



## 1st Call for application to UNITA PhD Cotutelles: 2021

*This programme has received funding from Agence Nationale de la recherche*



### Context

UNITA is an alliance of six Romance-language speaking universities located in rural and cross-border mountain areas. It is constituted of the Universidade Beira Interior (Portugal), Universidad Zaragoza (Spain), Université de Pau et des Pays de l'Adour (France), Université Savoie Mont Blanc (France), Università di Torino (Italy, coordinator), and Universitatea de Vest din Timisoara (Romania), gathering more than 165,000 students and 13,000 staff members (<http://univ-unita.eu>).

One of UNITA's goals is develop Research and Innovation activities in each of the alliance's three thematic areas:

- Cultural heritage
- Renewable energies
- Circular economy

To Promote these research activities, 8 cotutelle PhD grants have been awarded to research projects that involve a French research team (at UPPA and USMB) and another partner university of the alliance. More details about each project is provided at the end of the document.

#### **Cultural Heritage**

1. On the circulation of religious literature between Italy and France in the 16th century : the case of the first French translation of Dante's Paradise (manuscripts Paris, BnF, naf 4119 and 4530) (USMB-UNITO)
2. Managing Intangible Cultural Heritage: A Comparative Case-Study between Pays de Béarn (France) and Banat (Romania) (UPPA-UVT)
3. Towards building a Virtual UNITA Montis Museum:Enhancing and Mediating Historical Cultural Heritage in a Plurilingual Environment (UPPA-UNITO)

#### **Circular Economy**

1. Development of enabling technologies for regional residual biomass valorization in a context of circular economy. (USMB-UNITO)
2. Development of sustainable nanofibrous material from bacterial polymers and biobased waterborne latex (UPPA-UBI)

## **Renewable Energy**

1. Distributed solar energy source in a mixed local renewable energy system in response of energy demand in mixed urban – rural attractive territory (USMB-UNIZAR)
2. DESCOPE-NANO: Durable and Efficient Solar Cells COmbining PErovskite and NANOcrystals (USMB-UNIZAR)
3. Synthesis of stable Hole Transporting Materials (HTMs) for emerging hybrid photovoltaics (UPPA-UNITO)

## **Aim**

Through this first call, highly motivated candidates are called to develop their research talent beyond their master degree by choosing one of the projects listed above. We seek outstanding candidates with a clear passion for research and who are excited by the opportunity to raise scientific knowledge within the frame of UNITA. Fellows will benefit from academic supervision and co-supervision from partners universities within UNITA

## **Procedure:**

Fellowships are open to highly-qualified graduates from fields in connection with the research project they apply for. We want to attract candidates who stand out for their scientific excellence and to whom we will offer scientific challenges that meet their expectations.

**Monthly net salary before taxes** = 1350 €, with other diverse allowances for mobility, conferences.

**Employer** : Université de Pau et des Pays de l'Adour (UPPA) or Université Savoie Mont Blanc (USMB)

**Start** : September 2021 - Duration : 36 months

## **Eligibility:**

**Citizens of all nationalities** are eligible to apply

**Entrance requirements:** candidates must hold a Master's degree (or equivalent degree) with outstanding records

**Required competencies:** Applicants are expected to show outstanding commitment connected to the projects they are applying for.

## **Selection criteria:**

.The candidate's marks and rankings during the selection process

.The candidate's motivation, scientific maturity, and curiosity

.The adequacy between the research project and his/her skills

.Ability to work independently and to take responsibility for the progress and the quality of the project

## **Schedule**

- **Opening of the call:** 28 June 2021
- **Deadline for application:** 9 July 2021. 12h00 (Noon)
- **Selection process:** from July 12 to 21 2021
- **Nomination of candidates:** July 21 2021
- **Starting of the PhD:** September 2021

## **Subjects for Cultural Heritage**

### **On the circulation of religious literature between Italy and France in the 16th century : the case of the first French translation of Dante's Paradise (manuscripts Paris, BnF, naf 4119 and 4530)**

**Supervisors:** Dr. Massimo LUCARELLI (USMB) and Prof. Paola CIFARELLI (UNITO)

**Home University :** Université Savoie Mont Blanc, France

**Discipline :** History

**Project summary :** The PhD project aims to provide a critical edition of Bergaigne translation and to reflect on how a major medieval literary work whose purpose was “to remove those living in this life from the state of misery and to lead them to the state of bliss” (as Dante wrote in the letter by which he dedicated the Paradise to Cangrande della Scala), spread from Italy to France in a crucial period for the unity of western European Christianity. Did Bergaigne's translation and paratextual additions contribute to convey in France a catholic response against Martin Luther, whose Reformation was criticizing the cult of the Saints and the sacrament of penance (that on the contrary have a key role in Dante's “sacred poem” [Paradise, XXV, 1])? Who was Bergaigne's translation addressed to? And how do the miniatures in the manuscripts strengthen the moral message of both the text and the paratext? Answering these questions will contribute to advance the understanding of cultural and cultic exchanges between Italy and France at the beginning of the Renaissance.

