

# MSCA Postdoctoral Fellowships 2023

Attractive Research opportunities  
in Extremadura -Spain-



European  
Commission



Marie Skłodowska-Curie Actions  
Research Fellowship Programme

*Freedom of scientific research / Internationalization / Prestige / Economic resources*

## **HOSTING OFFER**

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### **Project Idea: “Rising and bursting bubbles in complex fluids”**

Thematic priority: Climate change and Health

### **Supervisor (Researcher at UEX):**

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#### **José María Montanero Fernández (Full Professor)**

José María Montanero (JMM) conducted his Doctoral Thesis in the field of kinetic theory of gases and granular media in the area of theoretical physics and worked in that field until around 2005. Looking for fields with more technological relevance, JMM became interested in problems of fluid dynamics dominated by surface tension, analysing theoretically and experimentally capillary systems like liquid bridges, jets, drops, bubbles, emulsions, etc., both on the millimeter and micrometer scales. His early works about liquid bridges fell within the framework of microgravity, which motivated his stay at the Microgravity Research Center of Brussels University in 2007.

Over the last 15 years, JMM has mainly focused on industrial and biotechnological applications related to microfluidics. His stay at the York University (Toronto, Canada) in 2019 allowed him to work on wetting of viscoelastic liquids. He also initiated a research line focused on the simulation of fluid dynamics problems of biomedical interest. Because he was the first Ph.D. in the area of fluid mechanics at the University of Extremadura, he had the opportunity to form a young research group with international projection, which probably constitutes his greatest satisfaction as a researcher.

The continuous funding obtained from the Research National Program has allowed us to equip a laboratory specialized in microfluidics. The projects granted by the Junta de Extremadura have enabled the opening of a line of research in Bioengineering. Also, his group frequently conducts both numerical and experimental studies for companies and enterprises which have to deal with problems related to fluid dynamics.

**JMM has supervised eight doctoral theses in the last ten years. He has published more than 170 publications in journals indexed in Scopus. His h-index in Scopus is 34.**

### **What we offer (Research support):**

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#### Research facilities:

Microfluidics lab (2 ultra-high-speed cameras, Kirana5M, and 3 high-speed cameras) and MEMS lab (Nanoscribe). More details in: [https://mfluidosunex.es/?page\\_id=281](https://mfluidosunex.es/?page_id=281)

#### Networking possibilities and external relations:

University of Seville, University of Porto, University of Minho, University of Bristol, University of Oxford, University of Limerick, University of York, among others.

## **Project idea/position (scientific requirements, topic, discipline):**

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**Thematic priority: Climate change and Health**

**Project idea: Rising and bursting bubbles in complex fluids**

The presence of surfactant and polymeric molecules substantially changes the behaviour of fluids in microfluidics. We will analyze the effects of these two factors on capillary flows of great relevance in nature and with remarkable technological applications.

Bubble bursting plays a critical role in fields ranging from disease transfer to environmental and earth science. Liquids naturally contain the complex molecules mentioned above. For this reason, understanding the surfactant and viscoelasticity effects on this singular phenomenon is of enormous importance. We will measure the number, size, and velocity of the drops produced by bubble bursting as a function of the surfactant and polymer concentration in experiments. The dimensional analysis and comparison with numerical simulations will give us insight into the physical mechanisms driving bubble bursting in complex fluids.

The motion of bubbles in liquids has a central role in diverse fields, ranging from the chemical industry to the environment. It has been documented since the Renaissance that an air bubble rising in water will deviate from its vertical path to perform periodic oscillations if the bubble size exceeds a critical value. Very recently, it has been demonstrated that this phenomenon results from the interplay between flow and bubble deformation, contrary to the widespread belief that the instability originates in the bubbles wake. We will extend this study, conducted for pure water, to the much more common case in which surfactants are dissolved in water. We will elucidate the role played by the adsorbed surfactant monolayer from both our experiments and the linear stability analysis.

## **What we expect from you (requirements, preferences):**

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Our Fluid Mechanics Group want to participate in a **European Fellowship** application.

**Preferences: experimental skills in fluid mechanics.**

Furthermore, you should:

- Have a PhD degree at the time of the deadline for applications (**13/09/2023**).
- At the call deadline, you must not have more than 8 years full-time equivalent experience in research, measured from the date of award of the doctoral degree
- Have not been in Spain for more than 12 months in the 3 years before the call deadline.

- Your profile should comply with the requirements identified in the call. Please, visit [call text](#) and read requirements carefully.

