

MSCA Postdoctoral Fellowships 2026

Research with Industrial and Societal Impact
Instituto Superior Técnico Research Ecosystem



Connecting outstanding postdoctoral researchers with world-class supervisors, interdisciplinary research centres, industry partners and high-impact scientific challenges.

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Instituto Superior Técnico Research Ecosystem

Research with Industrial and Societal Impact

Research centers from the IST research ecosystem invite outstanding postdoctoral researchers worldwide to submit an **Expression of Interest** for the Marie Skłodowska-Curie Postdoctoral Fellowships (MSCA-PF) 2026.

Candidates will develop ambitious and high-impact research projects with internationally recognised supervisors across Artificial Intelligence, Energy, Mobility, Materials, Health, Biotechnology, Climate and Digital systems and basic sciences.

Selected Candidates Will Benefit From

Dynamic
interdisciplinary
research
ecosystem

Dedicated
supervision and
mentoring

MSCA-PF
proposal writing
masterclass

Institutional
proposal
preparation
support

Join the IST research ecosystem and shape a better future through impactful research.

A globally connected research ecosystem

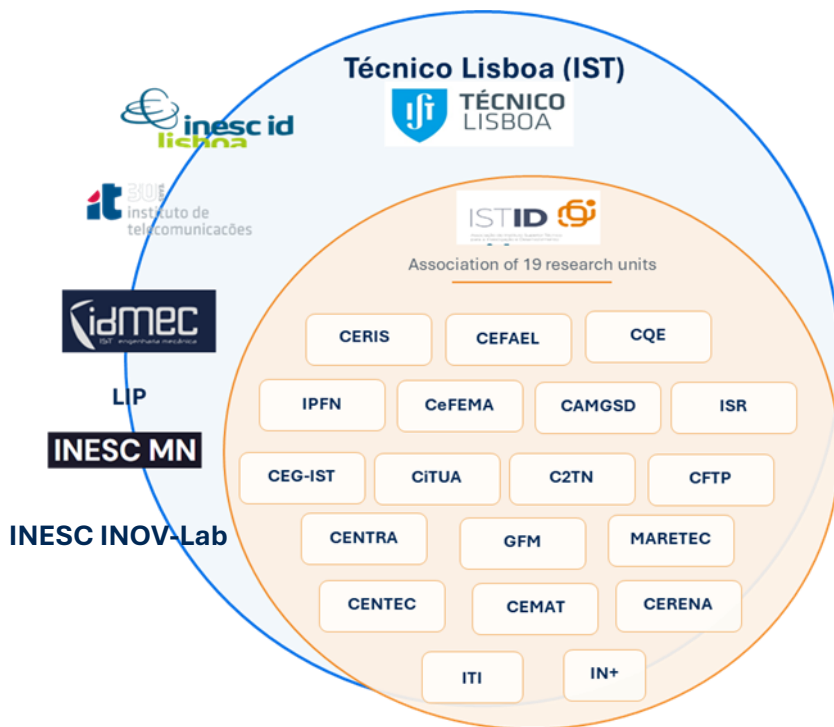
([IST](#), [IST-ID](#), [INESC-ID](#), [INESC-INOV Lab](#), [INESC-MN](#), [IDMEC](#), [IT](#), [LIP](#))

Instituto Superior Técnico (IST) is Portugal's leading school of **engineering, science and technology**, integrating internationally recognised research centres, advanced infrastructures and **strong links with industry and global innovation networks**.

Interdisciplinary
excellence

Horizon Europe
participation

Industry
collaboration



Research Strengths

- Artificial Intelligence
- Climate & Energy
- Biotechnology
- Digital Systems
- Advanced Materials
- Smart Mobility
- Biomedical Engineering
- Sustainable Infrastructure

International

Research collaborations

Interdisciplinary

Research ecosystem

High-impact

Scientific innovation

Multiple Research Domains Across IST's Ecosystem

Candidates may apply to a broad portfolio of interdisciplinary MSCA-PF research opportunities.

Information & Communication Technologies

Computing and Informatics, Digital transformation, Robotics, AI and Intelligent Systems, Telecommunications and Security and data science

Engineering & Production Technologies

Space, Aeronautics and Oceans, Process Eng., Manufacturing, Automation and Industry 4.0, Marine Technologies

Materials, Microtechnology & Nanoscience

Architectural and Advanced Materials, Micro/Nano Technologies and Nanosciences, Electronics, Biological and Biomedical Devices

Technology Management & Entrepreneurship

Decision science and Management Eng., Operations Logistics and Supply Chains, Strategy, Innovation and Entrepreneurship, Public Policies

Energy, Environment & Mobility

Decarbonization and Climate challenges, Energy efficiency, renewables, Hydrogen and energy storage, Territorial Management Urban Planning and Construction, Geomodelling and Geophysics, Transportation Systems

Applied Life Sciences

Applied Microbiology, Biomedical Eng., Genomics and Systems Biology, Modelling of Biological Systems, Bioengineering and Biotechnology, Cell and Tissue Engineering and Regenerative Medicine

Basic Sciences

Physics, Mathematics, Chemistry, Biological Sciences, Geology

Programme Highlights

- International supervisors
- Horizon Europe integration
- Proposal writing support
- Industrial collaboration
- Interdisciplinary ecosystem
- High-impact research

Candidate Support Framework

Selected candidates will benefit from a structured institutional support process including:

- supervisor matching and scientific guidance;
- proposal development support;
- online MSCA-PF Masterclass;
- proposal review and feedback;
- administrative and procedural guidance;

Structured mentoring and institutional guidance are designed to maximise MSCA competitiveness.

MSCA-PF 2026 Timeline

- **Launch**
18 May
- **EoI Deadline**
20th June
- **Masterclass**
30th June
- **Proposal Development**
June–September
- **MSCA-PF 2026 Submission Deadline**
9th September

CANDIDATE JOURNEY

Your path to an MSCA Postdoctoral Fellowship



From opportunity to impact — advancing research excellence and driving change through **MSCA Postdoctoral Fellowships**.



MSCA-PF 2026 Eligibility Conditions

Applicants must comply with the eligibility conditions established by the European Commission.



PhD Requirement

Candidates must hold a PhD degree by the call deadline.



Research Experience

Maximum of 8 years of full-time equivalent research experience after the PhD award.



Mobility Rule

Mobility rules apply according to the MSCA-PF framework.

Candidates are encouraged to consult the [official MSCA-PF call conditions](#) for detailed eligibility information.

Important Notes

- Eligibility follows official European Commission MSCA rules
- Mobility conditions are mandatory
- Research experience is calculated after PhD award
- Candidates should consult official MSCA-PF call documents

Applications must be submitted through an Expression of Interest form.

Evaluation Process

Expressions of Interest will be evaluated by supervisors and research centres based on:

- scientific excellence;
- alignment with research opportunity;
- MSCA competitiveness;
- innovation and impact potential;
- feasibility and strategic fit.

Selected candidates will be contacted directly regarding the next stages of the proposal preparation process.

- Candidates should prepare:
- Curriculum Vitae;
 - publication list;
 - short research proposal concept;
 - motivation statement.

Contact

For questions regarding the MSCA-PF programme or the application process, please contact: pre-award@ist-id.pt

Explore IST Research Ecosystem's Flagship MSCA-PF 2026 Research Clusters

Select a thematic cluster to explore supervisor opportunities and dedicated research offers.

AI, Data & Digital Systems

[Click to open cluster opportunities](#)

Energy, Climate & Environmental Resilience

[Click to open cluster opportunities](#)

Urban Mobility, Transport & Smart Infrastructures

[Click to open cluster opportunities](#)

Materials, Sustainable Built Environment & Urban Futures

[Click to open cluster opportunities](#)

Health, Biomedical & Regenerative Technologies

[Click to open cluster opportunities](#)

Biotechnology, Microbiology & Environmental Health

[Click to open cluster opportunities](#)

Mathematics, Modelling & Decision Sciences

[Click to open cluster opportunities](#)

Sustainable Industry, Manufacturing & Bioprocessing

[Click to open cluster opportunities](#)

Navigation

1. Select cluster
2. Open opportunity slide
3. Explore supervisors & Access detailed project information

[Submit Expression of Interest](#)

AI, Data & Digital Systems

Ana Maria Madureira — INESC INOV-Lab

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Ana Paiva — INESC-ID

[*Social Artificial Intelligence and Human-Agent Interaction*](#)

António Manuel R. C. Grilo — INESC INOV-Lab

[*Agentic AI for Autonomous Aerial Communication Networks*](#)

Arlindo Oliveira — INESC-ID

[*Hybrid Deep Learning and Reasoning Architectures*](#)

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[*Trustworthy Edge AI Hardware and Embedded Intelligence*](#)

Ricardo Araújo — CERENA, IST

[*Deep Learning, Event Cameras and Animal Motion Analysis*](#)

AI-Accelerated Systems-on-Chip and Chiplet Architectures

[Guilherme Paim](#) — INESC-ID

Research Domain: Information & Communication Technologies



Research Overview

This project explores next-generation hardware acceleration architectures for Artificial Intelligence and secure computing systems through scalable Systems-on-Chip and chiplet-based approaches.

Potential Research Topics

- AI hardware acceleration
- Chiplet architectures
- FPGA and embedded systems
- Cryptographic acceleration
- Energy-efficient computing

Expected Candidate Profile

- Electrical Engineering
- Computer Engineering
- Embedded Systems
- Hardware Design
- AI Systems

[More Information](#)

Why This Opportunity Matters

The project contributes to trustworthy and scalable AI hardware infrastructures with applications in advanced computing, cybersecurity and embedded intelligence.

Keywords: AI Hardware | SoC | FPGA | Embedded Systems | Cryptography

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Brief description of the proposed research topic(s) for MSCA-PF candidates?

My group works on Artificial Intelligence, DSP and Cryptographic Acceleration for Scalable Systems on Chip and Chiplets Designs. From Silicon to Software, we also make AI Compilers to configure and optimize SW for our chips. So, we want people from HW and SW to help us to develop next-generation AI platforms

What makes your research group and environment attractive to candidates?

We have an excellent Chip design infra with europractice tools, access for advanced nodes and know how to make efficient chips to tapeout. Besides, we have an excellent FPGA server infrastructure to emulate large systems on chip designs.

We collaborate with top groups in EU (e.g TUM, KU Leuven, ETHZ, etc.), USA (e.g, CMU) and Brazil (e.g, UFRGS, UNICAMP). We also have a strong collaboration with important companies (e.g, Bosch, Chipus, Synopsys, etc) on chip design.

What type of candidate profile are you looking for?

Any of these skills:

- AI models and Compilers (MLIR)
- Cryptographic Systems
- RISC-V assembly
- Processor Design
- SoC Design
- Ultra-low Voltage (ULV design)
- HW Accelerators Design
- Digital ASIC Frontend flow
- Digital ASIC Backend flow
- Chiplets / Advanced Packaging
- Offchip interconnects (UCIe, PCIe, DDR, HBM)
- On-chip interconnects (AXI, AHB, APB, OBI, NoC)

Hybrid Deep Learning and Reasoning Architectures

[Arlindo Oliveira](#) — INESC-ID

Research Domain: Artificial Intelligence



Research Overview

Research focuses on hybrid AI architectures integrating deep learning and symbolic reasoning to create more explainable, robust and trustworthy intelligent systems.

Potential Research Topics

- Neuro-symbolic AI
- Explainable AI
- Reasoning systems
- Cognitive architectures
- Trustworthy machine learning

Expected Candidate Profile

- Artificial Intelligence
- Computer Science
- Machine Learning
- Cognitive Systems
- Data Science

[More Information](#)

Why This Opportunity Matters

This opportunity contributes to the next generation of interpretable AI systems capable of combining reasoning, learning and human trust.

Keywords: Deep Learning | Explainable AI | Neuro-Symbolic AI | Cognitive Systems

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Brief description of the proposed research topic(s) for MSCA-PF candidates

The research programme investigates deep learning architectures that combine fast pattern recognition with slower, deliberative reasoning mechanisms inspired by dual-process theories of cognition.

The work focuses on recurrent and iterative neural architectures, including recurrent transformers, memory-augmented networks, graph-based reasoning systems, and neuro-symbolic models capable of multi-step inference, planning, abstraction, and self-reflection.

The objective is to develop robust and interpretable AI systems that integrate learning, reasoning, memory, and symbolic manipulation, addressing current limitations of large language models in compositionality, long-horizon reasoning, and generalization.

What makes your research group and environment attractive to candidates?

The Machine Learning and Knowledge Discovery (<https://mlkd.idss.inesc-id.pt/>) group at INESC-ID is a research group dedicated to advancing the state of the art in machine learning, deep learning, and knowledge discovery, with applications in areas such as medical imaging, natural language processing, computer vision, reasoning models, and sequential decision making.

Its research spans topics including learning theory, neural networks, reinforcement learning, self-supervised learning, attention mechanisms, and neuro-symbolic approaches, combining fundamental research with practical applications in AI-driven systems.

The group is closely connected to Instituto Superior Técnico and provides a strong research environment with advanced GPU computing infrastructure, supporting both doctoral and post-doctoral research in modern AI and data-driven methods.

What type of candidate profile are you looking for?

The ideal candidate should have a strong background in computer science, machine learning, mathematics, or related areas, with experience in deep learning frameworks and scientific programming. Interest in modern AI topics such as reasoning, recurrent architectures, large language models, neuro-symbolic methods, or cognitive-inspired AI is highly valued, together with strong analytical skills, creativity, and motivation for research.

Social Artificial Intelligence and Human-Agent Interaction

[Ana Paiva](#) — INESC-ID

Research Domain: Artificial Intelligence & Social Sciences



Research Overview

The project develops socially intelligent systems integrating affective computing, social AI and human-agent interaction for natural and trustworthy digital experiences.

Potential Research Topics

- Social AI
- Human-agent interaction
- Affective computing
- Conversational agents
- Human-centred AI

Expected Candidate Profile

- Artificial Intelligence
- Human-Computer Interaction
- Cognitive Science
- Social Robotics
- Interactive Systems

Why This Opportunity Matters

Research supports the development of ethical and human-centred AI systems with applications in education, healthcare and digital interaction.

Keywords: Social AI | Human-Agent Interaction | Affective Computing | Human-Centred AI

Dynamic Knowledge Graphs and AI for Resilient Networked Systems

[João Tiago Aparício](#) — INESC-ID

Research Domain: Artificial Intelligence / Network Science



Research Overview

This project investigates dynamic knowledge graphs and intelligent networked systems to improve resilience, adaptability and complex systems management.

Potential Research Topics

- Knowledge graphs
- Complex systems
- Network science
- Graph AI
- Resilient infrastructures

Expected Candidate Profile

- Artificial Intelligence
- Network Science
- Computer Science
- Data Engineering
- Complex Systems

[More Information](#)

Why This Opportunity Matters

The project supports resilient and adaptive digital infrastructures capable of handling large-scale dynamic information ecosystems.