The methodology is linked to textual criticism and to philology, with a particular focus on the historical, cultural and linguistic contexts.

### **Managing Intangible Cultural Heritage: A Comparative Case-Study between Pays de Béarn (France) and Banat (Romania)**

**Supervisors:** Dr. Patricia HEINIGER-CASTERET (UPPA) and Prof. Otilia HEDESAN (UVT)

**Home University :** Université de Pau et des Pays de l'Adour, France

**Discipline :** Anthropology

**Project summary:** The preservation and development of Intangible Cultural Heritage (ICH) is managed, at a first level, by local actors, but also involves institutions from regional and national authorities. Each country, each region, develops specific programmes, strategies and policies adapted to the realities of the territories. Inclusive research-action programmes carried out at the regional level, for instance, have been able to put in place methods of scientific approach and valorisation of ICH, but these methods have simultaneously revealed major risks such as weakening living practices.

The subject of this thesis focuses on the management of ICH from a comparative point of view in Banat (Romania) and the Pays de Béarn (France). Two axes will have to be examined. First, a preliminary work of legislative, administrative and cultural comparison between France and Romania will have to be established in order to examine the modes of management of ICH (its identification, its treatment in the inventories, its scientific analyses, its valorization, its transmission, its dedicated resource centres, etc.). Secondly, an action-research project will lead the PhD student to conduct semi-directive interviews with each of the actors, practitioners, scientists, politicians and administrators in order to understand the expectations and mechanisms put in place, from the local to the national level, in ICH management. In order to carry out this ethnography of expressions and networks of actors, the PhD student will have to participate actively in cultural or ICH promotion/enhancement events using as much as possible participant observation.

## **Towards building a Virtual UNITA Montis Museum: Enhancing and Mediating Historical-Cultural Heritage in a Plurilingual Environment**

**Supervisors:** Prof. Laurence ROUSSILLON-CONSTANTY (UPPA)  
Prof. Silvia PIREDDU (UNITO)

**Home University:** Université de Pau et des Pays de l'Adour, France

**Discipline:** English studies

**ERC SH5:** Cultures and Cultural Production Literature, philology, cultural studies, study of the arts, philosophy

SH5\_2 Theory and history of literature, comparative literature

SH5\_6 History of art and architecture, arts-based research

SH5\_7 Museums, exhibitions, conservation and restoration

SH5\_8 Cultural studies, cultural identities and memories, cultural heritage

**Project summary:** Over the past decade, the world of cultural heritage has witnessed dramatic digital transformations becoming widely accessible and facilitating access to knowledge of the past, enhancing information for present and future use. However, the downside of this development is the tendency to standardize culture and make an overbearing use of English as a means of communication.

The project intends to address this issue and demonstrate how English, instead, can be used to disseminate knowledge and provide visibility to local communities (esp. the mountain areas).

We invite the PhD candidate to study aspects of cultural heritage while considering language skills and communication, education and the media. Aside from theoretical readings on cultural heritage, landscape theory and communication matters, the candidate will be invited to implement a hands-on approach to cultural mediation (with a particular interest in education schemes) and collaborate to create an online thesaurus to connect the places and languages of the consortium.

The ideal candidate for this position should hold a Master's Degree in English Studies or any other field indicated above and have a strong interest for the dissemination of Cultural Heritage.

## **Subjects for Circular Economy**

### **Development of enabling technologies for regional residual biomass valorization in a context of circular economy**

**Supervisors:** Dr. Gregory Chatel (USMB) and Prof. Giancarlo Cravotto (UNITO)

**Home University :** Université Savoie Mont Blanc, France

**Discipline :** Science and System engineering

**Project summary :** In the context of a circular economy, the establishment of new waste or coproduct valorisation channels at the scale of a territory requires the development of new technologies and processes leading to innovative solutions. PhD student will work on the residual biomasses available in the Savoie Mont Blanc territory and the Piedmont region to identify new ways of recovering waste or coproducts, common to these two territories (agriculture, agrifood or other local practices). The heart of the thesis will focus on the development of new technologies based in particular on unconventional techniques and methods for a green and sustainable process intensification. Among them ultrasound, hydrodynamic cavitation, microwaves, ball milling, extruders, supercritical CO<sub>2</sub>, and hybrid techniques, all outstanding allies to convert biomass into value-added platform chemical and materials.

### **Development of sustainable nanofibrous material from bacterial polymers and biobased waterborne latex**

**Supervisors:** Dr. Maud Save (UPPA) and Dr. Isabel Gouveia (Universidade Beira Interior UBI, Portugal)

**Home University :** Université de Pau et des Pays de l'Adour (UPPA), France

**Discipline:** Polymer chemistry, Materials, Biotechnology.

**Project summary:** Over the years, production and abusive use of products from fossil fuels is leading to increased environmental concerns, which, in turn, intensifies the growing interest in natural alternatives and their application for the development of sustainable solutions. In accordance, this PhD project sits at the frontier of recent biobased materials research in natural polymers (exopolysaccharides) and advances in biobased waterborne latex to produce innovative nanofibrous bioplastics with the best balance between high performance of final product and sustainability, directly supporting the future changes to a biobased economy. Providing solutions to the double substitution of harmful and fossil resource-based chemicals with less toxic and more sustainable biobased materials, is at the heart of the project.