**Documents to be submitted and deadline**

Applicants should submit his/her CV and a letter of motivation latest until **May 15<sup>th</sup> 2023**, to [amelia.aguilar@fundecyt-pctex.es](mailto:amelia.aguilar@fundecyt-pctex.es) with subject line **MSCA-PF-2023 - UEX Hosting Offer 5**

# Why Extremadura and our University?

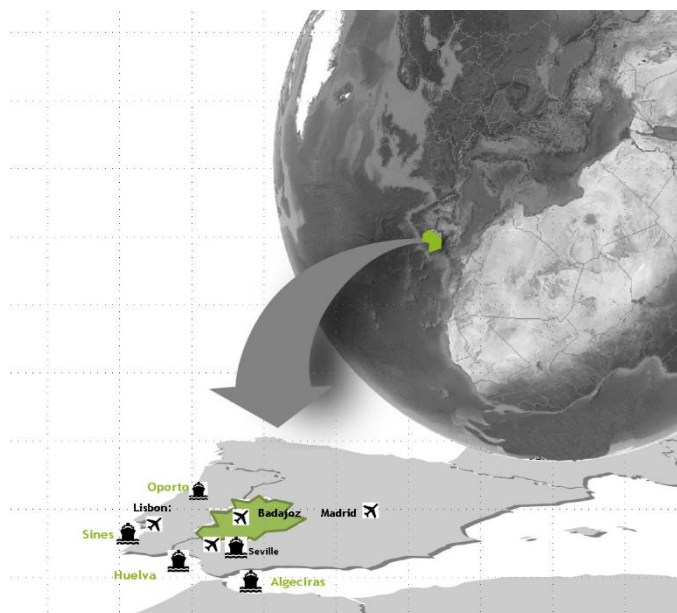
## REGIONAL PROFILE

The Region of Extremadura is an Autonomous Community located in the southwest of Spain, bordered by Portugal. In particular, its proximity to cities such as Madrid, Seville and Lisbon constitutes a geostrategic advantage.

Extremadura covers a total area of 41,634 square kilometres, being the fifth largest region in Spain, with 8.1% of the total Spanish territory.

In terms of natural resources, Extremadura has an **outstanding biodiversity**, with more than 30% of its territory under some sort of environmental protection, and one of the largest reservoir of fresh water in Spain. In this geographical and demographic context, the region has a clear **rural imprint**.

Thanks to its climate conditions, renewable energy makes Extremadura a **national leader in electricity production with solar technology, specially thermo solar energy**, being Extremadura the second producer region in Spain, and has a **biomass potential** of more than 6.8 million tons per year. The latest data (2018) indicate that renewable energy production has reached 24.8% of regional energy production. This figure means that the region is in 7th position among the Autonomous Communities in terms of clean energy production.



The dispersed and aging population has contributed to develop a **very efficient network of health, education and administrative infrastructure**. In fact, the social services in Extremadura are used as a model of good practise for regions showing similar characteristics.

Tourism is also gaining prominence thanks to the **natural and historical heritage**, and the free software is among the key segments of the regional Information and Communication Technologies (ICT).