Keywords: Knowledge Graphs | Network Science | Graph AI | Complex Systems

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Brief description of the proposed research topic(s) for MSCA-PF candidates

The proposed project will develop graph-based retrieval and data-fusion methods for building living network representations from dispersed digital evidence. In many problems of interest, mobility resilience, scientific and technological emergence, institutional intelligence, and urban disruptions, the relevant evidence is not a clean dataset. It is scattered across web pages, PDFs, reports, open data portals, APIs, geospatial layers, timetables, scientific corpora, event logs, and other heterogeneous sources. The project is centred on how to collect, retrieve, extract, align, and fuse these traces into dynamic knowledge graphs and multilayer networks whose nodes, edges, and events remain traceable to their sources.

The fellow may work on responsible web and document scraping and parsing, graph-based information retrieval, entity and event linking, semantic and spatiotemporal alignment, uncertainty-aware data fusion, temporal network analysis, graph learning, and resilience metrics. This research may be applied to disruption intelligence for mobility, dynamic maps of emerging research areas, and evidence graphs for public-sector decision support. Expected outputs include algorithms, reproducible pipelines, open datasets or benchmarks, and publications in Information Retrieval, Network Science, and AI.

What makes your research group and environment attractive to candidates?

The fellow will be hosted at INESC-ID, having the opportunity to collaborate with several public and defence sectors. The environment is attractive for candidates who want to research and develop computational methods keeping contact with concrete empirical problems.

The supervision will emphasise methodological originality, reproducible software and a strong publication strategy. The candidate will be encouraged to build an independent profile and will have flexible work hours. IST and INESC-ID provide a strong technical ecosystem, international research connections, interdisciplinary collaborations and opportunities to engage with public-sector and non-academic stakeholders.

What type of candidate profile are you looking for?

I am looking for a motivated and resilient candidate, with a strong publication record and ideally evidence of software or reproducible research outputs.

The background may be interdisciplinary, but should connect clearly to Computer Science, Data Science, AI, Information Retrieval, Network Science, complex systems, geospatial analysis or related areas.

Useful skills include Python, graph analysis, machine learning, NLP, knowledge graphs, web and document processing, data fusion, temporal or spatial data analysis.

The ideal candidate is intellectually independent, willing to experiment, comfortable with imperfect real-world data, careful with evaluation and provenance, and ambitious about producing both excellent papers and reusable computational artefacts.

Machine Learning for Biological and Environmental Systems

[Manuel Lopes](#) — INESC-ID

Research Domain: Artificial Intelligence / Applied Life Sciences



Research Overview

This interdisciplinary opportunity applies advanced machine learning approaches to better understand complex biological and environmental systems. The project aims to develop computational models capable of extracting meaningful patterns from large-scale, uncertain and heterogeneous datasets.

Potential Research Topics

- causal machine learning
- representation learning
- scientific AI
- biological modelling
- environmental data analysis

Expected Candidate Profile

- Machine Learning
- Computational Biology
- Data Science
- AI for Science
- Environmental Modelling

[More Information](#)

Why This Opportunity Matters

The project bridges AI and scientific discovery, contributing to data-driven understanding of biological and environmental dynamics with potential societal and sustainability impact.

Keywords: Machine Learning | AI for Science | Computational Biology | Environmental Systems | Data Science

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Brief description of the proposed research topic(s) for MSCA-PF candidates

We're using new machine learning tools to get a better handle on how biological and environmental systems actually work. This covers everything from tracking the specific ways fish and insects behave to improving large-scale environmental monitoring and sustainability.

The goal is to use these computational methods to bridge the gap between observing nature and actually solving complex problems. It's a chance to see how advanced tech can help us understand—and protect—the natural world more effectively.

What makes your research group and environment attractive to candidates?.

Good infrastructure, several collaborations with biologists and industry, international environment, lively and safe city

What type of candidate profile are you looking for?

A good candidate should be organized and self-motivated. Computational and mathematical modelling skills are fundamental. Interest in the described applications

Agentic AI for Autonomous Aerial Communication Networks

[António Manuel Raminhos Cordeiro Grilo](#) — INESC INOV-Lab

Research Domain: Artificial Intelligence / Telecommunications



Research Overview

This research investigates self-organising aerial communication networks composed of autonomous drones functioning as mobile aerial base stations. The project aims to develop next-generation architectures based on Agentic AI and multimodal data fusion for adaptive communication infrastructures.

Potential Research Topics

- autonomous UAV coordination
- multi-agent AI systems
- resilient communication networks
- multimodal sensing
- distributed optimisation
- adaptive connectivity systems

Expected Candidate Profile

- Telecommunications
- Artificial Intelligence
- Autonomous Systems
- Robotics
- UAV Networks
- Distributed Systems

[More Information](#)

Why This Opportunity Matters

The project addresses emerging communication challenges in disaster response, mobility systems and future autonomous infrastructures.

Keywords: Agentic AI | UAV Networks | Autonomous Systems | Telecommunications | Multi-Agent Systems

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Brief description of the proposed research topic(s) for MSCA-PF candidates

Mobile Networks of Aerial Base Stations (ABSs) are networks comprising Uncrewed Aerial Vehicles (UAVs) or drones, which are deployed on demand to provide connectivity to mobile users, which can be pedestrians, ground vehicles or other UAVs. These networks are considered especially useful in situations where the terrestrial mobile network is inexistent, crippled, damaged, or insufficient (e.g., crowd events, disaster scenario, military operations, etc.). Optimization of ABS positioning has been a topic or research in the last decade, but the scope of the proposed solutions is often narrow through the selection of specific algorithms, which can be centralized (slow response to changes, not scalable) or decentralized (local decisions, fast, not optimal). Only lately some new approaches have started to integrate Agentic AI together with Multimodal Data Fusion to optimize ABS positions.

The objective of this research is to develop new architectures for self-organizing Mobile Networks of ABSs based on Agentic AI. The architecture should define different layers of agent decision making (e.g., strategic mission orchestration at the top (e.g., algorithm selection), optimization of individual ABSs at the bottom). The architecture should also be able to guarantee minimum connectivity when the number of ABSs is not enough to provide full coverage.

What makes your research group and environment attractive to candidates?

INESC INOV-Lab, an R&D Unit within INESC INOV, offers a unique and highly competitive environment for researchers by seamlessly bridging the gap between fundamental science and market-ready innovation.

Our visionary mission is centered on the full data value chain, driving high-impact digital transformation through three strategic areas: Cyber-Physical Systems and Computing, Intelligent Communication Networks, and Intelligent Information Systems. To support this mission, candidates may have access to world-class facilities, including the pioneering Integrated 5G/6G and Optoelectronics and Electronics Labs, a Data Centre continuously upgraded with high-capacity GPUs for AI, and NATO Class 1 Classified Information Facilities for sensitive defense projects. We are deeply committed to empowering our talent through a structured Career Development Programme and tailored Training initiatives. Furthermore, candidates thrive in our globally connected ecosystem.

We actively lead major Horizon Europe projects, COST Actions, and international events, such as EuCNC & 6G Summit and SCEE, among others. Above all, INESC INOV-Lab guarantees robust operational support, providing researchers with the freedom and the ideal ecosystem for their ideas to thrive and translate into high-impact innovation for society and industry.

What type of candidate profile are you looking for?

The ideal candidate should hold a PhD in Computer Science or Telecommunications Engineering with deep expertise in UAV communications and Agentic AI. Proficiency in designing decentralized architectures, and multi-agent systems (e.g., AutoGen) is essential. They must demonstrate experience in multimodal data fusion and optimization techniques for dynamic network topologies.

A strong track record of publishing in high-impact journals and proficiency in simulation tools like NS-3, OMNeT++, or Python-based AI frameworks are required. We seek a proactive researcher capable of bridging the gap between high-level mission orchestration and low-level swarm intelligence

Trustworthy Edge AI Hardware and Embedded Intelligence

Mário Véstias — INESC INOV-Lab

Research Domain: [Embedded Systems / Artificial Intelligence](#)



Research Overview

This opportunity focuses on next-generation trustworthy AI platforms for edge and embedded systems operating under strict real-time, safety and energy constraints. Applications span automotive systems, healthcare devices, aerospace and industrial automation.

Potential Research Topics

- AI accelerators
- heterogeneous computing
- edge intelligence
- hardware/software co-design
- fault tolerance
- embedded AI systems

Expected Candidate Profile

- Embedded Systems
- Computer Architecture
- AI Hardware
- Real-Time Systems
- Hardware/Software Co-Design

[More Information](#)

Why This Opportunity Matters

The project contributes to robust and trustworthy AI infrastructures for mission-critical systems and next-generation intelligent devices.

Keywords: Edge AI | Embedded Systems | AI Accelerators | Trustworthy AI | Hardware Design

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Brief description of the proposed research topic(s) for MSCA-PF candidates

This research topic focuses on the design of a next-generation hardware/software platform for trustworthy Artificial Intelligence (AI) at the edge. The goal is to enable efficient execution of complex AI workloads under strict requirements for determinism, energy efficiency, functional safety, and fault tolerance, which are essential in safety- and mission-critical embedded systems.

The research is integrated in a full computing stack from hardware to software. On the hardware side, candidates may explore novel AI accelerator designs, heterogeneous multi-core architectures, and low-power processing units optimized for real-time inference. On the software side, work may include development of compilers, runtime systems, or scheduling strategies that ensure predictable and trustworthy execution.

A key aspect is hardware/software co-design, enabling tight integration between architectural features and software abstractions. Additional focus areas include support for fault tolerance mechanisms, safety assurance techniques, and energy-aware optimization strategies for edge environments.

The developed solutions will be validated through representative use cases domains such as automotive systems, healthcare devices, aerospace platforms, and industrial automation, where timing guarantees, and robustness are critical.

What makes your research group and environment attractive to candidates?

INESC INOV-Lab, an R&D Unit within INESC INOV, offers a unique and highly competitive environment for researchers by seamlessly bridging the gap between fundamental science and market-ready innovation. Our visionary mission is centered on the full data value chain, driving high-impact digital transformation through three strategic areas: Cyber-Physical Systems and Computing, Intelligent Communication Networks, and Intelligent Information Systems.

To support this mission, candidates may have access to world-class facilities, including the pioneering Integrated 5G/6G and Optoelectronics and Electronics Labs, a Data Centre continuously upgraded with high-capacity GPUs for AI, and NATO Class 1 Classified Information Facilities for sensitive defense projects.

We are deeply committed to empowering our talent through a structured Career Development Programme and tailored Training initiatives. Furthermore, candidates thrive in our globally connected ecosystem. We actively lead major Horizon Europe projects, COST Actions, and international events, such as EuCNC & 6G Summit and SCEE, among others. Above all, INESC INOV-Lab guarantees robust operational support, providing researchers with the freedom and the ideal ecosystem for their ideas to thrive and translate into high-impact innovation for society and industry.

What type of candidate profile are you looking for?

We are looking for a candidate with a background in computer engineering, computer science, or related fields, with a strong interest in AI systems for embedded and edge computing. Key skills include computer architecture, embedded systems, and familiarity with system-on-chip design.

Experience with hardware/software co-design, real-time systems, and performance or energy optimization is highly valuable. Knowledge of AI/ML deployment, compiler or runtime systems, and parallel programming is an advantage. Methodologically, the candidate should be comfortable with system-level design, experimental evaluation, and benchmarking. Motivation for interdisciplinary research and strong analytical and problem-solving skills are essential.

AI for Digital Healthcare Transformation and Human-Centred Intelligent Systems

[Ana Maria Madureira](#) — INESC INOV-Lab

Research Domain: Artificial Intelligence / Digital Health / Human-Centred Systems



Research Overview

This research opportunity explores the development of explainable and trustworthy Artificial Intelligence systems for digital healthcare transformation and intelligent decision-support environments. The research combines technological innovation with ethical, societal and human-centric perspectives.

Potential Research Topics

- machine learning
- data-driven healthcare systems
- Agentic AI
- explainable AI
- predictive analytics
- human-centred intelligent systems
- responsible AI methodologies

Expected Candidate Profile

- Artificial Intelligence
- Computer Science
- Data Science
- Information Systems
- Digital Health
- Machine Learning
- Human-centred AI

[More Information](#)

Why This Opportunity Matters

The project contributes to next-generation intelligent healthcare and digital transformation systems by combining AI innovation with human-centred design, explainability and trustworthy computing principles.

Keywords: Artificial Intelligence | Digital Healthcare | Agentic AI | Explainable AI | Intelligent Systems
Human-Centred AI | Predictive Analytics

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Brief description of the proposed research topic(s) for MSCA-PF candidates

Research proposals for prospective MSCA-PF candidates may focus on the development of explainable and multimodal intelligent systems capable of integrating heterogeneous data from both digital and physical (“phygital”) environments, fostering innovative approaches to human–machine interaction and decision support.

Priority topics include Human-Centered Artificial Intelligence, multimodal models for behavioural and contextual analysis, explainable and ethical AI, adaptive intelligent systems, blockchain integration in trusted digital ecosystems, and AI applications in digital health, smart marketing, education, tourism, Industry 5.0, defense and smart cities.

Projects may further explore methodologies in Computational Intelligence, machine learning, deep learning, and predictive analytics applied to complex and dynamic environments, with particular emphasis on algorithmic transparency, digital sustainability, and interoperability among intelligent systems. Another relevant research direction involves immersive and hybrid experiences, combining emerging technologies, intelligent sensing, and multimodal data analysis to enhance personalization, user engagement, and well-being.

The proposed topics should privilege interdisciplinary approaches aligned with European priorities regarding trustworthy AI, responsible innovation, sustainable digital transformation, and European technological sovereignty.

What makes your research group and environment attractive to candidates?

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What type of candidate profile are you looking for?

We are looking for motivated candidates with a background in Artificial Intelligence, Computer Science, Data Science, Information Systems, or related fields. Preferred profiles include experience or interest in Human-Centered and Explainable AI, machine learning, deep learning, multimodal data analysis, computational intelligence, adaptive systems, and trusted digital ecosystems.

Candidates should demonstrate strong analytical, programming, and research skills, particularly in Python and AI frameworks. Interest in interdisciplinary applications such as digital health, smart tourism, Industry 5.0, defense, smart cities, or education is valued.

We seek proactive researchers committed to trustworthy AI, responsible innovation, sustainability, and impactful human-centered digital transformation.

AI-Driven Digital Twins for Mineral Resource Modelling

Helga Jordão — CERENA, IST

Research Domain: AI, Geosciences & Mineral Resources



Research Overview

This project design, develops and implements AI-based and geostatistical methods to build dynamic digital twins of mineral resources, integrating geological, geochemical and sensor-based data to quantify uncertainty and support mining decisions.

Potential Research Topics

- AI for mineral resource modelling
- Bayesian neural networks
- Geological and grade uncertainty
- Geostatistical simulation
- Digital twins in mining
- Real-time sensor data integration
- Risk-based resource classification

Expected Candidate Profile

- Mining / Geological Engineering
- Geosciences
- Data Science / AI
- Geostatistics
- Applied Mathematics
- Computational modelling

[More Information](#)

Why This Opportunity Matters

The project supports faster, uncertainty-aware and more reliable mineral resource updates, contributing to smarter and more sustainable mining.

