One extreme case concern largest fluid injection induced earthquakes related to wastewater disposal, focussing on the Oklahoma region (USA). At the other end, we will consider acoustic emission events, with magnitudes well below zero, recorded in a near field network for hydraulic fracturing experiments that took place at the Äspö Hard Rock Laboratory (Sweden).
In summary, this project aims to extend the current state of the art by:

1. Resolving point and finite source parameters (rupture duration, rupture directivity and rupture size) at different scales, from moderate induced earthquakes to cm-scale hydraulic fractures
2. Understanding whether human operations and stress perturbation control the rupture directivity and growth, and thus the earthquake magnitude
3. Building/improving discrimination approaches based on the more accurate knowledge of the rupture process dynamic and the rupture geometry.

María Medina de la Torre – BloNEP

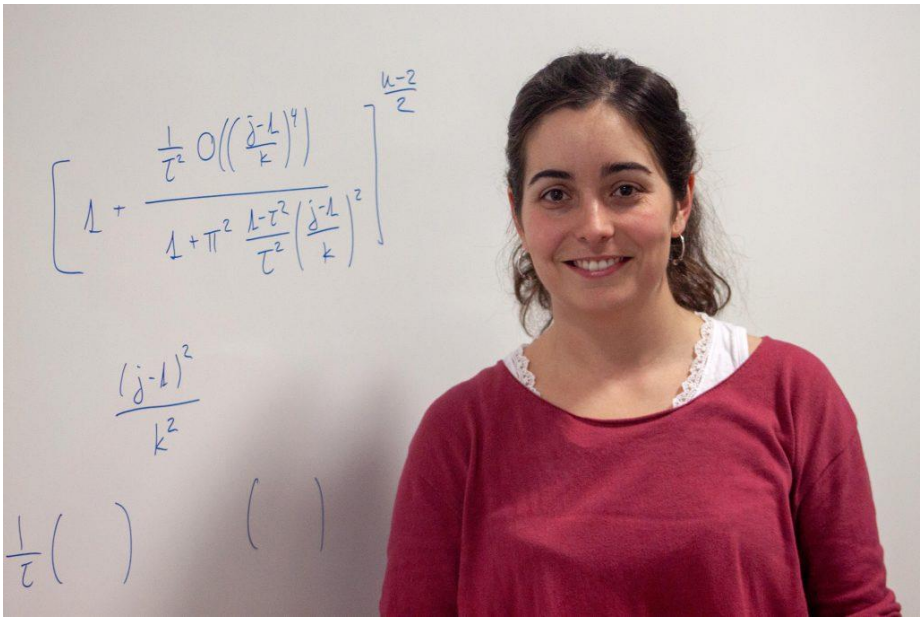
Blowing-up phenomena for geometric and topological nonlocal elliptic problems

The aim of the project is to study different concentration phenomena in elliptic problems, some of them of nonlocal character, that is, with the fractional Laplacian as main operator. We will study the existence and the precise shape of solutions to certain problems that tend to concentrate their mass around a point (to explode), that is, solutions that present a phenomenon of concentration or blow-up, appearing in some cases in the form of a nonlocal interaction. The central line will consist on characterizing the bubbling profile of certain Liouville equations, which represent the geometrical problem of finding a conformal deformation of a metric in such a way that the curvature becomes the Gaussian one. In low dimensions we expect this profile to reflect the interaction between a local behaviour of the Gaussian curvature and a nonlocal from the geodesic one at the points where the concentration occurs, that is, the goal will be to find a nonlocal concentration phenomenon produced in a local problem. We also aim to study different blow-up phenomena at other local equations, like Yamabe or Ginzburg-Landau, concerning different questions like symmetry properties or maximality in concrete dimensions, and at a purely nonlocal equations, like the fractional Yamabe or Schrödinger, with different boundary conditions, where a preliminary study of the profiles and of the own boundary behaviour is required.

The project is being carried out at the Department of Mathematical Analysis of the Universidad de Granada under the supervision of David Ruiz, with a 9-month outgoing phase at Università La Sapienza di Roma (Roma, Italy) under the supervision of the professor Angela Pistoia.

I got my Ph. D. in 26/06/15 at Dept. de Matemáticas de la Univ. Autónoma de Madrid (UAM). From 01/11/15 to 31/10/18 I enjoyed a postdoctoral position in Pontificia Universidad Católica de Chile in Santiago de Chile. I currently work at Universidad de Granada under the Athenea3i Fellowship Programme.
I have published a monograph and 11 papers and given numerous conferences and seminars in national and international workshops and research centers. I have also performed international visits to the University of Pittsburgh, Weierstrass Institute for Applied Analysis and Stochastics, Universidad de Buenos Aires and "La Sapienza" Università di Roma. I have been lecturer of several courses at different grados and of some Ph.D. courses.
In June '17 I received the Award in Mathematical Reseach Vicent Caselles (RSME and BBVA Foundation).

http://sl.ugr.es/0aHX



Carlos Pérez Espigares – HyfOQS

Hydrodynamics and fluctuations in open quantum systems

I completed my PhD at the University of Granada (UGR) in 2012 under the supervision of P. I. Hurtado and P. L. Garrido. During this time I performed a 3-month stay in Paris (ESPCI). In 2013 I continued working as a postdoc at UGR. In 2014 I moved to Italy to work for two years with C. Giardinà at the University of Modena (Italy). In this period I carried out a 2-month stay at the "Institut Henri Poincaré" (Paris). From 2016 to 2018, I continued my research at the University of Nottingham, together with J. P. Garrahan and I Lesanovsky.
I have 15 publications (9 as first and 3 as last author), including 1 Phys. Rev. A as Editors' Suggestions, 2 PRLs and 1 PNAS. I have been invited speaker in several international conferences and in a number of universities across the world. Since September 2018 I work at UGR after being awarded a Marie Curie Cofund fellowship under the Athenea3i programme.