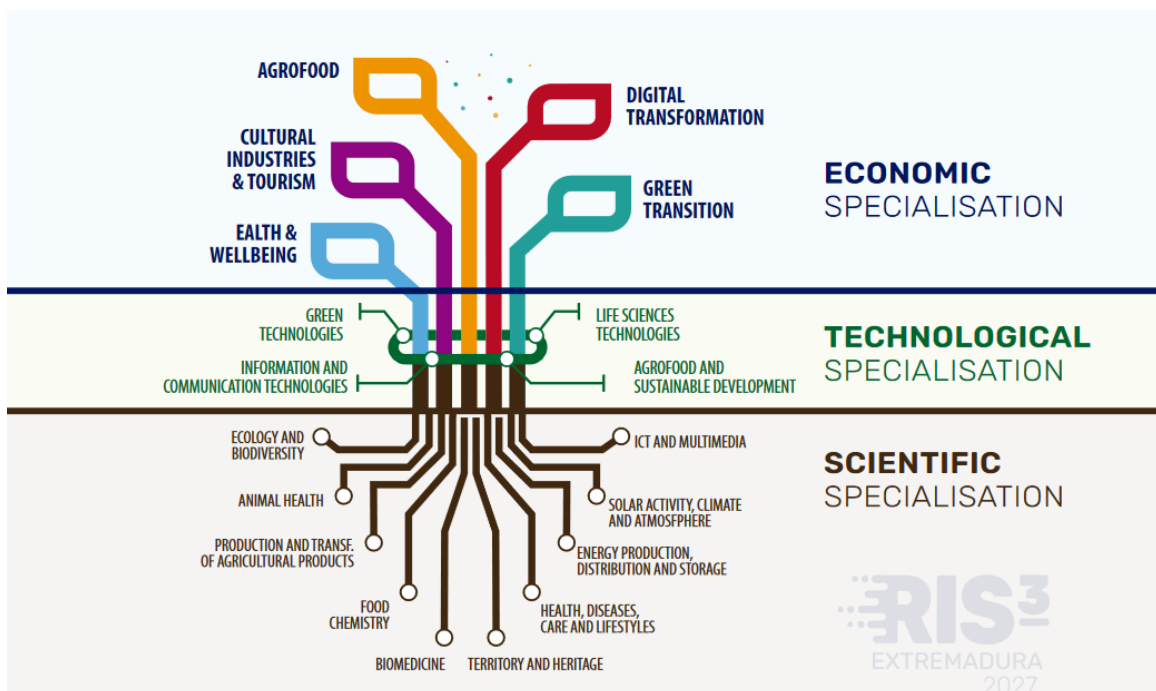
## RESEARCH, DEVELOPMENT AND INNOVATION

Spain is a highly decentralised country. Its regions are responsible for Research, Development and Innovation (R&D&I) policies and are in charge of university funding. According to this, the Regional Government (“Junta de Extremadura”), through the General Secretary of Science, Technology, Innovation and University, is responsible for coordinating **the System of Science, Technology and innovation of Extremadura (SECTI)**, which is articulated on the basis of the Extremadura Law of Science (Ley 10/2010), and for implementing policies and programmes to support research, development and innovation in the region.

The SECTI is the framework in which regional R&D&I stakeholders operate and collaborate, integrating agents that generate knowledge (as the University of Extremadura and other research and technology centres), intermediary (mainly public) bodies and regional companies.

### RIS3 2021-2027

The **smart specialisation pattern of Extremadura** describes the scientific, technological and business capabilities in which the region is best positioned:



The RIS3 Extremadura 2027 has been designed in connection with existing policies and strategies at international, national and regional level, as a roadmap to **make Extremadura an exporting region of products and services with its own brand and high added value, with the aim of moving towards a green and digital transition** capable of exploiting our resources and capacities in a sustainable way, making the region an attractive destination for investment and talent. The RIS3 Extremadura 2027 is the result of a participatory governance process and the outcome of a shared and consensual vision with companies, researchers, public administrations, policymakers, citizens and other relevant stakeholders **in the social and economic development of the region.**

**UNIVERSITY OF EXTREMADURA: The fundamental agent in the field of knowledge and talent generation for the region, and internationally well connected for your research.**

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**The Faculty of Sports Sciences, number 28 in the world according to the Shanghai Ranking:**

The Faculty of Sports Sciences of the University of Extremadura has experienced a notable rise in the 2021 Global Ranking of Sport Science Schools and Departments, reaching number 28 in this prestigious world ranking (last year it ranked 50).

**Two researchers from the UEX in the world list of most cited scientists:** Antonio Plaza and Mario Estévez continue to rank as the most influential researchers, according to the world-renowned list of highly cited researchers published by Clarivate.

**Antonio Plaza** is university professor at the Polytechnic School of Cáceres. His work focuses on the efficient processing of hyperspectral images of the earth's surface, obtained by satellites and other remote earth observation platforms. He is a **Fellow member of the Institute of Electrical and Electronics Engineers (IEEE)** and coordinator of the "Hyperspectral Computing" (HyperComp) research group of the Department of Computer and Communications Technology, University of Extremadura. He has been **Editor-in-Chief of the IEEE Transactions on Geoscience and Remote Sensing and IEEE Journal on Miniaturization for Air and Space Systems**, as well as coordinator of various national and international projects. **He has published more than 340 articles** in impact journals, being **selected as a Highly Cited Researcher in 2018, 2019, 2020 and 2021 by Clarivate Analytics.**

**Mario Estévez** is full professor at the Faculty of Veterinary Medicine of Cáceres and Coordinator of the Food Technology research group of the IPROCAR Research Institute of the University of Extremadura. His current work focuses on the impact of diet on oxidative stress and intestinal health, a subject on which he leads a research project in which doctors and nurses from the digestive system service of the University Hospital of Cáceres collaborate. **He is a recognized international expert on the impact of food oxidation on quality and safety.** He has participated in many international conferences and has taught and supervised the work of researchers from the US, Canada, China, Finland, Belgium, Denmark, Portugal, Italy, Brazil, Argentina, Mexico, among

many other countries. He has written **more than 160 scientific articles** and is editor of prestigious scientific journals in the area of Food Science & Technology & Nutrition. He has been **recognized as one of the most influential researchers in his field** (Highly Cited Researcher) in the years 2020 and 2021 by Clarivate Analytics.