Keywords: AI | Digital Twins | Mineral Resources | Geostatistics | Uncertainty | Mining

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Brief description of the proposed research topic(s) for MSCA-PF candidates

My research focuses on AI-driven digital twins for mineral resource modelling. The main goal is to combine probabilistic neural networks, geostatistical simulation and sensor-based data, such as XRF, to update geological and grade models while quantifying uncertainty. Possible topics include uncertainty-aware 3D geological modelling, integration of real-time data into resource models, and decision-support tools for mineral resource classification and mine planning.

What makes your research group and environment attractive to candidates?

The candidate will join CERENA at Instituto Superior Técnico, a multidisciplinary research centre working on raw materials, energy and environment, with strong expertise in geosciences, mining engineering, geostatistics, spatial data science and environmental modelling. CERENA explicitly promotes internationalisation and collaboration with industry for sustainable and innovative engineering solutions. The research environment is connected to national and European projects in critical raw materials, AI, digital twins, geophysical exploration, circular economy and mining waste.

What type of candidate profile are you looking for?

Candidates with background or interest in:

- Geostatistics
- Machine learning / deep learning
- Geological modelling
- Mineral resource estimation
- Uncertainty quantification
- Python or scientific programming
- Mining and geoscience applications

The ideal candidate should be motivated to work at the interface between AI, geosciences and mining engineering, developing methods that are scientifically robust and relevant to industry.

Deep Learning, Event Cameras and Animal Motion Analysis

Ricardo Araújo — CERENA, IST

Research Domain: [AI and Deep learning for animal motion analysis](#)



Research Overview

The candidate would contribute to the computational component of DAEDALUS (ERC Grant) by developing deep learning and event-camera approaches to quantify head motion across extant vertebrates. The goal is to extract biologically meaningful movement variables, such as angular velocity and frequency spectra, from video, multi-camera recordings and event-based imaging.

Potential Research Topics

- Deep learning for animal head-motion tracking;
- event-camera methods for high-speed biological motion;
- markerless pose estimation;
- extraction of angular velocity and frequency spectra;
- sensor fusion between video, accelerometry and event cameras;
- comparative analysis of vertebrate movement;
- AI-assisted reconstruction of vestibular function.

Expected Candidate Profile

- deep learning,
- computer vision, event cameras,
- pose estimation,
- animal tracking,
- signal processing,
- time-series analysis,
- biomechanical modelling
- Python, PyTorch or TensorFlow,
- video-based movement tracking,
- multi-camera reconstruction, optical flow, event-based vision or sensor fusion

[More Information](#)

Why This Opportunity Matters

The project provides access to a distinctive biological problem, diverse animal movement data and validation settings involving accelerometry, multi-camera systems and event-based sensors.

Keywords: [Deep Learning](#) | [Event Cameras](#) | [Computer Vision](#) | [Animal Tracking](#) | [Pose Estimation](#) | [Biomechanics](#) | [Vestibular System](#) | [AI for Biology](#) | [Sensor Fusion](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

The candidate would contribute to the computational component of DAEDALUS by developing deep learning and event-camera approaches to quantify head motion across extant vertebrates. The goal is to extract biologically meaningful movement variables, such as angular velocity and frequency spectra, from video, multi-camera recordings and event-based imaging. These data will be used to understand how living animals use their vestibular system and to constrain biomechanical models of inner ear function in extinct taxa, including early mammals and dinosaurs.

Potential Research Topics: Deep learning for animal head-motion tracking; event-camera methods for high-speed biological motion; markerless pose estimation; extraction of angular velocity and frequency spectra; sensor fusion between video, accelerometry and event cameras; comparative analysis of vertebrate movement; AI-assisted reconstruction of vestibular function.

The candidate would join an unusually broad research ecosystem connecting palaeontology, artificial intelligence, computer vision, biomechanics, animal behaviour, tomography and evolutionary modelling. The project provides access to a distinctive biological problem, diverse animal movement data and validation settings involving accelerometry, multi-camera systems and event-based sensors. The candidate would have the chance to develop methods with impact beyond palaeontology, including animal behaviour, biomechanics, robotics, neuroscience and biomedical motion analysis.

What type of candidate profile are you looking for?

A candidate with experience in deep learning, computer vision, event cameras, pose estimation, animal tracking, signal processing, time-series analysis, biomechanical modelling or related areas. Experience with Python, PyTorch or TensorFlow, video-based movement tracking, multi-camera reconstruction, optical flow, event-based vision or sensor fusion would be highly desirable.

Energy, Climate & Environmental Resilience

Diogo Mendes — CERIS, IST-ID

[*Coastal Adaptation Pathways and Morphodynamic Modelling for Resilient Shorelines*](#)

Hugo Morais — INESC-ID

[*AI for Smart and Sustainable Energy Systems*](#)

José Pedro Matos — CERIS, IST-ID

[*AI-Driven Hydrological Forecasting and Climate Resilience under Uncertainty*](#)

Lígia Pinto — MARETEC, IST-ID

[*Ocean Data Assimilation and Operational Marine Forecasting for Coastal Resilience*](#)

Lucas Pereira — ITI, IST-ID

[*AI-Driven Energy Informatics and Intelligent Energy Systems*](#)

Peter Bourne-Webb — CERIS, IST-ID

[*Shallow Geothermal Energy and Sustainable Geotechnical Systems*](#)

Tânia Alexandra dos Santos Costa e Sousa — MARETEC, IST-ID

[*Sustainability Transitions and the Biophysical Foundations of Economic Growth*](#)

AI for Smart and Sustainable Energy Systems

[Hugo Morais](#) — INESC-ID

Research Domain: Energy, Environment & Mobility



Research Overview

This opportunity focuses on the application of Artificial Intelligence and optimisation methods to support the transition toward smarter, more resilient and sustainable energy systems. Research topics include renewable integration, energy forecasting, flexibility management, distributed energy resources and intelligent operation of future power systems.

Research Topics

- AI and machine learning
- Smart grids
- Energy analytics
- Optimisation algorithms
- Digital energy platforms

Candidate Profile

- Energy Systems
- Artificial Intelligence
- Data Analytics
- Electrical Engineering
- Optimisation
- Smart Grid Technologies

[More Information](#)

Why This Opportunity Matters

The project contributes directly to energy transition challenges, supporting decarbonisation, grid intelligence and sustainable infrastructure development.

Brief description of the proposed research topic(s) for MSCA-PF candidates

The research group is addressing several topics such as the application of Artificial Intelligence (AI) to enhance the operation, planning, and resilience of modern power systems with high shares of renewable energy. It also investigates the impact of autonomous and electric vehicles on power systems, analysing their effects on demand profiles, grid stability, and flexibility requirements across different time scales.

Another key research line focuses on modeling and quantifying flexibility in large-scale power systems, enabling the efficient integration of distributed energy resources, storage systems, and new types of loads.

In parallel, the group develops smart and scalable charging infrastructures for heavy-duty electric vehicles, considering grid constraints, optimization strategies, and interaction with electricity markets.

Additionally, research on Hybrid AC/DC grids aims to improve system efficiency, controllability, and reliability, supporting the integration of renewable generation, power electronics, and emerging technologies in future energy systems.

What makes your research group and environment attractive to candidates?

Our research group at INESC ID offers an attractive and stimulating environment for candidates seeking both academic excellence and real-world impact. We actively coordinate and participate in European projects, providing opportunities to engage in cutting-edge research within international and multidisciplinary consortia.

The group is supported by advanced infrastructure, including a newly established laboratory equipped with Power-in-the-Loop capabilities up to 100 kW, enabling high-impact experimental validation in areas such as energy systems, power electronics, and smart grids.

We promote a dynamic, open, and collaborative culture, where researchers are encouraged to share ideas, take initiative, and grow professionally. Strong links with industry and research partners further enhance opportunities for applied research, networking, and career development in an international context.

What type of candidate profile are you looking for?

Electrical Engineering, Computer Science, Mathematics, Optimization, Machine Learning

AI-Driven Energy Informatics and Intelligent Energy Systems

[Lucas Pereira](#) — ITI, IST-ID

Research Domain: Energy, Environment & Mobility



Research Overview

This project focuses on AI-driven approaches for intelligent energy systems and energy informatics. Research may address energy flexibility, smart consumption, behavioural analytics, digital energy platforms and human-centric energy optimisation.

Research Topics

- Machine learning
- IoT systems
- Smart buildings
- Energy analytics
- Data-driven energy management

Candidate Profile

- Artificial Intelligence
- Data Science
- Energy Systems
- IoT
- Smart Buildings
- Human-Computer Interaction

[More Information](#)

Why This Opportunity Matters

The project contributes to sustainable energy transition through intelligent and user-oriented digital energy solutions.

Keywords: AI | Energy Informatics | Smart Buildings | Sustainability | IoT | Data Analytics

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Brief description of the proposed research topic(s) for MSCA-PF candidates

We are seeking highly motivated candidates in the area of AI-driven energy systems and energy informatics. The proposed research topics explore how artificial intelligence, machine learning, and digital technologies can support the transition toward more sustainable, resilient, and flexible energy systems.

Potential directions include probabilistic and decision-aware forecasting for distributed energy resources, federated and privacy-preserving learning, AI methods for electric mobility and energy flexibility, digital twins for ports and urban energy systems, and the integration of foundation and generative AI models into future energy management platforms.

The research emphasizes both methodological innovation and practical impact, leveraging real-world case studies related to energy communities, EV charging infrastructure, and smart urban environments.

Candidates will be encouraged to develop their own research vision while contributing to ongoing national and European research initiatives in collaboration with academic and industrial partners.

What makes your research group and environment attractive to candidates?

The candidate will join an interdisciplinary and internationally connected research environment at the intersection of artificial intelligence, sustainability, and energy systems, hosted at the Interactive Technologies Institute/LARSyS (<https://iti.larsys.pt>) and Instituto Superior Técnico.

The group provides access to a strong ecosystem of collaborations involving universities, research institutes, utilities, municipalities, ports, and technology companies. Candidates will benefit from ongoing European (e.g., <https://shift2dc.eu> and <https://horizon-ahead.eu>) and national projects (e.g., <https://sency.tecnico.ulisboa.pt>), close interaction with stakeholders, and opportunities to validate research in operational settings.

At the ITI/LARSyS, researchers are supported in building independent research profiles within a collaborative and interdisciplinary environment, with opportunities to engage in European projects, international collaborations, real-world demonstrators, and open-source development. The environment also promotes scientific dissemination through dedicated support for publication in top-tier venues, including A* and A-ranked conferences.

What type of candidate profile are you looking for?

We are looking for motivated candidates with a strong background in computer science, artificial intelligence, machine learning, data science, energy informatics, electrical engineering, or related fields.

Experience in areas such as time-series forecasting, optimization, federated learning, probabilistic modelling, digital twins, or energy systems is valued.

We particularly value curious, forward-thinking researchers who are comfortable working across disciplines, exploring new ideas, and continuously stepping beyond their comfort zone.

Prior experience with real-world datasets, collaborative projects, or open-source development is considered an advantage.

Sustainability Transitions and the Biophysical Foundations of Economic Growth

[Tânia Alexandra dos Santos Costa e Sousa](#) — MARETEC, IST-ID

Research Domain: Sustainability / Economics / Climate



Research Overview

This interdisciplinary research investigates the relationship between economic growth, sustainability transitions and biophysical constraints shaping long-term socio-economic development.

Research Topics

- Ecological economics
- Sustainability transitions
- Climate policy
- Energy-economy modelling
- Resource systems

Candidate Profile

- Sustainability Science
- Ecological Economics
- Climate Studies
- Systems Modelling
- Environmental Policy

[More Information](#)

Why This Opportunity Matters

The project contributes to global debates on sustainability, climate resilience and the transformation of economic systems toward low-carbon futures.

Keywords: Sustainability | Climate | Ecological Economics | Energy Transition

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Brief description of the proposed research topic(s) for MSCA-PF candidates

The proposed research focuses on the biophysical foundations of economic growth and sustainability transitions, analysing the interactions between energy, materials, information, and social wellbeing. The aim is the development of an integrated model capable of quantifying global energy and material flows and stocks while incorporating information flows associated with digitalisation and artificial intelligence (AI). The research will investigate how energy, materials, and information jointly contribute to economic productivity, technological change, and human wellbeing.

The work combines the analysis of historical datasets with the development of prospective scenarios up to 2050 to evaluate the implications of electrification, renewable energy expansion, and increasing ICT and AI use. Particular emphasis will be placed on exergy-based indicators because, unlike conventional energy or mass indicators, exergy captures both the quantity and quality of energy and material resources along transformation chains. This makes it particularly suitable for analysing efficiency losses, resource depletion, and cumulative upstream resource requirements across complex socio-economic systems, while providing a consistent basis to assess sustainability trade-offs across alternative decarbonisation pathways.

What makes your research group and environment attractive to candidates?

MARETEC offers an interdisciplinary research environment focused on sustainability transitions, energy systems, societal metabolism, and environmental modelling. Candidates will have the opportunity to work on topics linking energy, materials, information, and economic systems, integrating perspectives from engineering, ecological economics, and environmental sciences. The group is also involved in the development of datasets, models, and analytical tools related to decarbonisation, digitalisation, and resource use. The research team collaborates with international researchers and institutions, including the University of Leeds and BOKU University Vienna, particularly in the areas of societal exergy analysis, material flow analysis, and integrated modelling.

MARETEC has extensive experience in supervising PhD and MSc students and participating in international research projects. The environment promotes collaboration across disciplines and provides opportunities for scientific publications, conference participation, and engagement with open research tools and datasets. Candidates will join a collaborative team working on the biophysical dimensions of sustainability and long-term societal transitions.

What type of candidate profile are you looking for?

We are looking for candidates interested in the biophysical dimensions of sustainability transitions and the interactions between energy, materials, information, and economic systems. Relevant backgrounds include thermodynamics, energy systems, environmental engineering, ecological economics, and industrial ecology.

Candidates should have an interest in quantitative and systems-oriented research, including modelling, data analysis, and computational approaches. Programming skills (e.g., Python, R, Matlab, or similar) and experience with datasets or modelling are desirable.

Given the interdisciplinary nature of the research, we value candidates who are comfortable working across disciplinary boundaries, are curious and critical thinkers, and can collaborate effectively in an international research environment.

Ocean Data Assimilation and Operational Marine Forecasting for Coastal Resilience

[Lígia Pinto](#) — MARETEC, IST-ID

Research Domain: [Oceanography](#) / [Marine Forecasting](#) / [Environmental Modelling](#)



Research Overview

This MSCA-PF opportunity focuses on advanced ocean data assimilation and operational marine forecasting methodologies for improving the understanding and prediction of ocean and coastal systems.