Large fluctuations or rare events, though rare, crucially determine the fate of a system. For instance, the probability for an earthquake or a stock market crash to happen is very low, however, if they do, they condition in a critical fashion the future behaviour. Similar phenomena appear in physical systems, both classical and quantum, where large fluctuations --also known as large deviations-- encode fundamental aspects of the dynamics.
The understanding of these fluctuations in many-body open quantum systems, despite being a potentially fruitful enterprise - essential for possible applications in near-term quantum technologies -, has not been fully exploited so far to the same extent as in classical non-equilibrium systems. Thus, this project is designed to develop a new initial theoretical framework describing the transport and fluctuations of many-body open quantum systems in terms of simple hydrodynamic (fluid-like) classical equations, with potential application in the engineering and control of new quantum technologies such as quantum cryptography or quantum computation.

Belén Rubio Ruiz – NanoTherHAi

Development of a novel nanotechnology-assisted antitumor strategy for combination therapy based on the implication of hyaluronic acid in cancer biology

I obtained my BSc in Pharmaceutical Sciences at the University of Granada. In 2008, once I completed my master´s degree in Drug Development, I was awarded a competitive FPU fellowship to conduct my PhD at the Department of Medicinal and Organic Chemistry. In 2014, I started my postdoctoral stage at the University of Edinburgh, where I was based for 5 years. This period was funded by different grants, including an individual MSCA from the European Commission. Recently, I was awarded a MSCA Cofund Athenea3i to work at the Pfizer-UGR-Junta de Andalucía Centre for Genomics and Oncological Research (GENYO) in the development of a nanosystem for combination therapy. During my research career, I have published 25 articles in peer-review international journals, 1 book chapter and I am the co-inventor of 2 patents.

http://sl.ugr.es/0aHY

Cancer is the second most important cause of death and morbidity in Europe. The inherent heterogeneity of this disease, the dose-limiting adverse effects due to the unspecificity of classic chemotherapeutic agents and the appearance of chemoresistance are some of the drawbacks in current cancer treatments. One of the most promising approaches to address cancer heterogeneity is the use of combination therapy, which is based on the use of simultaneous strategies to get a synergistic effect. Among the different possibilities to be explored, the use of photothermal therapy (PTT) as adjuvant strategy together with conventional cancer chemotherapy is causing considerable attention. PTT consists in the use of nanomaterials able to transform light to heat, which causes a local hyperthermia that kills cancer cells. Among these materials, palladium (Pd) nanoparticles have high capacity to display photothermal activity. This project aims to develop a nanosystem able to conduct both chemotherapy and photothermal therapy at the same time. This nanodevice will be designed to specifically deliver a drug into cancer cells and mediate photothermal ablation due to the presence of Pd-nanoparticles.

I completed a successful PhD in 2013 covered aspect concerning the aerosol radiative properties during desert dust intrusions in the GFAT. After, I secured a postdoctoral fellowship at the UGR to extend my research line during 2013-2015 period. In 2015 I was awarded a 2-year postdoctoral fellowship at the University of Evora (Portugal) to lead my own research project. Later, I was awarded with a highly competitive Marie Curie fellowship the University of Bristol (UK) during 2016-2018 period. In September 2018 I was awarded with a second Marie Curie fellowship within Athenea3i, a program which focuses on attracting highly talented researchers to the UGR. My work resulted in 29 papers. I participated in 11 international projects. I co-supervised 2 PhD students and a postdoctoral researcher and I have been coordinator of Innovation teaching project. I was award with two prizes.

Antonio Valenzuela Gutiérrez – ARAMPRA

Assessment of radiative impact from single particles employing an advanced Polar Nephelometer to reduce uncertainties in the aerosol optical properties

Understanding how anthropogenic aerosols impact the Earth's climate system is a daunting challenge. According to the recently published report of the Intergovernmental Panel on Climate Change, aerosols result in a net cooling of the Earth's climate by an amount that remains difficult to quantify accurately through their interaction with radiation and clouds, and which could be comparable in magnitude to the net warming effect of greenhouse gases.
Not only does hydration cause an increase in size, but it also alters the complex refractive index (RI) of the particle; the real part of the RI governs the scattering of light by the aerosol and the imaginary part the degree of absorption. Thus, quantifying the relationships of chemical composition, relative humidity (RH) and particle phase with complex RI is critical for predicting the radiative forcing of aerosol and in interpreting atmospheric measurements. Further, optical properties depend strongly on mixing state (external vs. internal mixtures), morphology (e.g. crystalline non-spherical, complex morphologies) and atmospheric processing (change in composition and RI with oxidative aging). Using a new instrumentation and technique to accurately determine the extinction cross-sections of single spherical and non-spherical particles developed in the Granada Atmospheric Physics Group (GFAT), we will provide a rigorous assessment of treatments used to characterize the optical properties of aerosol. Of particular emphasis, we will examine the optical properties of mixed-component aerosol and the influence of chemical aging of organic aerosol on light absorption. Crucially, the parameterizations for optical properties that result will then be used to refine (and assess sensitivities of direct forcing to phase state) the treatment of aerosol properties in radiative transfer and global climate models. This work will also provide crucial information to improve our understanding of field and remote sensing instruments.