Our research groups (G.I.) and projects conduct multidisciplinary research across institutional boundaries. The activity developed by the Research Groups is carried out in a wide variety of scientific-technological areas. An important part of these research areas is aligned with the areas of specialization of the Region, such as: Agri-food (Biology, Biotechnology, Production technologies, Meat products); Clean energies (Energy transition, Natural resources, Dehesa); Health (Health Technologies, Biosanitary); Tourism (Culture); ICT (Information and Communication Technologies).

In addition to the G.I. of the UEX, there are also Research Groups under the figure of mixed Research Groups. Additionally, the Research Institutes of the UEX, "are specialized centers dedicated to research related to science, technique and technology, as well as human and social sciences and artistic creation".

#### **LIST OF UNIVERSITY RESEARCH INSTITUTES AT UEX:**

- 1) **i-PAT** - Heritage Research University Institute
- 2) **IACYS** - University Institute for Research on Water, Climate Change and Sustainability
- 3) **IBPM** - University Institute of Biomarkers of Molecular Pathologies
- 4) **ICCAEX** - Institute for Advanced Scientific Computation
- 5) **IMUEX** - Institute of Mathematics of the University of Extremadura
- 6) **INBIO G+C** - University Institute of Livestock and Hunting Biotechnology
- 7) **INDEHESA** - Dehesa University Institute of the University of Extremadura
- 8) **INPEX** - University Institute of Research and Educational Prospection
- 9) **INTERRA** - University Research Institute for Sustainable Territorial Development
- 10) **INTIA** - University Institute for Research in Applied Computer Technologies
- 11) **INUBE** - University Institute of Biosanitary Research of Extremadura
- 12) **INURA** - University Institute for Agricultural Resources Research
- 13) **IPROCAR** - Meat and Meat Products Research Institute
- 14) **LINGLAP** - University Research Institute in Linguistic and Applied Languages of the UEX



These centers are aimed at facilitating collaboration between researchers and access to scientific infrastructure. They also carry out knowledge and technology development and application activities in collaboration with the region's business fabric.

The UEX has **specialized infrastructures** to support the transfer from the SECTI research teams to companies, such as the **Management and Transfer of Research Results Service (SGTRI)**, and the **European Projects Office (OPE-UEX)**, giving support for the internationalization. As an example, the connection with the following EU Network:

**ERRIN** - European Regions Research & Innovation Network, a well-established platform based in Brussels with more than 125 regional organisations. The network focuses exclusively on research and innovation policy and funding programs, as well as project development.

**ERIAFF** - Network of European Regions for Innovation in Agriculture, Food and Forestry, an informal association of regional Authorities. The Network is currently participated by 50 member Regions and 38 observers from 21 European countries.

**UNILION** - Universities Informal Liaison Offices Network, an informal network of 49 Brussels-based liaison offices representing more than 150 excellent universities from Europe and Japan.

**EURAXESS** - Researchers in Motion, a unique pan-European initiative providing information and support services to professional researchers. EURAXESS supports the mobility of researchers and professional development, while enhancing scientific collaboration between Europe and the world. The OPE, through FUNDECYT Science and Technology Park of Extremadura (FUNDECYT-PCTEX), is integrated into this network as a regional node for Extremadura.

**CORAL** - Community of Regions for Assisted Living, an informal network of European regions on active and healthy ageing.

**EURADA** - European Association of Development Agencies, gathers professionals working on economic development across Europe. EURADA represents development agencies before the European Union institutions.

**SERN** - Startup Europe Regions Network, a European network of regional stakeholders committed to inspire a culture of start-up-friendly regions. SERN offers a unique interconnected space for collaboration between regional authorities, innovation and development agencies, universities, and associations dedicated to support entrepreneurship and start-up growth across Europe.

**EBN** - European Business and Innovation Centre Network, is a not-for-profit that serves a pan-European, global community of people that use innovative business as a driver for regional (economic) development.