Research Topics

- Ocean data assimilation
- Operational oceanography
- Marine forecasting
- Environmental modelling
- Coastal ocean prediction

Candidate Profile

- Oceanography
- Environmental Engineering
- Marine Science
- Applied Mathematics
- Physics
- Computational Modelling

[More Information](#)

Why This Opportunity Matters

The project contributes to improved operational marine forecasting and ocean monitoring capabilities supporting coastal resilience and sustainable ocean systems.

Keywords: [Ocean Data Assimilation](#) | [Operational Oceanography](#) | [Marine Forecasting](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

We are looking for an enthusiastic postdoctoral researcher with a strong interest in ocean data assimilation and excellent coding skills to join MARETEC (IST, University of Lisbon), the home institution of the MOHID modelling system – an open-source platform continuously developed by our group and applied worldwide for operational oceanography, coastal management, and water quality studies

The proposed research aims to develop enhanced nonlinear ensemble data assimilation methods and implement them within the MOHID modelling system, an open-source platform widely used for operational marine forecasting. The candidate will design and conduct data assimilation experiments for the Portuguese coast, a dynamic oceanic region influenced by upwelling, river plumes, and mesoscale variability.

Specific objectives include: (i) advancing nonlinear ensemble techniques (e.g., hybrid or particle-based methods) to improve state and parameter estimation; (ii) integrating diverse observations (satellite, in situ, HF radar) into MOHID; and (iii) rigorously assessing forecast skill through comparison against independent observations.

This research will directly enhance operational marine forecasts and coastal management tools. The candidate will benefit from strong links to LARSyS, and collaborations with international marine agencies.

What makes your research group and environment attractive to candidates?

MARETEC offers an internationally competitive environment within Instituto Superior Técnico (IST), University of Lisbon. As an integral member of LARSyS, the group provides access to cross-disciplinary expertise and shared facilities. Our central asset is the MOHID modelling system, an open-source platform widely adopted in operational ocean forecasting across Europe.

Candidates will engage with real-time operational model setups, high-performance computing, and diverse observational data (satellite, in situ, HF radar). MARETEC maintains strong collaborations with industry, marine agencies, and the UN Global Compact. In this context, your work on ocean data assimilation will directly contribute to advancing operational marine forecasts and coastal management applications.

What type of candidate profile are you looking for?

PhD degree in oceanography, meteorology, mathematics, physics, or similar.

Very good language skills in English (approximately equivalent to CEFR level C1).

Excellent programming skills (especially Python and Fortran).

Proven publication activity in peer-reviewed journals.

Skills to developing own research questions and tackling both scientific and technical challenges individually, while working well as part of a team

Shallow Geothermal Energy and Sustainable Geotechnical Systems

[Peter Bourne-Webb](#) — CERIS, IST-ID

Research Domain: [Geotechnics](#) / [Geothermal Energy](#) / [Energy Systems](#)



Research Overview

This MSCA-PF opportunity focuses on shallow geothermal energy systems integrated with geotechnical infrastructure for sustainable heating and cooling technologies and energy-efficient built environments.

Research Topics

- Shallow geothermal energy harvesting
- Thermo-geotechnical systems
- Heat exchange modelling
- Lifecycle assessment
- Renewable heating and cooling

Candidate Profile

- Geosciences
 - geothermal systems;
 - sustainable infrastructure;
 - thermal modelling;
 - renewable energy technologies;
 - lifecycle assessment;
- or energy-efficient engineering systems

[More Information](#)

Why This Opportunity Matters

The project contributes to sustainable energy transition and climate-resilient infrastructure through innovative geothermal technologies integrated into civil systems.

Keywords: [Geotechnics](#) | [Shallow Geothermal Energy](#) | [Sustainability](#) | [Renewable Heating and Cooling](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

1. Shallow geothermal energy harvesting through geotechnical structures focusing on the modelling and prediction of heat exchange potential for embedded walls and piles, and heat management.
2. Life cycle analysis of renewable heating and cooling systems focusing on the comparison between differing technologies and especially, shallow geothermal energy systems."

What makes your research group and environment attractive to candidates?

Our group has ongoing professional links and collaborations within the industry (e.g. Enercrete in Austria and ECOME in France) and academia across the EU, which allow for the exchange of ideas and people, to facilitate training and knowledge transfer. These would be leveraged as part of the planned investigations.

What type of candidate profile are you looking for?

The candidate could have a background in any engineering discipline and numerate geosciences, ideally with some background in the topics/ideas, but, more importantly, motivated to learn the skills needed and develop the work.

Coastal Adaptation Pathways and Morphodynamic Modelling for Resilient Shorelines

[Diogo Mendes](#) — CERIS, IST-ID

Research Domain: [Coastal Engineering](#) / [Morphodynamic Modelling](#) / [Climate Adaptation](#)



Research Overview

This MSCA-PF opportunity focuses on dynamic coastal adaptation pathways and innovative engineering strategies for resilient shoreline protection under climate change and sea-level rise scenarios.

Research Topics

- Coastal adaptation pathways
- Morphodynamic modelling
- Physical modelling in wave flumes;
- Beach and shoreface nourishment;
- Coastal revetments;
- Resilient coastal engineering solutions.

Candidate Profile

- Numerical Modelling
 - Experimental Hydraulics
 - Hydrodynamic and morphodynamic processes;
 - coastal systems analysis;
- or climate adaptation research

[More Information](#)

Why This Opportunity Matters

The project contributes to climate-resilient coastal adaptation strategies through advanced shoreline engineering and morphodynamic modelling.

Keywords: Coastal Adaptation Pathways | Morphodynamic Modelling | Physical Modelling | Beach Nourishment | Hard Structures

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Brief description of the proposed research topic(s) for MSCA-PF candidates

As sea levels rise and sediment borrow areas are depleted, coastal protection must evolve from static defence to dynamic coastal adaptation pathways. This research investigates the functional synergy between beach/shoreface nourishments and coastal revetments to design resilient shorelines. The candidate will employ morphodynamic modelling and physical modelling in a wave flume to better understand the underlying physical processes between different coastal engineering solutions and identify critical "tipping points" for phased coastal interventions, which are relevant for proposing a clear coastal adaptation pathway.

What makes your research group and environment attractive to candidates?

"At Técnico Lisboa, the candidate will work closely with a motivated, early-career professor, ensuring direct mentorship and a key role in a growing lab. You will have priority access to our brand-new, state-of-the-art wave flume, allowing for high-impact experimental research. Strategically, being based in Portugal offers a significant competitive edge: as a widening country, MSCA-PF applicants here benefit from higher success rates through the ERA Fellowships, providing a "second chance" at prestigious European funding. Beyond the research, Lisbon offers an exceptional international atmosphere with year-round sunshine, world-class beaches and great food experiences."

What type of candidate profile are you looking for?

We seek a motivated researcher with a PhD in Civil or Coastal Engineering, Coastal Oceanography or Coastal Geology. You should be acquainted with the hydrodynamic and morphodynamic processes of coastal areas. Previous experience in numerical modelling is welcome, alongside a strong interest in experimental hydraulics. A proactive mindset and a curiosity-driven personality are essential.

AI-Driven Hydrological Forecasting and Climate Resilience under Uncertainty

José Pedro Matos — CERIS, IST-ID

Research Domain: Hydrology / Machine Learning / Climate Resilience



Research Overview

This MSCA-PF opportunity focuses on the integration of machine learning, hydrological modelling and uncertainty analysis for resilient environmental systems and climate adaptation.

Research Topics

- Explainable deep learning hydrological forecasting in ungauged catchments
- Real-time meta-modelling of inundation parameters under uncertainty;
- global climate change impact analysis on water resources accounting for epistemic and aleatoric uncertainty;
- and hybrid deep-learning/ conceptual hydrological modelling under uncertainty;

Candidate Profile

- machine learning;
 - hydrological or hydraulic modelling;
 - optimisation;
 - large datasets;
- or real-world applications

[More Information](#)

Why This Opportunity Matters

The project contributes to next-generation hydrological forecasting and climate resilience methodologies integrating explainable AI and uncertainty-aware modelling.

Keywords: Hydrology | Machine Learning | Climate Change | Forecasting | Optimisation

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Brief description of the proposed research topic(s) for MSCA-PF candidates

Several research topics are envisioned, depending on the skills and preferences of the candidate, namely: Explainable deep learning hydrological forecasting in ungauged catchments | world-wide deep learning prediction models beyond LSTMs, where reliability and explainability is privileged. Real-time meta-modelling of inundation parameters under uncertainty | numerical hydraulic models are often too slow to model the impacts of dam operations in real time, especially under uncertainty; we explore machine-learning data-driven meta-models that, based on a rich pre-calculated catalogue of numerical results, can estimate inundation parameters in real-time. Global climate change impact analysis on water resources accounting for epistemic and aleatoric uncertainty | impacts of climate change accounting for the uncertainty inherent to the meteorological and hydrological phenomena (aleatoric) and our knowledge gaps, model shortcomings, and other sources of uncertainty (epistemic). Hybrid deep-learning / conceptual hydrological modelling under uncertainty | The capacity of deep learning to faithfully reproduce extreme hydrological events can be questioned, particularly when such events are absent from training datasets; we aim to combine the adaptability of deep learning with the reliability of conceptual hydrological models.

What makes your research group and environment attractive to candidates?

FORESIGHT (Forecasting and Optimization for Resilient Environmental Systems through Investigation with Groundbreaking Hydrological Tools) – foresight.tecnico.ulisboa.pt – is a burgeoning research group with a strong emphasis on exploration and development of new tools. With operational uses in mind, we do not shy away from a challenge and enjoy developing and using programming skills in deep learning, optimization, climate change, meta-modelling, uncertainty, and other topics that are intellectually stimulating and useful. Our activity bridges research, teaching, and international industrial applications / consultancy projects. At this stage, we are very much receptive to researchers at the post-doctoral level, who have maturity and energy to leave their mark on hydrological sciences and can create great synergies with Ph.D. and M.Sc. candidates in the group.

What type of candidate profile are you looking for?

Someone who enjoys coding and is curious about how models work. Experience with machine learning, hydrologic and hydraulic modeling, and optimization would be ideal. Similarly, experience with handling large datasets (time series and satellite data) and real-world applications (e.g., databases and web-server development) would definitely be useful. In other words, we are looking for a unicorn hydrologist that threads in the same fields we do. It is not so important to have all these skills, but mostly be curious, hard-working, and oriented towards development. Capacity to interact and create synergies with highly motivated Ph.D. students is highly valued.

Urban Mobility, Transport & Smart Infrastructure

Baiqiao Chen — CENTEC, IST-ID

[*Intelligent Lifecycle Management for Infrastructure Systems*](#)

Filipe Moura — CERIS, IST-ID

[*AI-Enabled Digital Twins for Inclusive and Climate-Resilient Urban Mobility*](#)

Gabriel Costa Valença — CERIS, IST-ID

[*Data-Driven Urban Mobility and Street Space Reallocation Analytics*](#)

João de Abreu e Silva — CERIS, IST-ID

[*Telework, E-Shopping and Sustainable Urban Mobility Dynamics*](#)

Luis G. de Picado Santos — CERIS, IST-ID

[*Sustainable Pavement Engineering and Intelligent Transport Infrastructure Systems*](#)

Intelligent Lifecycle Management for Marine and Offshore Infrastructure

[Baiqiao Chen](#) — CENTEC, IST-ID

Research Domain: Engineering & Production Technologies



Research Overview

This project develops intelligent, real-time and lifecycle-integrated management frameworks for critical infrastructure systems, with a primary focus on marine renewable energy and offshore floating platforms, combining predictive analytics, digital technologies and intelligent monitoring systems.

Research Topics

- Digital twins
- Predictive maintenance
- Infrastructure analytics
- Intelligent monitoring systems
- Lifecycle optimisation

Candidate Profile

- Civil Engineering
- Infrastructure Systems
- Data Analytics
- AI Applications
- Digital Twins
- Structural Monitoring

[More Information](#)

Why This Opportunity Matters

The project contributes to smarter and more resilient infrastructure systems with applications in sustainable urban development and industrial asset management.

Brief description of the proposed research topic(s) for MSCA-PF candidates

The proposed research aims to develop a cutting-edge Real-Time, Intelligent, Lifecycle Integrated Management Framework for aging floating offshore wind turbines (FOWTs). As the industry moves into deeper waters, ensuring the structural integrity of these platforms under extreme storm conditions is paramount. This project focuses on bridging the gap between conceptual digital twin simulations and practical, field-validated applications.

Candidates will work on an interdisciplinary framework that integrates high-fidelity numerical modeling (CFD/NLFEA) with real-time sensor data and AI-driven diagnostics. Key research activities include developing physics-informed digital twins to predict coupled turbine-mooring interactions, implementing Bayesian-based algorithms for fatigue crack growth prediction, and optimizing maintenance scheduling to prevent catastrophic failures. Utilizing data from commercial projects like Hywind Scotland, the research offers a unique opportunity to validate theoretical models against real-world operational datasets. This work is critical for extending the operational life of offshore assets and accelerating the global transition to sustainable, resilient renewable energy infrastructure.

What makes your research group and environment attractive to candidates?

Candidates will join the Centre for Marine Technology and Ocean Engineering (CENTEC), a research unit hosted at Instituto Superior Técnico, University of Lisbon. Ranked among the top 5 universities worldwide in Marine and Ocean Engineering, our environment offers unparalleled academic prestige and technical resources.

Our group provides access to advanced computational infrastructure, including high-performance computing for complex CFD and structural simulations. We maintain strong industry links with global leaders such as Principle Power and GALP, ensuring research has direct commercial relevance.

With a highly international team and involvement in over 80 European projects, candidates will benefit from a vibrant, collaborative atmosphere and a proven track record of mentoring researchers into top-tier positions in both academia and the global offshore industry.

What type of candidate profile are you looking for?

Looking for a highly motivated researcher with a PhD in Naval Architecture, Ocean Engineering, Mechanical Engineering, or Data Science. The ideal candidate should possess a strong background in hydrodynamics and structural mechanics, with proven experience in finite element analysis (FEA) and computational fluid dynamics (CFD).

Proficiency in programming (e.g., MATLAB, Python) and familiarity with offshore industry software are highly valued. Experience in AI/Machine Learning or Digital Twin frameworks is a significant advantage.

We seek a profile capable of independent research, cross-disciplinary collaboration, and effective scientific communication.

Telework, E-Shopping and Urban Mobility Dynamics

[João de Abreu e Silva](#) — CERIS, IST-ID

Research Domain: [Urban Mobility](#) / [Spatial Planning](#) / [Travel Behaviour](#)



Research Overview

This MSCA-PF opportunity focuses on the impact of telework and online shopping on travel behaviour, urban dynamics and spatial organisation in contemporary cities.

Research Topics

- Telework and mobility behaviour
- E-shopping and travel demand
- Urban sprawl
- Spatial modelling
- Transport policy analysis

Candidate Profile

- travel behaviour analysis;
 - GIS and spatial modelling;
 - quantitative mobility analysis;
 - discrete choice models;
 - causal inference methods;
- or urban systems research

[More Information](#)

Why This Opportunity Matters

The project contributes to understanding how digital transformation and telework reshape mobility systems and urban form for more sustainable cities.