## **Subjects for Renewable Energy**

### **Distributed solar energy source in a mixed local renewable energy system in response of energy demand in mixed urban – rural attractive territory**

**Supervisors:** Prof. Christophe Ménézo (USMB) and Prof. Norberto Fueyo (UNIZAR)

**Home University :** Université Savoie Mont Blanc, France

**Cotutelle PhD Thesis :** Université Savoie Mont Blanc/ Zaragoza University

**Discipline:** Energy Engineering and Fluid mechanics

#### **Project summary:**

This PhD thesis is the first step of a broader project aiming at considering globally the 100% Renewable Energy use, considering the grids capabilities to manage intermittency, the variability of the resources, as well as a certain flexibility between different energy vectors and energy their storage.

The objective of the thesis is to investigate prospective scenarios, with the horizon of year 2050, that will consider climate change effects in terms of renewable energy potential and energy demand, and the trends towards a voluntary energy transition scheme. For each demand scenario, an optimal production mix will be identified to maximize the dynamic cover of the residential energy needs. The selected territories (Grand Bornand in Savoy and the Zaragoza area) are abundant in solar resources that still not fully exploited; and the use of solar energy as primary energy source is limited. Moreover both Grand Bornand and Zaragoza are surrounded by areas suitable for the production of complementary renewable energy for electricity (wind in the case of Zaragoza, bio-gas, hydroelectricity for Grand Bornand) and heat&cool production.

The work will include, for urban area the potential of building facades that, even if they are not optimally oriented, that will become economically attractive due to space limitations. The optimization of landscape surfaces will be also considered for rural area (ex. agricultural production and energy generation). The complexity of a mixed urban-rural environment as well as the distributed nature of the solar photovoltaic energy production requires to develop an integrated simulation approach in order to quantify their benefits and ensure proper implementation and economic feasibility. An increasing number of cities are now modeled in 3D and recent progress in computing make it possible to achieve acceptable accuracy in an annual daylight simulation with significant reduced simulation time, and also to deal with larger spatial scales as is necessary for solar cadasters. The approach that this PhD will develop is original because it will allow hourly time steps for both residential energy loads and distributed power generation at urban territory or mixed rural-urban scale.

Starting from an existing tool, Archelios, developed by *Cythelia energy* in order to assess 3D city and territory solar cadaster, the PhD aims at assessing solar PV energy production from building rooftops and vertical facades based on a 3D model of a city. The study will use real data provided by local authorities, thus allowing to validate the adopted modelling approach in order to elaborate prospective scenarios with a year 2050 horizon. The approach will represent the basis for implementation of multi-criteria management technics grounded on geo-referenced tools (GIS) relying on information layers.

**Keywords :** Solar energy, Building energy consumption, Energy Planning, Modelling

## **DESCOPE-NANO: Durable and Efficient Solar Cells COmbining PErovskite and NANOcrystals**

**Supervisors:** Pr. Lionel FLANDIN (USMB) and Dr. María Bernechea Navarro (UNIZAR)

**Home University :** Université Savoie Mont Blanc, France

**Discipline:** Chemistry-Materials.

**Project summary:** The main goal of the project is to assemble a solar cell device containing two types of light harvester materials namely, a hybrid halide perovskite and AgBiS<sub>2</sub> nanocrystals (NCs), to obtain an extended to infrared light absorption solar cell device with improved performance. The stability of the device together with working and degradation mechanisms will be studied in detail to design ways to optimize devices, formulation, processing and post-processing.

To attain this goal two groups with complementary expertise will work together to provide the PhD student with a complete set of skills. Synthesis of active materials, assembly and solar cell efficiency will be mainly performed at UNIZAR while modelling and degradation studies will be performed at USMB.

## **Synthesis of stable Hole Transporting Materials (HTMs) for emerging hybrid photovoltaics**

**Supervisors:** Dr. Christine LARTIGAU DAGRON (UPPA) and Dr. Nadia BARBERO (UNITO)

**Home University :** Université de Pau et des Pays de l'Adour, France

**Discipline:** Chemistry-Materials.

**Project summary:** This PhD project aims at developing interfacial layers for emerging hybrid photovoltaic cells, in particular for Perovskite Solar Cells (PSCs). It appeared from the state of the art that suitable hole transporting materials that could guarantee the required long-term stability of perovskites are still missing. Based on the expertise of partners IPREM (UPPA) and MOF (UNITO), new organic molecular and macromolecular materials will be developed, respectively. The workplan will be shared between both partners to synthesize and characterize the materials. The routes will be complementary with the design of materials based on the same building blocks. Particular attention will be paid on the use of friendly synthetic techniques and solvents to respect the industrial requirements. To further study materials properties in photovoltaic devices, the PhD student will do several stays at CHOSE in Rome.

**Required skills:** practical knowledge of organic chemistry and/or polymer chemistry. Know-how on pi-conjugated materials would be an asset.