A Novel Polar Nephelometer and a single nanoparticle Paul trap have been developed and built within of the ARAMPRA project. Single particles have been trapped, confined and levitated in air over time in changing environment conditions and experimental phase functions have been recorded in a large scattering angle range. I have tested the new setup with 1,2,6-hexanetriol particles and I have also recorded elastic scattering using different single levitated salts as sodium chloride. Unprecedent results have been obtained and one first manuscript is being prepared to be submitted to high impact journal.

SECOND CALL

Ana Jiménez del Barco Carrión - Bio-ROAD

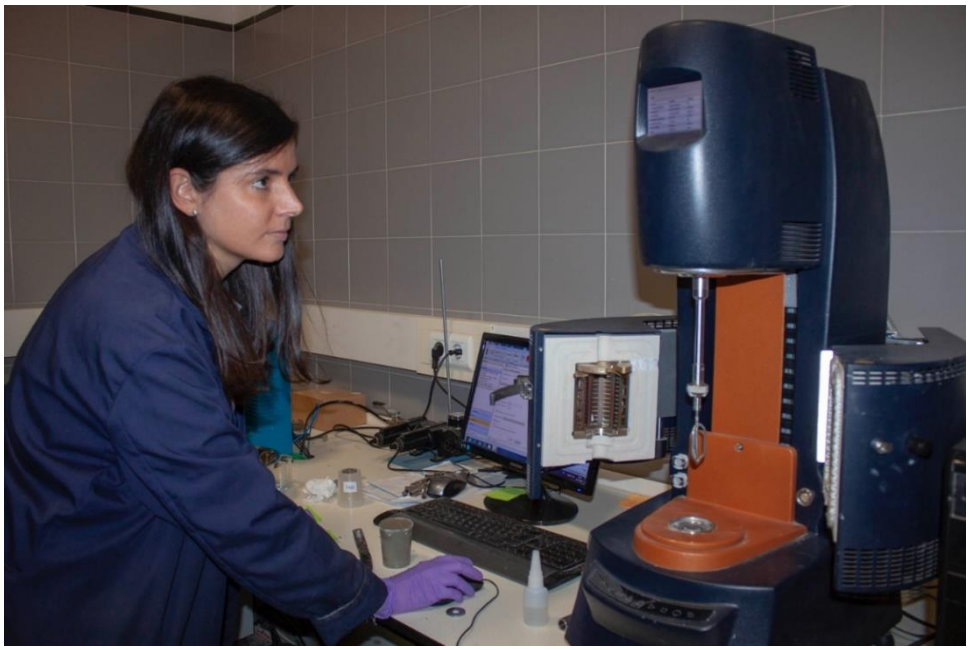
Bio-Recycling off Asphalt mixtures at Decreased temperatures

Bio-ROAD is a training-through-research project conceived to deal with the main environmental concerns related to pavement engineering, and move towards their **sustainable development** in accordance to the 2030 Agenda for Sustainable Development and the Sustainable Development Goals. The high consumption of aggregates, bitumen, energy and related greenhouse emissions needed to manufacture asphalt mixtures for pavements are the principal environmental issues in this field. To deal with them, Bio-ROAD will develop innovative asphalt mixtures that will: (1) contain high recycling rates moving towards the achievement of circular economy; (2) use bio-binders as only binder in the recycled mixture pushing the concept of bio-economy and post-fuel societies; (3) be manufactured at low temperatures reducing the environmental, economic and social impact of the maintenance and construction of roads; (4) be assessed in terms of Sustainability and compared to conventional technologies to ensure these steps are moving in the right direction towards sustainable pavements. To do this, the combination of the individual components of the mixtures will be optimised to maximise recycling and the bio-binders will be emulsified and foamed to reduce manufacturing temperatures. The mechanical performance characterisation of the mixtures will be essential to check the viability of their implementation, and the sustainability assessment will reveal their impact on the three pillars of sustainability. LabIC.UGR is the perfect research group to carry out this project, as a world-leading group for the development and implementation of advanced materials in transport infrastructures. Bio-ROAD counts with an industry partner (Eiffage, France) who will contribute to the exploitation of results from the industry point of view.

Dr Jiménez del Barco Carrión's expertise is **Sustainable Engineering**, focused on transport infrastructures. She received her PhD in Civil Engineering in 2017 at the University of Nottingham (UK) and is currently working as a MSCA Research Fellow at the University of Granada in the project Bio-ROAD within the programme Athenea3i. Her research involves the development of effective techniques for recycling of wastes, their application to pavement engineering and sustainability assessment. In 2014, she was awarded with a MSCA Early Stage Researcher Fellowship in SUP&R ITN. She has worked in several international projects and published 19 scientific articles in indexed journals. She has been the project manager and work package leader of training and dissemination of another MSCA ETN (SMARTI). Her passion for sustainable engineering will always lead her to the path of research and innovation.