Keywords: [Telework](#) | [Travel Behaviour](#) | [Spatial Modelling](#)

[Back](#)

Brief description of the proposed research topic(s) for MSCA-PF candidates

The research I'm developing looks into how COVID-19-induced shifts to telework and e-shopping reshape travel behaviour and urban form. Key research topics include: the effects of telework frequency on weekly travel distances, trip scheduling, congestion, and activity spaces; the relationship between e-shopping and in-store shopping (substitution or complementarity); and the interplay between telework and e-shopping. The study also examines how telework influences residential and office location, potentially contributing to urban sprawl, as well as retail location patterns linked to e-shopping adoption. Another objective also aims to address causality and self-selection issues often overlooked in the literature about telework. This research integrates both qualitative methods and quantitative data, aiming to estimate global spatial impacts of telework under different adoption scenarios. By analysing these effects, their drivers, and conditions for minimising harm, the research aims to inform both urban planning and transport policy-related decisions.

What makes your research group and environment attractive to candidates?

The SCity Lab team is international and interdisciplinary, bringing together expertise from mobility planning, urban geography, and transport technology. Ongoing collaborations with European and Brazilian partners enrich the Lab's perspective on how mobility actively shapes urban dynamics. Together, the team investigates the interplay between activity distribution, travel behaviour, and technological change—all with the goal of fostering more sustainable urban communities. This collaborative environment enables the Lab to tackle complex questions about telework, e-shopping, and urban form from multiple methodological and cultural viewpoints.

What type of candidate profile are you looking for?

We seek a researcher with experience in travel behaviour analysis and/or spatial modelling, holding a degree in transportation, geography, or planning. The candidate will investigate telework and online shopping impacts on mobility and urban form. Expertise includes quantitative methods (e.g. discrete choice models), GIS-based spatial modelling, and familiarity with causality issues. Research interests cover telework frequency, e-shopping substitution versus complementarity, and locational effects on residences, offices, and retail. The ability to integrate qualitative insights and a policy-oriented mindset is an asset. This position offers the opportunity to contribute to innovative, interdisciplinary research at SCity Lab on sustainable urban communities.

Sustainable Pavement Engineering

Luis G. de Picado Santos — CERIS, IST-ID

Research Domain: [Transportation Infrastructure](#) / [Materials Engineering](#)



Research Overview

This MSCA-PF opportunity focuses on sustainable pavement engineering and advanced transport infrastructure systems, with emphasis on lifecycle performance, infrastructure resilience and mobility safety.

Research Topics

- road and airport pavement mechanics;
- sustainable pavement materials;
- lifecycle assessment of transport infrastructure materials;
- asset management;
- urban transport safety;
- and dynamic traffic management.

Candidate Profile

- pavement mechanics;
 - sustainable infrastructure;
 - transport systems;
 - asset management;
 - traffic management;
- or infrastructure lifecycle assessment

[More Information](#)

Why This Opportunity Matters

The project contributes to more sustainable and resilient transportation infrastructures through advanced pavement engineering and lifecycle-oriented approaches.

Keywords: Road and Airport Pavement Mechanics | Sustainable Materials | Asset Management | Urban Transport Safety | Dynamic Traffic Management

Brief description of the proposed research topic(s) for MSCA-PF candidates

Developing sustainable pavement techniques and materials, and contributions to their life cycle assessment.

What makes your research group and environment attractive to candidates?

The candidate will have access to a fully equipped laboratory infrastructure. The research group has a 30-year collaboration with public administration and the industry, as well as significant international collaborations.

What type of candidate profile are you looking for?

The candidate should have a background and be interested on the expertise areas of the research group.

Data-Driven Urban Mobility and Street Space Reallocation Analysis

Gabriel Costa Valença — CERIS, IST-ID

Research Domain: [Urban Mobility](#) / [Data Science](#) / [Spatial Analytics](#)



Research Overview

This MSCA-PF opportunity focuses on data-driven methodologies for understanding urban mobility patterns, street space allocation and the spatial organisation of cities through large-scale computational analysis.

Research Topics

- Travel behaviour analysis
- Street space reallocation
- Urban morphology
- GIS & spatial analysis
- Python-based urban modelling

Candidate Profile

- Transportation Engineering
- Urban Planning
- Python Programming
- GIS and spatial analysis;
- computational modelling;
- data-driven urban research;
- or geospatial analytics

[More Information](#)

Why This Opportunity Matters

The project contributes to next-generation urban analytics and evidence-based mobility planning supporting more sustainable and equitable urban environments.

Keywords: [Travel Behaviour](#) | [Street Space Reallocation](#) | [Data-Driven Analysis](#) | [R and Python Programming](#)

Brief description of the proposed research topic(s) for MSCA-PF candidates

Building on preliminary work already developed, the candidate will create a Python package to classify streets according to their mobility and place functions using OpenStreetMap. This research is particularly relevant because it enables the evaluation of street interventions and the identification of urban deficiencies, such as limited greenery, or inadequate public space allocation. The project will significantly expand the scope of existing work by applying the algorithm to thousands of cities worldwide. The resulting classifications will support the identification of clusters of “mobility cultures” based on urban form, street design, and spatial organization. By combining large-scale computational analysis with urban morphology and mobility research, the project aims to generate globally comparable insights into how cities function and evolve. The ambition of the project is to produce a methodological and empirical contribution substantial enough for publication in a high-impact journal such as Nature.

What makes your research group and environment attractive to candidates?

The candidate will join the U-Shift Lab, one of Portugal’s leading research groups in transportation and urban mobility. The lab provides a highly interdisciplinary and collaborative environment, with regular meetings dedicated to discussing ongoing research, methodologies, and projects across the group. U-Shift maintains strong national collaborations with companies, municipalities, and public agencies, while also fostering an extensive international network with leading universities such as Technical University of Munich (TUM), Technical University of Denmark (DTU), and Delft University of Technology. This research environment offers the candidate access to data-driven expertise in fields such as spatial analysis and GIS, econometric modelling, and machine learning.

What type of candidate profile are you looking for?

The candidate should have a strong knowledge of Python and background in transportation or/and urban planning.

AI-Enabled Digital Twins for Inclusive Climate-Resilient Urban Mobility

[Filipe Moura](#) — CERIS, IST-ID

Research Domain: [Urban Mobility](#) / [Climate Resilience](#) / [AI for Cities](#)



Research Overview

This MSCA-PF opportunity focuses on AI-enabled Digital Twins and advanced modelling approaches for inclusive, climate-resilient urban mobility systems combining AI, geospatial analytics and adaptive mobility planning.

Research Topics

- Sustainable urban mobility;
- Travel behaviour;
- Climate-resilient transport systems;
- AI and machine learning for mobility;
- Digital twins for urban systems;
- Equitable mobility planning.

Candidate Profile

- intersection of urban mobility, climate adaptation, AI-based modelling and inclusive planning;
- transport engineering, urban planning, data science, intelligent transportation systems or related fields;
- machine learning;
- reinforcement learning;
- geospatial analysis;
- network modelling;
- digital twins; ;
- agent-based simulation;

[More Information](#)

Why This Opportunity Matters

The project contributes to next-generation climate-resilient urban mobility systems integrating AI, Digital Twins and inclusive planning methodologies.

Keywords: Sustainable Urban Mobility| Travel Behaviour; Active, Public and Shared Mobility

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Brief description of the proposed research topic(s) for MSCA-PF candidates

"Title: AI-enabled Digital Twins for inclusive climate-resilient urban mobility
Cities are increasingly exposed to climate-related disruptions such as heatwaves, flooding, storms, and cascading infrastructure failures. These events can severely affect urban mobility systems, reducing accessibility, reliability, safety, and equity, particularly for vulnerable populations. This MSCA-PF topic invites candidates to explore how advanced modelling approaches — including machine learning, artificial intelligence, large language models, and urban Digital Twins — can support the anticipation, assessment, and management of stressful events affecting urban mobility. The research may combine transport modelling, climate-risk analysis, real-time and historical mobility data, geospatial analytics, and participatory approaches to simulate disruption scenarios and test adaptation or mitigation strategies. A key focus will be on ensuring that climate-resilience measures do not reinforce existing inequalities, but instead improve accessibility and protection for all users, including children, older adults, low-income groups, people with disabilities, and car-independent populations. Candidates are encouraged to develop interdisciplinary, policy-relevant research that bridges urban mobility, climate adaptation, AI-based modelling, and inclusive planning, contributing to more resilient, fair, and adaptive cities."

What makes your research group and environment attractive to candidates?

U-Shift offers an interdisciplinary and international research environment for candidates interested in shaping the future of urban mobility. Based at CERIS, Instituto Superior Técnico, University of Lisbon, the group combines strong expertise in transport systems, urban mobility behaviour, active travel, public transport, accessibility, transport poverty, geospatial analysis and digital decision-support tools. Candidates will join a dynamic research lab working at the interface between scientific modelling, open urban data, policy innovation and real-world urban challenges. The group develops applied tools and methods such as accessibility and transport poverty indicators, GTFS-based public transport analysis, cycling and pedestrian assessment methods, and open-source mobility dashboards. U-Shift benefits from collaborations with municipalities, transport authorities, European research networks, international universities and urban mobility stakeholders. This provides candidates with access to rich empirical contexts, policy-relevant case studies, interdisciplinary supervision and opportunities for international visibility. Lisbon also offers a highly relevant living laboratory for studying climate resilience, mobility transitions, equity and sustainable urban planning.

What type of candidate profile are you looking for?

We are looking for candidates with a strong interdisciplinary profile at the intersection of urban mobility, climate adaptation, AI-based modelling and inclusive planning. Ideal candidates should have a background in transport engineering, urban planning, data science, intelligent transportation systems, or related fields, and experience with methods such as machine learning, agent-based simulation, reinforcement learning, geospatial analysis, network modelling, or Digital Twins. We especially value candidates able to connect technical modelling with societal impact, including accessibility, safety, wellbeing, equity and vulnerable users. Experience with open data, reproducible coding, urban analytics, and policy-oriented decision-support tools is highly desirable, as is the ability to work across disciplines and with stakeholders. This profile is inspired by work combining climate adaptation, transport, health, wellbeing, AI and simulation.

Materials, Sustainable Built Environment & Urban Futures

Alexandra Alegre – CiTUA, IST-ID

[Learning Landscapes, Educational Environments & Urban Learning Ecologies](#)

Ana Paula Ferreira Pinto — CERIS, IST-ID

[Sustainable Materials and Concrete Heritage Conservation for Resilient Built Assets](#)

André Furtado — CERIS, IST-ID

[Earthquake Engineering and Sustainable Modular Construction for Resilient Infrastructure](#)

Inês Flores-Colen — CERIS, IST-ID

[Sustainable Rehabilitation Materials from Marine Waste for Energy-Efficient Infrastructure](#)

Isabel Loupa-Ramos – CiTUA, IST-ID

[AI-Driven Urban Landscapes, Nature-Based Solutions & Territorial Governance](#)

João R. Correia — CERIS, IST-ID

[Thermoplastic FRP Composites for Sustainable and Resilient Civil Infrastructure](#)

José Gonilha — CERIS, IST-ID

[Metal 3D-Printed Connections for Thin-Walled and Composite Structural Systems](#)

Earthquake Engineering and Sustainable Modular Construction for Resilient Infrastructure

[André Furtado](#) — CERIS, IST-ID

Research Domain: [Earthquake Engineering](#) / [Structural Engineering](#) / [Sustainable Construction](#)



Research Overview

This MSCA-PF opportunity focuses on advanced earthquake engineering methodologies and sustainable structural systems for resilient and low-carbon built environments.

Research Topics

- Modular and prefabricated structures
- Seismic assessment and retrofit
- Machine learning for structural engineering
- Lifecycle assessment
- Integrated retrofit strategies

Candidate Profile

- Structural and Earthquake Engineering
 - reinforced concrete structures;
 - prefabricated/modular construction;
 - finite element analysis;
 - nonlinear numerical modelling;
 - performance-based seismic assessment;
 - structural retrofitting;
 - experimental testing;
 - machine learning for structural systems;
 - BIM;
- or lifecycle assessment

[More Information](#)

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Why This Opportunity Matters

The project contributes to safer, more sustainable and resilient infrastructure systems through advanced earthquake engineering and modular construction technologies.

Keywords: [Earthquake Engineering](#) | [Modular and Prefabricated Concrete Structures Construction](#) | [Seismic Assessment and Retrofit](#) | [Sustainable Construction](#) | [Data-Driven Structural Engineering](#) | [Lifecycle Assessment](#)

Brief description of the proposed research topic(s) for MSCA-PF candidates

The proposed research topics focus on the intersection of earthquake engineering, prefabricated and modular construction, sustainable design, and data-driven structural assessment. One research direction addresses next-generation prefabricated modular concrete buildings, with emphasis on seismic design, structural robustness, dry/bolt-based connection systems, constructability, circularity, and Life Cycle Assessment. This topic aims to investigate how seismic requirements influence the environmental performance of modular structures and how innovative prefabricated systems can contribute to safer and more sustainable construction. A second research direction focuses on machine learning and advanced numerical modelling for predicting the seismic behaviour of masonry-infilled reinforced concrete frame systems, supporting simplified assessment, damage prediction, and performance-based decision-making. A complementary topic concerns integrated seismic and energy retrofitting of reinforced concrete buildings, including multifunctional envelope solutions, recycled or low-carbon materials, and life-cycle-based evaluation of retrofit strategies. These topics offer opportunities for experimental, numerical, and data-driven research within a multidisciplinary environment at CERIS/Instituto Superior Técnico.

What makes your research group and environment attractive to candidates?

CERIS/Instituto Superior Técnico offers a highly attractive research environment, combining strong academic expertise with direct links to industry in prefabricated/modular construction, seismic assessment, sustainable retrofitting, and advanced structural systems. The candidate will be integrated into a dynamic research group with several ongoing projects, with a total current budget exceeding €3.5M, and broader experience in more than 20 research and innovation projects, representing over €15M in funding. The group has active collaborations with universities and research groups in Spain, Italy, the United Kingdom, the United States, Poland, and other countries, as well as strong involvement in international fib activities, including Task Groups 2.7, 6.12, and 1.7. The group provides a multicultural environment with postdoctoral researchers and PhD students working in complementary areas. Candidates may also have opportunities to co-supervise MSc and PhD students. Experimental research is supported by excellent laboratory facilities for full-scale structural testing, while advanced numerical studies benefit from access to powerful workstations for computational analyses.

What type of candidate profile are you looking for?

A suitable candidate should have a strong background in structural and earthquake engineering, preferably with experience in reinforced concrete structures, prefabricated/modular construction, seismic assessment, or structural retrofitting. Skills in nonlinear numerical modelling, finite element analysis, performance-based seismic assessment, experimental testing, or life-cycle/sustainability assessment are highly valued. Experience with machine learning, data-driven modelling, BIM, or advanced computational tools would also be advantageous. The candidate should demonstrate scientific independence, strong motivation, good writing skills, and the ability to work in a multidisciplinary and international research environment involving both academic and industry partners.

Sustainable and Advanced Materials for Concrete Heritage Conservation

[Ana Paula Ferreira Pinto](#) — CERIS, IST-ID

Research Domain: [Construction Materials](#) / [Heritage Conservation](#) / [Sustainable Construction](#)



Research Overview

This MSCA-PF opportunity focuses on the development of advanced sustainable materials and conservation strategies for historic and culturally significant concrete structures.

Research Topics

- Concrete conservation;
- Built heritage preservation;
- Durability of construction materials;
- Advanced sustainable materials;
- Conservation treatments for historic concrete;
- Sustainability characterisation.

Candidate Profile

- Interface of civil engineering, materials science and heritage conservation;
 - Cementitious or inorganic materials;
 - Durability testing;
 - Microstructural characterisation;
 - Non-destructive testing;
 - Conservation treatments;
- or data analysis

[More Information](#)

Why This Opportunity Matters

The project contributes to sustainable preservation strategies for concrete heritage and resilient built environment systems through advanced materials research.

Keywords: [Concrete Conservation](#) | [Built Heritage](#) | [Durability](#) | [Advanced Materials](#) | [Sustainable Construction](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

The proposed research focuses on the development, optimisation and validation of advanced, sustainable materials targeting the conservation of historic and culturally significant concrete structures, such as military and industrial heritage assets, as well as architecturally relevant 20th-century concrete buildings. Building on ongoing work on eco-friendlier inorganic products, the candidate will explore novel formulations and application strategies to improve efficacy and long-term performance of conservation treatments to enhance concrete durability. The research may combine materials design, laboratory testing, microstructural and physico-mechanical characterisation, durability assessment under aggressive environments, and evaluation of treatment performance on representative concrete substrates. Topics may include stabilization of degraded concrete surfaces, crack sealing, salt and moisture-related deterioration, compatibility between the treatments and historic concrete. This is an opportunity to work at the interface of construction materials, heritage science, sustainability and advanced characterisation, contributing to practical conservation solutions for 20th-century concrete heritage and to broader strategies for extending the service life of existing built assets.

What type of candidate profile are you looking for?

We are looking for an early-career researcher with strong motivation to work at the interface of civil engineering, materials science and heritage conservation. The candidate should have solid experimental skills, good analytical capacity and interest in developing sustainable, application-oriented solutions for the built environment. Experience with cementitious or inorganic materials, durability testing, microstructural characterisation, non-destructive testing, conservation treatments or data analysis would be an advantage, but candidates with complementary backgrounds and a willingness to learn new methods are also encouraged. Independence, curiosity, collaborative spirit and good scientific communication skills are highly valued.

Rehabilitation Materials from Marine Waste for Energy-Efficient Buildings

[Inês Flores-Colen](#) — CERIS, IST-ID

Research Domain: [Sustainable Construction](#) / [Rehabilitation Materials](#) / [Circular Economy](#)



Research Overview

This MSCA-PF opportunity focuses on innovative rehabilitation materials for energy-efficient buildings and resilient infrastructure systems using marine-derived waste materials and circular economy approaches.

Research Topics

- Rehabilitation materials;
- Advanced insulating materials;
- Circular economy approaches in construction;
- Marine waste valorisation;
- Sustainable mortars and composites;
- Low-carbon rehabilitation

Candidate Profile

- Civil, materials or environmental Engineering, architecture, or related fields;
- sustainable construction materials, rehabilitation, circular economy approaches or innovative solutions for thermal efficiency and durability;
- experimental research;
- material characterisation;
- laboratory testing;
- data analysis;
- mortars, composites or recycled materials;
- sustainability assessment methodologies;

[More Information](#)

Why This Opportunity Matters

The project contributes to circular economy-driven construction innovation through sustainable rehabilitation and low-carbon infrastructure materials.

Keywords: [Rehabilitation](#) | [Advanced Insulating Materials](#) | [Circular Economy](#) | [Marine Waste Valorisation](#) | [Low-Carbon Materials](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

MSCA candidates can play a transformative role in the field of rehabilitation by developing innovative and sustainable materials that improve thermal insulation, durability, and environmental performance. One promising area is the use of marine waste, such as seashells, algae residues, fish scales, and discarded fishing nets, to create eco-friendly construction and rehabilitation solutions. These materials can be integrated into insulating panels, lightweight composites, or bio-based coatings for buildings and infrastructure rehabilitation. For example, seashell-derived calcium carbonate can enhance the strength and durability of mortars, while algae-based materials may improve thermal insulation and moisture regulation. Recycled fishing nets can also be transformed into reinforcement fibres for sustainable construction products. By combining circular economy principles with advanced material science, students can contribute to reducing marine pollution while promoting energy-efficient rehabilitation practices. Their research may support the development of low-carbon materials with longer life cycles, better resistance to weather conditions, and improved indoor comfort. Such projects encourage interdisciplinary collaboration between engineering, environmental science, architecture, and biotechnology, preparing candidates to create sustainable solutions that address both environmental challenges and the future needs of resilient infrastructure.

What makes your research group and environment attractive to candidates?

Our research group offers an attractive and multidisciplinary environment for candidates interested in sustainable construction materials and rehabilitation solutions. Over the past years, we have developed several research projects focused on the incorporation of waste materials into mortars and composite materials, promoting circular economy principles and low-carbon construction approaches. Our work includes the development of thermal mortars incorporating aerogel for enhanced energy efficiency, as well as innovative studies on the reuse of marine-derived waste, such as bivalve shells and discarded fishing nets, in sustainable composites and rehabilitation materials. These projects combine material science, durability assessment, thermal performance, and environmental engineering. Candidates benefit from access to specialized laboratory infrastructure, collaborative research networks, and an international environment that encourages interdisciplinary work. The group also maintains connections with industry and sustainability-oriented initiatives, providing opportunities for applied research with real societal and environmental impact.

What type of candidate profile are you looking for?

We are looking for motivated candidates with a background in civil engineering, materials engineering, environmental engineering, architecture, or related fields. Candidates should have an interest in sustainable construction materials, rehabilitation, circular economy approaches, and innovative solutions for thermal efficiency and durability. Experience in experimental research, material characterization, laboratory testing, or data analysis is valued, particularly in areas related to mortars, composites, or recycled materials. Knowledge of sustainability assessment methodologies and scientific writing is also appreciated. We seek proactive and collaborative researchers who are interested in interdisciplinary work and international research environments, with a strong motivation to contribute to innovative and environmentally responsible construction solutions.

Metal 3D-Printed Connections for Thin-Walled and Composite Structural Systems

[José Gonilha](#) — CERIS, IST-ID

Research Domain: [Structural Engineering](#) / [Additive Manufacturing](#) / [Thin-Walled Structures](#)



Research Overview

This MSCA-PF opportunity focuses on advanced metal 3D-printed connection systems for thin-walled and composite structural applications using additive manufacturing and computational structural engineering approaches.

Research Topics

- Metal additive manufacturing;
- Thin-walled structures;
- Composite structures;
- Structural connections
- Damage and failure mechanisms.

Candidate Profile

- Experimental structural research
 - Finite element modelling;
 - Additive manufacturing;
 - Structural analysis;
- or computational mechanics

[More Information](#)

Why This Opportunity Matters

The project contributes to next-generation structural systems by integrating additive manufacturing technologies into advanced connection design for thin-walled structural applications.

Keywords: [Thin-Walled Structures](#) | [Composite Structures](#) | [Metal 3D Printing](#) | [Structural Connections](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

Development of metal 3D printed connection parts for thin-walled structures.

What makes your research group and environment attractive to candidates?

Very dynamic group with access to excellent experimental facilities and computational resources.

What type of candidate profile are you looking for?

Motivated candidate, background in both experimental and computational research would be ideal.

FRP Composites with Thermoplastic Resins for Sustainable Civil Engineering Structures

João R. Correia — CERIS, IST-ID

Research Domain: [Composite Materials](#) / [Structural Engineering](#) / [Sustainable Composites](#)



Research Overview

This MSCA-PF opportunity focuses on the development and application of advanced fibre-reinforced polymer (FRP) composites with thermoplastic resins for sustainable civil engineering structures.

Research Topics

- Advanced composite materials;
- FRP systems with thermoplastic resins;
- Durability and lifecycle performance;
- Elevated temperature and fire behaviour;
- Sustainable composites;
- Structural applications of recyclable composites.

Candidate Profile

- fibre-polymer composite materials;
- laboratory testing;
- data analysis;
- durability assessment;
or lifecycle assessment;

[More Information](#)

Why This Opportunity Matters

The project contributes to next-generation sustainable structures systems through recyclable and high-performance composite technologies.

Keywords: [Advanced Composite Materials](#) | [Durability](#) | [Elevated Temperature and Fire Performance](#) | [Sustainable Composites](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

The proposed research focuses on investigating the feasibility of using fibre-reinforced polymer (FRP) composites with thermoplastic resins in civil engineering structures, as a durable and sustainable alternative to conventional thermoset systems. Thermoset composites are widely used across several industries due to their lightness, high strength and durability. However, they cannot be reshaped, welded or easily repaired, which limits design flexibility and hinders recycling at the end of life, often leading to landfill disposal or incineration. The development of more sustainable composite systems has become a priority for the FRP industry, driving interest in thermoplastic alternatives. Recent advances in thermoplastic resins now offer new opportunities, as they can be reheated and reprocessed, enabling reshaping, welding and recycling. These advantages have already supported their adoption in aerospace, automotive and wind energy sectors, while their use in civil engineering remains largely unexplored. In particular, thermoplastic composites produced by pultrusion or vacuum infusion for civil structures are still at an early stage of development. Consequently, their short- and long-term behaviour, performance at elevated temperature, durability, structural response of connections and members, and environmental and economic benefits remain insufficiently addressed. This research addresses a rapidly evolving topic, with strong potential for innovation and significant impact on future sustainable construction practices using FRP structural systems, including the integration of thermoplastic FRPs into design codes.

What makes your research group and environment attractive to candidates?

The Composites Research Group (CORE Group) is internationally recognised among the leading research teams in fibre-polymer composites for civil engineering, developing fundamental and applied research on advanced and innovative materials and technologies. The group is highly international and multidisciplinary, fostering a dynamic environment for high-impact research and innovation. It brings together researchers, PhD and MSc students working across mechanical behaviour, connection technology, long-term performance, durability, fire behaviour and sustainability of FRP systems, including rebars, profiles, sandwich structures and strengthening systems. The group has strong expertise in experimental and numerical research, supported by a well-equipped laboratory infrastructure, covering composite manufacturing (vacuum infusion), mechanical testing at material and structural scale, elevated temperature and fire testing, durability studies, and thermomechanical and microstructural analyses (DMA, TGA, SEM). It is actively involved in international standardization (e.g. CEN/TS 19101:2022, Structural Eurocodes) and maintains close industry collaborations, through 20+ R&D projects and landmark infrastructure applications (e.g. footbridges and highway underpasses).

What type of candidate profile are you looking for?

The candidate is expected to have a background in fibre-polymer composite materials, as well as experience with laboratory testing and data analysis. Previous experience in durability assessment or sustainability assessment methodologies (e.g. life-cycle analysis) is welcome. The candidate should demonstrate good communication and scientific writing skills, and proficiency in English.

AI-Driven Urban Landscapes, Nature-Based Solutions & Territorial Governance

Isabel Loupa-Ramos — CiTUA, IST-ID

Research Domain:



Research Overview

This opportunity explores how artificial intelligence, spatial analytics and governance frameworks can support more sustainable, resilient and inclusive urban environments. The research combines advanced geospatial technologies with participatory planning approaches to better understand urban landscapes, environmental systems and territorial governance

Research Topics

- AI-Driven Urban Landscape Mapping and Character Assessment
- Landscape Character Assessment and Urban Identity
- GIS Modelling and Spatial Analytics
- Participatory Mapping and Citizen-Generated Data
- Governance of Nature-Based Solutions
- Urban Sustainability and Climate Adaptation
- Multi-Level Governance and Policy Integration
- Spatial Justice and Inclusive Urban

Candidate Profile

- Urban Planning
- Landscape Architecture
- Geography
- Environmental Studies
- Spatial Planning
- GIS and Geospatial Sciences
- Architecture
- Urban Data Science

[More Information](#)

Why This Opportunity Matters

The project contributes to the development of next-generation planning tools and governance models that combine artificial intelligence, environmental sustainability and citizen participation to support more resilient, inclusive and climate-adaptive cities.

Keywords: AI for Urban Planning | GIS Analytics | Landscape Character Assessment | Nature-Based Solutions | Urban Governance | Spatial Justice | Climate Adaptation | Participatory Planning

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Brief description of the proposed research topic(s) for MSCA-PF candidates

Research Topic 1: AI-Driven Urban Landscape Mapping and Character Assessment

This research topic focuses on the development of AI-driven technologies to advance urban landscape mapping, with a specific focus on identifying the variables that define landscape character in cities. Beyond conventional physical attributes the project integrates intangible dimensions of the urban landscape, including identity, meanings, sensory qualities and people's perceptions.

The research combines traditional spatial datasets with non-traditional and AI-supported data sources, including geotagged photographs, participatory mapping, text-based data and survey inputs. These heterogeneous datasets are integrated through methodologies that connect measurable spatial variables with subjective and perceptual information, enabling more holistic and culturally informed representations of urban landscapes.

The project aims to support landscape character assessment, urban design and evidence-based planning that reflects both physical form and lived experience. The research is linked to the ongoing ALL@CityScape project.

Research Topic 2: Governance of Nature-Based Solutions in Urban Planning

This research topic examines the governance of Nature-Based Solutions (NBS), focusing on how institutional arrangements, policy frameworks, stakeholder participation and multi-level governance structures shape the planning, implementation and long-term management of NBS in cities.

Particular attention is given to the roles of local authorities, public agencies, communities and private actors in the co-production of NBS, addressing issues of coordination, legitimacy, institutional capacity and accountability. The research investigates governance mechanisms that enable NBS to move beyond pilot projects and become integrated into mainstream urban planning instruments and professional practices.

The study also explores barriers such as sectoral silos, regulatory constraints and funding models, as well as enabling factors including collaborative governance, adaptive planning and policy integration. The objective is to provide actionable insights for embedding NBS within urban planning systems while ensuring ecological effectiveness, social inclusion and spatial justice. The research is linked to the ongoing NBSplus project.

What makes your research group and environment attractive to candidates?

CiTUA research addresses tangible issues while maintaining a connection with the natural environment and its socio-ecological context. Its activities are conducted within an inter and transdisciplinary framework, employing critical and reflective analysis. They emanate from 4 Collaborative Research Labs (RL) - Strategies and Transitions for Sustainability (SENSU), Public Policies for Territory Restructuring (PPOL), Digital Practices (DP) and Heritage (H), each opening to a pool of thematic areas that generate cross-related projects and spanning diverse spatial and temporal scales. Employing both qualitative and quantitative methods and taking advantage of AI and machine learning, CiTUA focuses on exploring novel approaches that serve as both research tools and instruments for disseminating the knowledge produced.