@anajimbc

http://sl.ugr.es/0aI4



Adrián Carmona Bermúdez – QuantumBridge

A quantum bridge between high energy theory and experiments

After graduating in Physics at the University of Sevilla with honors, I got a PhD cum laude in Particle Physics from the University of Granada in July 2012, during which I did research stays at the University of Oxford and Fermi National Accelerator Laboratory (US). The work performed during my PhD gave me the opportunity to end up as a Postdoctoral Research Assistant at the ETH Zürich, one of the most renowned academic institutions worldwide. After three years at ETH, I was awarded with a prestigious Marie Curie Individual Fellowship by the European Commission to carry out my research at CERN, definitively one of the most of particle physics. After two years at CERN as a Postdoctoral Fellow, I moved to Mainz University with a junior 5-year position. Since last September, I am back to the University of Granada with an Athenea3i fellowship to carry out my research on theoretical physics.

http://sl.ugr.es/0aHZ

The particle physics community is living a very exciting and challenging time. The dis-covery of the Higgs boson at CERN marks the beginning of a new era in high energy physics. After an impressive forty-year search that successfully ended with Peter Higgs and François Englert receiving the Physics Nobel prize, the finding of the long-sought particle offers us the unique opportunity to start exploring the origin of the masses of the constituents of matter and the mediators of some of the known forces. This means that we could be closer than ever to understand some extremely important unsolved puzzles in particle physics, like why gravity is so weak compared to other known interactions, why there is so much matter than anti-matter in the Universe or even what lies behind dark matter. However, the absence of any sign of new physics at current experiments is shaking the foundations of the field, asking for new solutions to these puzzles or even sggesting the necessity of new questions. In this context, being able to chart as much of possible of the unknown is paramount. One key tool in this regard is the framework of effective theories. This is useful in two different ways. On the one hand, because it allows experimentalists to parametrize the effects of new physics in a complete agnostic way. On the other hand, because it gives theorists the opportunity to readily compare the predictions of new models with experimental data. I aim to provide for the first time a complete dictionary between new models and the effective theories relevant for collider physics, flavor and dark matter experiments at the quantum level, which is the level of precision required nowadays. In particular, this will be done by developing a computer software connecting arbitrary models of new physics onto the effective theories relevant for such experiments in a completely automated way. This can be a game-changer for the community since it will allow to take the maximum advantage of current data.

Antonio Jesús Muñoz Pajares – EXTENSITY

EXTENded barcodes for monitoring biodiverSITY

Since Darwin, we know that all the forms of life in earth, from the tiniest bacteria to the largest dinosaur, have evolved from a common ancestor. But the fabulous diversity of life hide amazing mysteries that still intrigues evolutionary biologists and I feel lucky for being able to study several of these mysteries. After completing my degree in Biochemistry in 2006, I studied the origin of parasitic chromosomes in grasshoppers, and the role of pollinators in the evolution of generalist plants (that is, plant species visited by hundreds of insect species). In 2013 I moved to Oporto, where I focused, among other issues, on the diversity of grape varieties and the genetic basis of natural resistance to rust, one of the diseases most dramatically impacting coffee production worldwide. In 2019 I went back

Biodiversity loss has been recurrently identified as one of the major challenges that human beings must face during the next decades and special attention must be paid to the geographic areas showing a large number of species. These

geographic areas are called “biodiversity hotspots” and they also harbour a large number of endemic species (that is, species found nowhere else on Earth) and, in many cases, also has lost a large number of the species they harboured in the past. Among the 36 recognized biodiversity hotspots in the word, the impact of biodiversity loss is expected to be particularly dramatic in areas from the Mediterranean region due to environmental and demographic reasons. The Spanish Sierra Nevada has been considered a Mediterranean biodiversity super-hotspot because one third of the entire flora of the Iberian Peninsula inhabit this range. To conserve the

to the UGR after being granted by the Athenea3i MSCA-COFUND Fellowship Programme.

fabulous diversity of Sierra Nevada's flora it is extremely important to monitor genetic diversity across time periods to identify negative trends early enough to develop effective actions. This proposal will explore an innovative methodology to quantify genetic diversity in natural populations. We aim to demonstrate that, using the appropriate technique and sampling scheme, it is possible to monitor plant species of entire ecosystems with modest economic resources and requiring no previous knowledge on the species' genetic composition. To illustrate the huge potential of the proposed methodology we will explore spatial and temporal patterns of variation in genetic diversity of dozens of species to provide an accurate and powerful depiction of habitat loss in Sierra Nevada, revealing the species or local areas that must concentrate particular conservation actions.

Ana Isabel Pérez Muñóz - T-ComBrain:

Text Comprehension in the Brain: The role of Development and Bilingualism

I did my PhD in Experimental Psychology and Behavioural Neuroscience at the University of Granada (FPU, 2010-2014), with stays of research at Lancaster University and the University of Oxford. Then I worked as a postdoctoral researcher first at the University of Granada (2014-2015), and subsequently at the University of Poitiers (CNRS, 2015-2016) in an European educational project. Finally, I was research associate at the University of Cambridge (2016-2019) to investigate about bilingualism and cognition. I am currently principal investigator of the project "Text Comprehension in the Brain: The role of Development and Bilingualism - T-ComBrain" (Athenea3i, 2019-2022). Accordingly, I have interdisciplinary research experience in the areas of Language, Cognition, Memory and Education, and I have collaborated with different teams in Spain, France, Italy, Germany and the UK.

Successful text comprehension requires the construction of an integrated, coherent, and accurate mental representation of the state of affairs described by the text. This is a dynamic ability which involves high-level cognitive processes such as a) inferencing, the capacity to generate information that has not been explicitly mentioned; b) monitoring, the skill to detect information that contradicts previous parts of the text; and c) revision, the ability to update no longer relevant information, and replace it with new one. Crucially, these processes may also interact like it is the case of inferential revision. Neuroscientific research on text comprehension has shown the existence of a brain network where some areas plays a role in binding text information with prior knowledge retrieved from memory, and others exerts control of information and builds a unique representation of a particular context. This neurofunctional distinction suggests the ability of inferencing could be mainly governed by the first group of brain areas whereas the second group could be recruited in monitoring (conflict detection) and revision (ability to discard information). Even though some electrophysiological studies have identified brain activity related to these processes, little is known about how they are implemented in the brain from both a developmental and bilingualism perspective. This project aims to 1) elucidate how monolingual and bilingual children, adults and the elderly perform high-level cognitive processes during L1 and L2 text comprehension, and its relationship with cognitive control; and 2) distinguish brain areas related to monitoring and revision processes by exploring brain connectivity in monolingual and bilingual adults and the elderly. For this purpose, we use a comprehensive approach combining behavioural measures, electrophysiology and (functional) magnetic resonance imaging.

I am a physicist and computer scientist from Cáceres, Extremadura Spain (1987). My research explores how to use quantum effects to make better computers, called "quantum computers". I am a queer trans woman and my pronouns are "she/her."

I am now a Marie Curie-Athenea3i fellow at University of Granada. In the past, I worked as a postdoc researcher at the Free University of Berlin, Germany (2016-2018), and as a predoc researcher at the Max Planck Institute of Quantum Optics, Munich, Germany (2010-2015). I did my undergrad in University of Salamanca, Spain (2005-2010).

As an undergrad, I shared a research prize for a project on non-invasive neonatal intensive care units (Certámen de Jóvenes Investigadores 2008). In 2010, I won a La Caixa-DAAD fellowship

I am a diversity and labor rights activist. In 2018, I cofounded the Q-turn workshop, which promotes quantum information research, as well as diversity, inclusion and worker rights in quantum science & technology (2018). In 2014, I cofounded the Max Planck PhDnet Equal Opportunity group.

@queenofquanta

http://sl.ugr.es/0aI0

Juani Bermejo Vega – QURE

Quantum Computing with Minimal Resources

Quantum computers are devices that use quantum effects to improve the way we do computation. Quantum effects are exotic phenomena that we observe in "small systems" (e.g., atoms or photons) in the absence of "noise" (e.g., temperature or background radiation). Quantum effects play a key role in the working mechanisms of modern technologies such as lasers and electronic devices. My research explores how quantum effects may be used to do computer calculations using less time or consuming less energy.

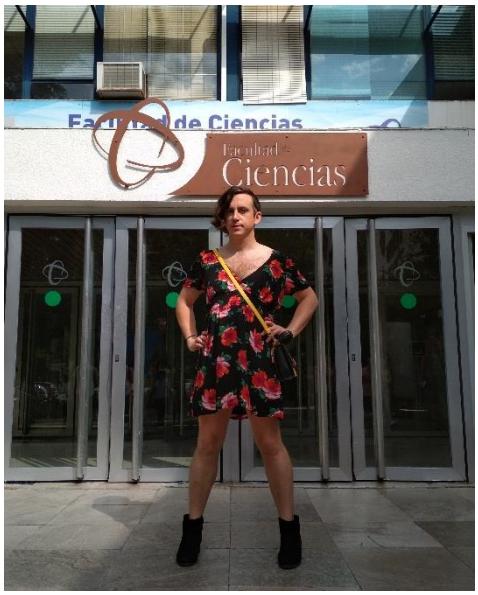
Quantum computers are known to be able to solve certain computational problems that classical computers cannot. For instance, it is known that large quantum computers could break certain widely-used cryptographic systems, and solve the physical equations that describe molecules; two problems the fastest classical supercomputers cannot solve. For this reason, scientists, engineers and mathematicians investigate how to build quantum computers, and what problems they can solve.

Yet, building a quantum computer is not easy. From an engineering point of view, it is challenging to build large-scale quantum computers because of the presence of background noise in microscopic systems. For this reason, available quantum computers have a modest size (between 50 and 100 quantum bits). Furthermore, it is difficult to develop quantum computer "applications" (algorithms) that solve practical problems with existing technology.

My research project "QuRe - Quantum Computing with Minimal Resources" investigates what problems can be solved with quantum computers of modest sizes. It attempts to delineate the physical principles that make quantum computers work, and to identify examples of "quantum programs" that could be run on small quantum devices. At the same time, it investigates how to verify whether a noisy quantum computation has worked.