What type of candidate profile are you looking for?

Candidate Profile

Researchers with backgrounds in: Urban Planning; Landscape Architecture; Geography; Environmental Studies; Spatial Planning; GIS and Geospatial Sciences; Architecture; Urban Data Science

Learning Landscapes, Educational Environments & Urban Learning Ecologies

Alexandra Alegre — CiTUA, IST-ID

Research Domain:



Research Overview

This opportunity investigates how educational environments, public spaces and urban systems can foster environmental literacy, social inclusion and innovative learning experiences. The research examines the relationships between architecture, pedagogy, climate-responsive design and community-based learning processes.

Research Topics

- Learning Landscapes
- Climate-Responsive Educational Environments
- School Outdoor Spaces
- Environmental Literacy
- Participatory Co-Design Processes
- Spatial Pedagogies
- Inclusive Learning Environments
- Urban Learning Ecologies
- Schools as Community Infrastructure
- Educational Innovation and Well-Being

Candidate Profile

- Architecture
- Urban Studies
- Educational Research
- Environmental Design
- Landscape Architecture
- Human Geography
- Social Sciences

[More Information](#)

Why This Opportunity Matters

The project supports the transformation of educational environments into catalysts for sustainability, inclusion and community resilience, contributing to new approaches for climate-responsive and socially engaged spatial design

Keywords: Learning Landscapes | Educational Environments | Spatial Pedagogies | Urban Learning Ecologies | Climate-Responsive Design | Environmental Literacy | Co-Design | Social Inclusion | Community-Based Learning

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Brief description of the proposed research topic(s) for MSCA-PF candidates

Learning Landscapes, focusing on climate-responsive educational environments, school outdoor spaces, environmental literacy and participatory co-design processes. Research may combine architectural design, spatial analysis, environmental assessment and participatory methodologies involving schools, municipalities and local communities. Candidates will benefit from an interdisciplinary and international research environment with ongoing collaborations and projects addressing educational innovation, sustainability, social inclusion and climate adaptation.

What makes your research group and environment attractive to candidates?

CITUA offers an interdisciplinary and international research environment connecting architecture, urban studies, education and environmental research. The Knowledge Environments research line provides expertise in participatory methodologies, post-occupancy evaluation, spatial analysis and co-design processes applied to educational and community-based environments. Candidates will benefit from ongoing collaborations with schools, municipalities, cultural and educational institutions. The research environment supports socially engaged and impact-oriented research addressing sustainability, inclusion, climate adaptation and educational innovation.

What type of candidate profile are you looking for?

We welcome candidates with backgrounds in architecture, urban studies, educational research, environmental design or related interdisciplinary fields. We are particularly interested in researchers with experience in participatory and collaborative methodologies, spatial analysis, post-occupancy evaluation, qualitative and mixed-methods research or community-based practices. Candidates with interests in educational environments, sustainability, climate-responsive design, social inclusion, urban learning, well-being or public space are especially encouraged to apply. Experience in interdisciplinary research, international collaboration and engagement with schools, municipalities or community organizations will be valued.

Health, Biomedical & Regenerative Technologies

Bruno L. Oliveira — C2TN, IST-ID

[PROTACs and Targeted Protein Degradation for Translational Cancer Therapeutics](#)

Claudia Lobato — iBB, IST-ID

[Stem Cell Engineering and Precision Regenerative Medicine](#)

João Silva — iBB, IST-ID

[Advanced Bio-Inks and Biomaterials for Tissue Engineering and Regenerative Medicine](#)

Margarida Diogo — iBB, IST-ID

[Advanced In Vitro Models for Nervous and Cardiac Tissue Engineering](#)

Paola A. Alberto — iBB, IST-ID

[Bioelectronics for Tissue Engineering and Cancer Therapies](#)

Simão Rocha — iBB, IST-ID

[X-Chromosome Inactivation and Epigenetic Regulation in Human Pluripotent Stem Cells](#)

PROTACs and Targeted Protein Degradation for Translational Cancer Therapeutics

[Bruno L. Oliveira](#) — C2TN, IST-ID

Research Domain: Medicinal Chemistry / Chemical Biology / Translational Oncology



Research Overview

This MSCA-PF opportunity focuses on innovative chemical biology strategies for targeted protein degradation and translational cancer therapeutics. Research explores PROTACs, single-domain antibodies, bioorthogonal chemistry, drug conjugates, antibody-drug conjugates and molecular imaging approaches.

Research Topics

- Targeted protein degradation
- PROTAC development
- Drug conjugates
- Bioorthogonal chemistry
- Molecular imaging

Candidate Profile

- Medicinal Chemistry
- Chemical Biology
- Biotechnology
- Molecular Biology
- Biochemistry
- Pharmaceutical Sciences

[More Information](#)

Why This Opportunity Matters

The project contributes to next-generation therapeutic strategies for cancer and complex diseases through targeted protein degradation technologies and advanced chemical biology approaches.

Keywords: PROTACs | Targeted Protein Degradation | Translational Oncology

Brief description of the proposed research topic(s) for MSCA-PF candidates

We are seeking highly motivated MSCA-PF candidates to join an interdisciplinary project focused on the development of next-generation brain-targeted therapeutics for triple-negative breast cancer (TNBC) brain metastases. The project combines antibody engineering, targeted protein degradation, molecular imaging, and translational oncology to develop innovative bispecific single-domain antibody (sdAb)-based Degradator–Antibody Conjugates (DACs).

The research will involve the engineering of bispecific sdAbs capable of crossing the blood–brain barrier and selectively targeting TNBC cells, followed by site-specific conjugation of PROTAC payloads for catalytic degradation of oncogenic proteins. Candidates will contribute to the design, biochemical characterization, radiolabeling, and preclinical evaluation of these novel therapeutics using advanced in vitro BBB models, 3D tumoroids, and in vivo imaging approaches (SPECT/CT and bioluminescence imaging).

The project offers a highly collaborative and international research environment involving leading groups from Portugal and Spain with complementary expertise in antibody engineering, radiopharmaceutical sciences, chemical biology, and translational cancer models. The work has strong translational potential and aims to establish a new therapeutic paradigm for TNBC brain metastases and other CNS malignancies.

What makes your research group and environment attractive to candidates?

Our research environment offers a highly interdisciplinary and international setting at the interface of antibody engineering, radiopharmaceutical sciences, chemical biology, and translational oncology. The consortium brings together complementary expertise from the University of Lisbon (FMV/CIISA and CTN-IST/C2TN) and IrsiCaixa Research Institute, providing access to state-of-the-art infrastructure for antibody development, protein bioconjugation, radiochemistry, molecular imaging (SPECT/CT), advanced cell culture, 3D tumoroids, and preclinical animal models.

Candidates will benefit from strong international collaborations, multidisciplinary supervision, and direct interaction with experts in translational cancer research and targeted therapeutics. The teams have extensive experience in European collaborative projects, technology transfer, patenting, and the development of clinically relevant therapeutic platforms. The project also provides exposure to translational and industry-oriented research through ongoing collaborations in therapeutic antibody development, molecular imaging, and drug conjugate technologies, creating an excellent environment for scientific training and career development.

What type of candidate profile are you looking for?

We are looking for highly motivated candidates with a strong background in biomedical sciences, biotechnology, biochemistry, molecular biology, pharmaceutical sciences, chemical biology, radiopharmaceutical sciences, or related fields. Applicants should hold a PhD and demonstrate experience in at least one of the following areas: antibody engineering, protein biochemistry, molecular and cellular biology, cancer biology, bioconjugation chemistry, radiochemistry, molecular imaging, or preclinical oncology models.

Experience with techniques such as recombinant protein expression and purification, flow cytometry, confocal microscopy, cell culture, 3D tumor models, molecular cloning, radiolabeling, LC-MS, or in vivo imaging will be highly valued. Candidates with expertise in targeted protein degradation (e.g., PROTACs), antibody–drug conjugates, or blood–brain barrier models are particularly encouraged to apply.

We seek enthusiastic researchers with strong analytical and communication skills, the ability to work collaboratively in an interdisciplinary and international environment, and a clear interest in translational biomedical research and therapeutic innovation in oncology.

Stem Cell Engineering and Regenerative Medicine

[Claudia Lobato](#) — iBB, IST-ID

Research Domain: [Stem Cell Engineering](#) / [Cell Therapies](#) / [Regenerative Medicine](#)



Research Overview

This MSCA-PF opportunity focuses on innovative stem cell engineering and advanced regenerative medicine technologies supporting personalised therapeutic strategies, combining fundamental cell biology with translational biomedical applications.

Research Topics

- stem cell engineering and cell therapies;
- regenerative and personalised medicine;
- advanced cellular models;
- translational biomedical applications.

Candidate Profile

- Stem Cell Engineering;
 - Regenerative Medicine;
 - Cell Biology;
 - Biomedical Engineering;
 - Biotechnology;
 - Translational Medicine;
 - stem cell engineering;
 - cell therapies;
 - regenerative medicine;
- or interdisciplinary research bridging engineering and biomedical sciences

[More Information](#)

Why This Opportunity Matters

The project contributes to advancing stem cell engineering and regenerative medicine, supporting research with potential implications for personalised therapeutic strategies and next-generation cell-based therapies.

Keywords: [Stem Cell Engineering](#) | [Cell Therapies](#) | [Regenerative Medicine](#) | [Personalised Medicine](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

This MSCA-PF opportunity focuses on innovative stem cell engineering and advanced regenerative medicine technologies supporting personalised therapeutic strategies, combining fundamental cell biology with translational biomedical applications.

Potential research topics include: stem cell engineering and cell therapies; regenerative and personalised medicine; advanced cellular models; and translational biomedical applications.

The project aims to advance the development of stem cell-based technologies and personalised therapeutic approaches, contributing to both fundamental knowledge of cell biology and translational regenerative medicine.

Research activities may involve: stem cell engineering and culture; cell therapy development; advanced cellular modelling; and translational biomedical research.

The research environment promotes interdisciplinary collaboration across stem cell engineering, regenerative medicine and biomedical sciences, supporting innovative research bridging engineering and life sciences.

What type of candidate profile are you looking for?

Researchers with backgrounds in:

- Stem Cell Engineering;
- Regenerative Medicine;
- Cell Biology;
- Biomedical Engineering;
- Biotechnology;
- Translational Medicine;

or related life science disciplines.

Candidates with experience in:

- stem cell engineering;
- cell therapies;
- regenerative medicine;

or interdisciplinary research bridging engineering and biomedical sciences are particularly encouraged to apply

Advanced In Vitro Models for Nervous and Cardiac Tissue Engineering

[Margarida Diogo](#) — iBB, IST-ID

Research Domain: [Tissue Engineering](#) / [Regenerative Medicine](#) / [Biomedical Engineering](#)



Research Overview

This MSCA-PF opportunity focuses on the development of physiologically representative in vitro models for nervous and cardiac tissues, supporting translational biomedical research and next-generation therapies.

Research Topics

- advanced in vitro tissue models and organoids;
- nervous and cardiac tissue engineering;
- disease modelling platforms;
- drug testing and screening systems.

Candidate Profile

- Tissue Engineering
- Regenerative Medicine
- Biomedical Engineering
- Cell Biology
- Biotechnology
- Biomaterials
- in vitro tissue models;
- organoids;
- or translational biomedical research

[More Information](#)

Why This Opportunity Matters

The project contributes to advancing in vitro tissue models for nervous and cardiac systems, supporting research with potential implications for disease modelling, drug discovery and next-generation therapies.

Keywords: [In Vitro Models](#) | [Organoids](#) | [Tissue Engineering](#) | [Disease Modelling](#) | [Drug Testing](#)

Brief description of the proposed research topic(s) for MSCA-PF candidates

This MSCA-PF opportunity focuses on the development of physiologically representative in vitro models for nervous and cardiac tissues, supporting translational biomedical research and next-generation therapies.

Potential research topics include: advanced in vitro tissue models and organoids; nervous and cardiac tissue engineering; disease modelling platforms; and drug testing and screening systems.

The project aims to advance the development of advanced in vitro models for complex tissues, contributing to disease modelling, drug testing and translational biomedical research.

Research activities may involve: in vitro tissue model and organoid development; nervous and cardiac tissue engineering; disease modelling platforms; and drug screening methodologies.

The research environment promotes interdisciplinary collaboration across tissue engineering, regenerative medicine and biomedical engineering, supporting innovative research bridging engineering and life sciences.

What type of candidate profile are you looking for?

Researchers with backgrounds in:

- Tissue Engineering;
- Regenerative Medicine;
- Biomedical Engineering;
- Cell Biology;
- Biomaterials;
- Biotechnology;

or related life science disciplines.

Candidates with experience in:

- in vitro tissue models;
- organoids;
- tissue engineering;

or translational biomedical research bridging engineering and life sciences are particularly encouraged to apply.

Bioelectronics for Tissue Engineering and Cancer Therapies

[Paola A. Alberto](#) — iBB, IST-ID

Research Domain: [Bioelectronics](#) / [Tissue Engineering](#) / [Biomedical Technologies](#)



Research Overview

This MSCA-PF opportunity focuses on the development of bioelectronic technologies for tissue engineering and cancer therapy, combining biomedical engineering with next-generation therapeutic systems.

Research Topics

- bioelectronic interfaces and sensing/stimulation platforms;
- tissue-engineered models and advanced in vitro systems;
- biomedical devices for cancer therapy applications;
- translational bioengineering for complex diseases.

Candidate Profile

- Biomedical Engineering
- Bioengineering
- Electronics
- Biotechnology
- Tissue Engineering
- Bioelectronics;
- Biomedical devices;
- Advanced in vitro systems;
- or translational biomedical research

[More Information](#)

Why This Opportunity Matters

The project contributes to advancing bioelectronic technologies for biomedical applications, supporting research with potential implications for cancer therapies, tissue engineering and next-generation therapeutic devices.

Keywords: [Bioelectronics](#) | [Tissue Engineering](#) | [Cancer Therapies](#) | [Biomedical Devices](#) | [Translational Bioengineering](#)

Brief description of the proposed research topic(s) for MSCA-PF candidates

This MSCA-PF opportunity focuses on the development of bioelectronic technologies for tissue engineering and cancer therapy, combining biomedical engineering with next-generation therapeutic systems.

Potential research topics include bioelectronic interfaces and sensing/stimulation platforms; tissue-engineered models and advanced in vitro systems; biomedical devices for cancer therapy applications; and translational bioengineering for complex diseases.

The project aims to advance the integration of bioelectronics with tissue engineering and therapeutic technologies, contributing to next-generation biomedical devices and treatment strategies for complex diseases.

Research activities may involve: bioelectronic interface development; tissue-engineered model design; advanced in vitro systems; and biomedical device fabrication for cancer therapy.