A 10-minute video introduction to my research can be found here: http://sl.ugr.es/0aIH

My recent work has led to two preprint papers [1,2]. These works probe potential computational-applications of quantum simulators. Quantum simulators are single-purpose quantum computers available world-wide in many laboratories. They are often regarded as candidates for solving problems in condensed matter physics. Yet, available quantum simulators are noisy and not very programmable.



In works [1,2] we make progress towards understanding whether and what kind of quantum simulators can provide computational advantages. In particular, we provide evidence that quantum simulators might be particularly good at computing dynamical structure factors, a quantity that appears in the study of condensed matter systems, or measuring the energy of many-body Hamltonians.

[1] Maria Laura Baez, Marcel Goihl, Jonas Haferkamp, Juan Bermejo-Vega, Marek Gluza, Jens Eisert https://scirate.com/arxiv/1912.06076

[2] Leonardo Novo, Juani Bermejo-Vega, Raúl García-Patrón https://scirate.com/arxiv/1912.06608

Mattia Bramini - MAG-NEUROREG

Magnetic ferrofluid nanosystems as innovative neuro-interfaces to foster regeneration and restore network connectivity in neurodegenerative disorders

Injuries in the central and peripheral nervous systems most often lead to death or permanent disabilities, causing a loss of quality of life. These life-threatening injuries are caused either by physical trauma, like stroke or traumatic nerve injuries, or by degenerative diseases, like Alzheimer's or Parkinson's. These conditions are traditionally treated by pharmacological approaches; however in the last years, the advancement in biomaterial science and the deep understanding of the functioning of neural cells, has led to a progress in neural tissue engineering research. Smart materials for neural tissue engineering are being developed; moreover, it has recently been demonstrated that external stimuli, such as magnetic field, can help the growth of the neural cultures towards regeneration. In this scenario, MAG-NEUROREG aims to generate neuro-nano hybrid structures that will transgress the frontiers between biological tissues and artificial materials to govern neuronal network reconstruction and function. In detail, our approach aims to overcome the limitations that conventional medicine approaches use in the field of neuronal regeneration. MAG-NEUROREG will develop a water-soluble and biocompatible magnetic nanoparticle (NP) solution that could be injected in the patients with minimal invasive procedures (overcoming complex surgery procedures). The magnetic solution will adapt to the complex extracellular environment and will be able to reach (thus, stimulate) a high area in an organ/tissue. The solution will be then exposed to an external tri-axial magnetic field that will act as a switcher to "activate" the NPs and stimulate neuronal reconnection. The use of tri-axial magnetic field with therapeutic aim is one the most innovative aspects of the project itself: by changing the frequency and angle of the stimuli in the three directions, we will tune and guide the NPs according to our necessity and accordingly to the specific damage that needs to be repaired.

Water-dispersable magnetic NP solutions have been already prepared from magnetite and maghemite. Different NP sizes have been fabricated (ranging from 10 nm to 1 µm diameter) in order to explore the best solution in terms of stability and biocompatibility. In addition, the group has recently developed a

three pairs of Helmholtz wire coils used to apply a tri-axial magnetic field. The magnetic field can be adjusted for what concern frequency and angles and is controlled by external amplifiers and electrical components. The device will play a crucial role in the project, and will be used to activate and control the magnetic NP solution behaviour upon neuronal and tissue exposure.

I hold a Bachelor Degree in Biotechnology (2007) from the Università degli Studi di Modena e Reggio Emilia (Italy). I then joined the Master of Science Degree in Medical and Pharmaceutical Biotechnology (obtained in 2009) from the same University; in addition, I spent 6 months as an Erasmus student in Netherlands (Radboud University of Nijmegen), joining the Donder Institute for Brain, Cognition and Behaviour. I obtained the PhD in Bionanointeractions in 2014 from the Centre for BioNano Interactions (CBNI), School of Chemistry and Chemical Biology, at the University College Dublin (Ireland). In April 2014, I joined the Italian Institute of Technology (IIT, Genova – Italy) at the Center for Synaptic Neuroscience and Technology as post-doctoral fellow within the European Graphene Flaghship project working on grapheme biomedical applications for brain pathologies.
https://scholar.google.com/citations?user=UjwcpfIAAAAJ&hl=en

@Tia_Bramo

http://sl.ugr.es/0aI1

Stephanie Marie Coo - RED PH EU

Rediscovering Philippine Material Culture in European Archives and Private Holdings

My current Athenea3i project is aimed at gathering, analysing and contextualizing different types of Philippine textual, iconographic and material (objects and architecture) culture scattered at different repositories in Spain and Portugal. If time and funds permit, the study may be expanded to Germany, Netherlands, Belgium, etc. The idea is to identify collectors/collections and discover historical realia using peripheral sources such as private holdings belonging to, for example, European families that lived or worked at neighbouring countries that had no direct ties with the Philippines. (the neighbouring countries surrounding the Philippines or that had ties with the Philippines).

More than just a survey or a catalogue of Philippine realia in Europe, my project is aimed at systematically assembling a good combination of digital records and complex sources belonging to overlapping categories and extract value from the varied collections. Analysis of growing data sets characterized by volume and variety can generate new knowledge not only about acquisition patterns in relation to the history of collecting but also about the shared histories of the Philippines, the Iberian world and the EU.

My project has wide applications: it can serve as reference to future scholars 9with no access to overseas archives) as well as to productions of different types, from documentaries to films and theatre plays to works of fiction. It can also be used to develop educational content or provide input to tourism publicity campaigns, even games and animations, etc.

I have a Bachelor's degree in Management and Master's degree in History from the Ateneo de Manila University in the Philippines. In 2014, I obtained my PhD in History from Université Nice Sophia Antipolis in France. I am Assistant Professor at the Department of History of the Ateneo de Manila University, where I have been teaching since 2002. Combining my business background with my degrees in History, I served as Chair of the Internationalization Committee and Coordinator for Internationalization of the Loyola Schools of the Ateneo de Manila University between 2018 and 2019. I am the author of a book chapter and several articles. My book, Clothing the Colony: Nineteenth century Philippine Sartorial Culture, 1820-1896 (Quezon City: Ateneo de Manila University Press, 2019), was launched at the Frankfurt Book Fair in October 2019.

https://ugr.academia.edu/StephanieCoo

https://scholar.google.com/citations?user=tEXTgGUAAAAJ&hl=en

https://orcid.org/0000-0002-2146-8353

http://sl.ugr.es/0aI3

Dr Miguel Molina-Solana [miguems.github.io] is an Athenea3i Research Fellow with University of Granada. Before he was a Marie Curie Individual Fellow at Imperial College London. His RESEARCH lies in the areas of Machine Learning, Artificial Creativity and Knowledge Representation, with a clear inter-disciplinary, applied, and problem-driven approach. He has authored 18 works in relevant JCR journals and presented more than 20 works in international peer-reviewed conferences. He has personally been awarded
more than €500k in competitive FUNDING from different institutions. Miguel serves as a REVIEWER for several JCR journals and international conferences, and he is in the Board of Editors of MDPI AI and Frontiers in Psychology. Miguel is active in OUTREACH, participating in activities with children, high school students, general public, and policymakers. Miguel's lectured at University of Granada and Imperial College, co-supervised six successful MSc projects on different Artificial Intelligence applications, and currently supervising a PhD thesis on Algorithmic Music Composition.

https://miguems.github.io/percentage/

http://miguelmolina.me/

http://sl.ugr.es/0aI5

Miguel José Molina Solana – PERCENTAGE

Deep Learning for Predicting Energy Consumption in Heritage Sites

PERCENTAGE (‘Deep Learning for Predicting Energy Consumption in Heritage Sites’) [miguems.github.io/percentage] project will develop advanced Deep Learning techniques for modelling and predicting energy consumption in Heritage Sites, with the aim of improving energy efficiency in such locations. PERCENTAGE will be developed at Universidad de Granada and Imperial College (two world-leading research institutions) and its results will be demonstrated at the Alhambra (most visited monument in Spain and located in Granada). The action will be instrumental to enhance the fellow’s scientific skills, training him on Applied Deep Learning techniques, while strengthening his existing leadership and outreach skills. The project will be an excellent example of successful knowledge transfer, demonstrating how new technologies can be respectfully used in heritage sites. It will produce high-impact open scientific publications and open-source software implementations, and will have a high societal and outreach impact, ultimately serving as a demonstrator for other monuments.

Miguel has presented his work "Towards self-adaptive building energy control in smart grids" at the prestigious NeurIPS 2019 Workshop "Tackling Climate Change with Machine Learning". [jgromero.github.io/ia4sg]

Francesca Oltolina - TAR-MA-LI-T

Novel TARgeted functionalized MAgnetoLIposomes for cancer Therapy

Francesca Oltolina got her Bachelor in Biotechnology in 2010, her Master in Medical Biotechnology in 2012 and her PhD in Biotechnology for Human Health in 2016, all of them at the Università del Piemonte Orientale (UPO). There, she was a post-doc fellow and her research fields were regenerative medicine and nanomedicine. In that period, she was also involved in supporting students, giving didactical laboratories, and assisting to exams. Now, she is MSCA-COFUND Athenea3i fellow at the Universidad de Granada (UGR) and she works in the Department of Microbiology on her project "Novel TARgeted functionalized MAgnetoLIposomes for cancer Therapy". For this she will develop a new drug delivery system based on magnetoliposome. The results of her research could be the basis for future applications to improve people's health.

@FOltolina

http://sl.ugr.es/0aI6

The project of Dr. Oltolina is "Novel TARgeted functionalized MAgnetoLIposomes for cancer Therapy" (Acronym TAR-MA-LI-T), with the aim of developing a new tumour targeted drug delivery system (DDS). Cancer is the second cause of mortality in western countries and the conventional treatments (surgery, radiotherapy and chemotherapy) lack specificity causing severe systemic side effects. NPs and in particular magnetic NPs (MNPs) offer a new therapeutic approach, because of their properties, i.e. nanometric size, making them efficient multifunctional carriers, long circulating times in the blood stream, enhanced permeability and retention (EPR) effect at tumour sites allowing their extravasion and possibility to direct them to a chosen target by a gradient magnetic field (GMF), besides passive (EPR effect) and active (after functionalization with a probe for a tumour biomarker) targeting. Moreover, upon the application of an alternating magnetic field, MNPs can produce heat resulting in tumour thermoablation. Herein, the chemotherapeutic drug doxorubicin (DOXO) will be adsorbed to MNPs, then these complexes will be covered by a lipid bilayer to obtain magnetoliposomes. These will then be coupled with monoclonal antibodies targeting a tumor associated biomarker (the hepatocyte growth factor receptor) which is overexpressed on many types of human cancer. The nanocomplexes obtained will be characterized and their in vitro and in vivo biocompatibility will be analysed. Targeted in vivo distribution of systemically administrated magnetoliposome complexes will be pursued by application of GMF in a mouse breast carcinoma model. Finally, the biological evaluation and setting of a device designed to induce hyperthermia in vitro will also performed. If successful, the data obtained in this project could represent the basis for future studies aimed at testing the nanoparticles in vivo in a tumor experimental model for their ability to inhibit tumour growth and to mediate hyperthermia.

When Dr. Francesca Oltolina was a post-doc fellow at Università del Piemonte Orientale under the supervision of Prof. Maria Prat, she published a paper in collaboration with the group of Prof. Concepcion Jimenez-Lopez about functionalized tumour targeted and DOXO carrier MNPs. This paper entitled "Functionalized Biomimetic Magnetic Nanoparticles as Effective Nanocarriers for Targeted Chemotherapy" was published in an indexed scientific journal called "Particle & Particle System Characterization". These previous and promising results have laid the basis for further studies, as the project "TAR-MA-LI-T" aimed at discovering a possible translational application for cancer treatment.

Dr. Sahbi Jaouadi studied first in Tunisia for a bachelor's and then for a master's degree in History and Archaeology. He then went on to develop his skills in natural sciences, paleoclimatology and botany by studying in Italy, Spain and France (International Erasmus Mundus Master and PhD in Quaternary and Prehistory - European Commission scholarships). After his PhD (APLF PhD prize - 2017), he secured a research and teaching contract within the National Museum of Natural History (Paris-France) and he obtained a lecturing qualification from the French Universities Council. Dr. Sahbi Jaouadi's research activities focus on climate change and human-environment interactions in Mediterranean arid lands through a multidisciplinary approach. He has led, and participated in, multidisciplinary teams in Europe and Tunisia whose focus has been prehistoric and historic archaeology, environmental sciences and climate change.

Jaouadi Sahbi – CERES

Climates, landscapes and historical social-Ecological systems RESilience in the semi-arid lands of central Tunisia and southern Spain

The Mediterranean Basin is a globally significant biodiversity hotspot where climate simulation models forecast increasing aridity and possible desertification under current global warming conditions; this may result in significant economic and social impacts. A retrospective view of past climate episodes and the associated dynamics of Mediterranean societies can provide a comprehensive historical background highlighting human resilience to environmental change, which can in turn be used to ensure an optimal management of future environmental and societal challenges. The CERES project develops an interdisciplinary approach by cross-referencing data regarding societies and natural environments within a broad spatio-temporal framework; the aim is to gain a better understanding of multifaceted and non-linear human-environment relationships. The CERES project will document and compare the relationships between human societies and their natural environments during the historic period in two semi-arid Mediterranean areas (Andalusia, Spain and Central Tunisia). Based on high-resolution multi-proxy analysis of two sedimentary cores, the project will firstly seek to reconstruct the ecosystem dynamics that will then be correlated to the historical and archaeological records for each region so as to trace the interactions between the societies and their environments, particularly during periods of environmental and climatic change. A comparative approach is then developed in order to discuss (1) the climatic dynamic in the central and western Mediterranean and its geographical variability, (2) the various responses, identical or divergent, of human societies on the northern and southern Mediterranean shores to identical or different climatic events and (3) the relationships between the adaptive strategies developed by populations to manage environmental stresses and their socio-political and economic organisation. Finally, the project will try to use lessons learnt from the past regarding the resilience of social-ecological systems in both regions in order to reduce current and future vulnerability to ongoing climate changes and to address the challenges of implementing sustainable development policies.

RELEVANT UPCOMING EVENTS

WORKSHOP **"Cómo comunicar tu Ciencia" FOR ATHENEA3i COFUND FELLOWS**

The International Research Projects Office in collaboration with the Communications Management Office organizes the workshop **"How to communicate your Science" ("Cómo comunicar tu Ciencia")**, which will take place on **22 and 23 January 2020**. The main aim of the workshop is to help the researchers of the Athenea3i programme to prepare a brief presentation of their project, as well as to provide help on how to disseminate their research through traditional media (written press, radio and television).

The workshop will be taught by the well-experienced journalists **Carlos Centeno** (Communication Management Office) and **Susana Escudero** (Canal Sur Radio, director of the award-winning scientific dissemination program "El Radioscopio").

WORKSHOP **PROJECT OFFICER VISIT**

The Athenea3i Project Officer will visit the UGR on **6 February 2020**.
The Athenea3i fellows will meet him and will perform a brief **presentation** of their project. The event will be open for the public and will be held in **Lemon Rock bar**.

International Research Project Office
Vice-Rectorate for Research and Knowledge Transfer, Universidad de Granada
C / Gran Vía de Colón, 48, 2nd Floor. 18071, Granada, Spain.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement Nº 754446 and UGR Research and Knowledge Transfer Found – Athenea3i.

UNIVERSIDAD DE GRANADA
Vicerrectorado de Investigación y Transferencia

athenea 3i

OFPI Oficina de Proyectos Internacionales