The research environment promotes interdisciplinary collaboration across bioelectronics, tissue engineering and biomedical technologies, supporting innovative research at the interface of engineering and translational medicine.

What type of candidate profile are you looking for?

Researchers with backgrounds in:

- Biomedical Engineering;
- Bioengineering;
- Electronics;
- Biotechnology;
- Tissue Engineering;

or related engineering and life science disciplines.

Candidates with experience in:

- bioelectronics;
- biomedical devices;
- advanced in vitro systems;

or translational biomedical research are particularly encouraged to apply.

Advanced Bio-Inks and Biomaterials for Tissue Engineering and Regenerative Medicine

[João Silva](#) — iBB, IST-ID

Research Domain: [Biomaterials](#) / [Bioengineering](#) / [Regenerative Medicine](#)



Research Overview

This MSCA-PF opportunity focuses on the development of innovative biomaterial formulations and advanced manufacturing approaches for tissue-engineered constructs and next-generation biomedical applications.

Research Topics

- Bio-inks and advanced biomaterials
- 3D bioprinting and biofabrication
- Tissue engineering and regenerative medicine technologies
- Biomimetic and Smart biomaterials

Candidate Profile

- Biomaterials
- Bioengineering
- Tissue Engineering
- Biomedical Engineering
- Biotechnology
- Regenerative Medicine;
- Advanced manufacturing for biomedical applications;
- 3D bioprinting;

[More Information](#)

Why This Opportunity Matters

The project contributes to advancing biomaterials and tissue engineering, supporting research with potential implications for regenerative medicine and the development of next-generation biomedical technologies.

Keywords: [Bio-inks](#) | [Biomaterials](#) | [3D Bioprinting](#) | [Tissue Engineering](#) | [Biofabrication](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

This MSCA-PF opportunity focuses on the development of innovative biomaterial formulations and advanced manufacturing approaches for tissue-engineered constructs and next-generation biomedical applications.

Potential research topics include: bio-inks and advanced biomaterials; 3D bioprinting and biofabrication; biomimetic and “smart” materials; and tissue engineering and regenerative medicine technologies.

The project aims to advance the design and application of bio-inks and biomaterials, contributing to the development of tissue-engineered constructs and next-generation biomedical solutions.

Research activities may involve: biomaterial formulation and characterisation; 3D bioprinting and biofabrication; design of biomimetic and smart materials; and advanced manufacturing for biomedical applications.

The research environment promotes interdisciplinary collaboration across biomaterials, bioengineering and regenerative medicine, supporting innovative research at the interface of materials science and biomedical applications.

What type of candidate profile are you looking for?

Researchers with backgrounds in:

- Biomaterials;
- Bioengineering;
- Tissue Engineering;
- Regenerative Medicine;
- Biomedical Engineering;
- Biotechnology;

or related life science disciplines.

Candidates with experience in:

- advanced manufacturing for biomedical applications;
- 3D bioprinting;
- biomaterials development;

or tissue engineering methodologies are particularly encouraged to apply

X-Chromosome Inactivation and Epigenetic Regulation in Human Pluripotent Stem Cells

[Simão Rocha](#) — iBB, IST-ID

Research Domain: [Stem Cell Biology](#) / [Epigenetics](#) / [Developmental Biology](#)



Research Overview

This MSCA-PF opportunity focuses on the study of X-chromosome inactivation and epigenetic regulation mechanisms in human pluripotent stem cells, combining fundamental biological research with translational biomedical perspectives.

Research Topics

- X-chromosome inactivation
- Epigenetic regulation
- Pluripotent stem cells
- Gene regulation mechanisms
- Stem cell-based disease modelling
- Developmental biology;

Candidate Profile

- Stem Cell Biology
- Molecular Biology
- Genetics
- Epigenetics
- Developmental Biology
- Biomedical sciences
- pluripotent stem cells;
- gene regulation;
- or advanced biological methodologies

[More Information](#)

Why This Opportunity Matters

The project contributes to advancing the understanding of epigenetic regulation and stem cell biology, supporting research with potential implications for developmental biology, disease modelling and future regenerative medicine applications.

Keywords: [X-Chromosome Inactivation](#) | [Epigenetics](#) | [Pluripotent Stem Cells](#) | [Developmental Biology](#) | [Gene Regulation](#) | [Stem Cell Biology](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

This MSCA-PF opportunity focuses on the study of X-chromosome inactivation and epigenetic regulation mechanisms in human pluripotent stem cells, combining fundamental biological research with translational biomedical perspectives.

Potential research topics include: X-chromosome inactivation; epigenetic regulation; pluripotent stem cells; developmental biology; gene regulation mechanisms; and stem cell-based disease modelling.

The project aims to advance the understanding of epigenetic processes governing cell identity and genome regulation in pluripotent systems, contributing to both basic biological knowledge and translational applications.

Research activities may involve: stem cell culture and differentiation; epigenetic analysis; molecular and cellular biology techniques; gene expression studies; and advanced cellular modelling approaches.

The research environment promotes interdisciplinary collaboration across stem cell biology, epigenetics and biomedical sciences, supporting innovative research at the interface of developmental biology and translational medicine.

What type of candidate profile are you looking for?

Researchers with backgrounds in:

- Stem Cell Biology;
- Molecular Biology;
- Genetics;
- Epigenetics;
- Biomedical Sciences;
- Developmental Biology;

or related life science disciplines.

Candidates with experience in:

- pluripotent stem cells;
- cellular and molecular biology;
- gene regulation;
- epigenetics;

or advanced biological methodologies are particularly encouraged to apply.

Biotechnology, Microbiology & Environmental Health

Ana Lanham — iBB, IST-ID

[Precision Viral Metagenomics and Phage-Based Control of Microbial Communities](#)

Carla de Carvalho – iBB, IST-ID

[Applied Biotechnology, Bioreactors and Applied Microbiology](#)

Nuno Mira — iBB, IST-ID

[Yeast-Based Biotechnology and Antifungal Resistance Mechanisms in Candida Species](#)

Ricardo Araújo – CERENA, IST

[Veterinary Sciences, Surgery and Inner Ear Biology](#)

Ricardo Santos — CERIS, IST-ID

[Environmental Virology, Biodiversity and Emerging Pathogen Surveillance](#)

Rodrigo Costa — iBB, IST-ID

[AI-Assisted Cultivation of the Unculturable and Microbial Metabolism Engineering](#)

Silvia Monteiro — CERIS, IST-ID

[Wastewater-Based Surveillance and Environmental Virology for Public Health Resilience](#)

Tina Koller-Costa — iBB, IST-ID

[Environmental Microbiomes and Bioremediation for Ecosystem Health and Climate Resilience](#)

Precision Viral Metagenomics and Phage-Based Control of Microbial Communities

[Ana Lanham](#) — iBB, IST-ID

Research Domain: [Environmental Biotechnology](#) / [Viral Metagenomics](#) / [Microbial Engineering](#)



Research Overview

This MSCA-PF opportunity focuses on advanced viral metagenomics and phage-based approaches for the targeted control and understanding of microbial communities in engineered systems, combining cutting-edge molecular tools with environmental biotechnology applications.

Research Topics

- Precision viral metagenomics and CRISPR-Cas mapping;
- Gene marker identification and phage–host interactomes;
- Environmental phage characterisation;
- Downstream processing of viral particles and bio-nanoparticles.

Candidate Profile

- Metagenomics;
 - Bioinformatics;
 - Molecular biology applied to viromes;
- Or interdisciplinary drive to apply these tools to real-world biological wastewater treatment systems

[More Information](#)

Why This Opportunity Matters

The project contributes to advancing precision microbial control strategies, supporting research with potential implications for environmental biotechnology, wastewater treatment and the development of phage-based applications.

Keywords: [Viral Metagenomics](#) | [CRISPR-Cas](#) | [Phage-Host Interactions](#) | [Microbial Engineering](#) | [Environmental Biotechnology](#) | [Bio-nanoparticles](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

This MSCA-PF opportunity focuses on advanced viral metagenomics and phage-based approaches for the targeted control and understanding of microbial communities in engineered systems, combining cutting-edge molecular tools with environmental biotechnology applications.

Potential research topics include: precision viral metagenomics and CRISPR-Cas mapping; gene marker identification and phage–host interactomes; environmental phage characterisation; and downstream processing of viral particles and bio-nanoparticles.

The project aims to advance the understanding of viral communities and phage–host dynamics, contributing to the targeted control of microbial systems with applications in environmental biotechnology and biological wastewater treatment.

Research activities may involve: viral metagenomics and bioinformatics analyses; CRISPR-Cas mapping; phage characterisation and interactome studies; molecular biology applied to viromes; and downstream processing of viral particles.

The research environment promotes interdisciplinary collaboration across environmental biotechnology, microbiology and computational biology, supporting innovative research at the interface of viral ecology and microbial engineering.

What type of candidate profile are you looking for?

Researchers with backgrounds in: Biological Engineering; Computational Biology; Bioinformatics; Environmental Biotechnology; Microbiology; or related life science disciplines.

Candidates with experience in: metagenomics; bioinformatics; molecular biology applied to viromes; or an interdisciplinary drive to apply these tools to real-world biological wastewater treatment systems are particularly encouraged to apply.

Applied Biotechnology, Bioreactors and Applied Microbiology

Carla de Carvalho — iBB, IST-ID

Research Domain: Applied Microbiology / Biocatalysis, Bioreactors & Bioprocesses
/ Marine Biotechnology



Research Overview

This MSCA-PF opportunity focuses on the development of bioprocesses using (marine) bacteria adaptation strategies, the cultivation of extremophiles and marine bacteria, and the adaptation of bacterial cells at the lipid level.

Research Topics

- bacterial adaptive mechanisms;
- persistent and viable-but-non-culturable cells;
- prevention and eradication of biofilms;
- marine biotechnology and cultivation of extremophiles;
- whole cell and enzyme biocatalysis;
- and design of bioreactors and bioprocess engineering.

Candidate Profile

- Biological Engineering;
- Biotechnology;
- Bioprocessing and Bioreactor development;
- gas chromatography;
- fluorescence microscopy;
- fermentation;
- isolation and screening of microbes;
or advanced bioprocessing methodologies

[More Information](#)

Why This Opportunity Matters

The project contributes to advancing applied microbiology and bioprocess engineering, supporting research with potential implications for industrial biotechnology, marine bioresources and sustainable biocatalytic processes.

Keywords: Biocatalysis | Bioreactor | Bioprocess | Lipidomics | Biofilm | Biotechnology

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Brief description of the proposed research topic(s) for MSCA-PF candidates

This MSCA-PF opportunity focuses on the development of bioprocesses using (marine) bacteria adaptation strategies, the cultivation of extremophiles and marine bacteria, and the adaptation of bacterial cells at the lipid level.

Potential research topics include: bacterial adaptive mechanisms; persistent and viable-but-non-culturable cells; prevention and eradication of biofilms; marine biotechnology and cultivation of extremophiles; whole cell and enzyme biocatalysis; and design of bioreactors and bioprocess engineering.

The project aims to advance the understanding of bacterial adaptation and biocatalysis, contributing to the development of robust bioprocesses with applications in industrial and marine biotechnology.

Research activities may involve: bacterial cultivation and lipidomic analyses; biofilm prevention and eradication studies; whole cell and enzyme biocatalysis; bioreactor design and bioprocess development; and isolation and screening of microbes.

The research environment promotes interdisciplinary collaboration across applied microbiology, bioprocess engineering and marine biotechnology, supporting innovative research at the interface of microbial physiology and industrial applications.

What type of candidate profile are you looking for?

Researchers with backgrounds in:

- Biological Engineering;
 - Biotechnology;
 - Bioprocessing and Bioreactor development;
- or related life science disciplines.

Candidates with experience in:

- gas chromatography;
 - fluorescence microscopy;
 - fermentation;
 - isolation and screening of microbes;
- or advanced bioprocessing methodologies are particularly encouraged to apply.

The Dual Face of Yeasts: Biotechnological Power and Clinical Challenges

[Nuno Mira](#) — iBB, IST-ID

Research Domain: Molecular Microbiology / Industrial Biotechnology / Pathogenesis and Antifungal Resistance in Yeasts



Research Overview

This MSCA-PF opportunity focuses on the use of extensive OMICS-based molecular microbiology approaches to understand the physiology of yeasts and impact processes relevant for health and industrial biotechnology.

Research Topics

- yeast-based industrial biotechnology assisted by computation, modelling and OMICS analyses;
- elucidation of molecular mechanisms of resistance to antifungals in *Candida*;
- elucidation of how pathogenic yeasts communicate with commensal bacteria in microbiomes;
- identification of new molecules with anti-*Candida* activity.

Candidate Profile

- Microbiology
- Biotechnology
- Molecular Biology
- Biochemistry
- Biomedical Sciences
- Yeast genetics and physiology;
- OMICS analyses;
- Molecular microbiology;
- or antifungal research

[More Information](#)

Why This Opportunity Matters

The project contributes to advancing the understanding of yeast biology, supporting research with potential implications for industrial biotechnology, antifungal resistance and the development of new therapeutic strategies.

Keywords: **Biotechnology** | **Antifungal Resistance** | **OMICS Analyses** | **Pathogenic Yeasts** | **Molecular Microbiology**

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Brief description of the proposed research topic(s) for MSCA-PF candidates

This MSCA-PF opportunity focuses on the use of extensive OMICS-based molecular microbiology approaches to understand the physiology of yeasts and impact processes relevant for health and industrial biotechnology.

Potential research topics include: yeast-based industrial biotechnology assisted by computation, modelling and OMICS analyses; elucidation of molecular mechanisms of resistance to antifungals in *Candida*; elucidation of how pathogenic yeasts communicate with commensal bacteria in microbiomes; and identification of new molecules with anti-*Candida* activity.

The project aims to advance the understanding of yeast physiology and pathogenesis, contributing to both industrial biotechnology applications and the development of new strategies against antifungal resistance.

Research activities may involve: OMICS-based analyses; yeast genetics and physiology; molecular microbiology techniques; computational and modelling approaches; and antifungal screening assays.

The research environment promotes interdisciplinary collaboration across molecular microbiology, industrial biotechnology and biomedical sciences, supporting innovative research at the interface of yeast biology and translational applications.

What type of candidate profile are you looking for?

Researchers with backgrounds in:

- Microbiology;
- Biotechnology;
- Molecular Biology;
- Biochemistry;
- Biomedical Sciences;

or related life science disciplines.

Candidates with experience in:

- yeast genetics and physiology;
- OMICS analyses;
- molecular microbiology;

or antifungal research are particularly encouraged to apply.

One Health Microbiology, AI-Assisted Biodiscovery, Marine Symbioses, Microbiome Engineering

[Rodrigo Costa](#) — iBB, IST-ID

Research Domain: [Microbiology](#) / [Biotechnology](#) / [AI for Biological Systems](#)



Research Overview

This MSCA-PF opportunity focuses on combining advanced microbiological techniques with AI-supported analytical approaches to uncover insights into marine symbioses as pillars of ecosystem health and sources of sustainable biotechnologies.

Research Topics

- AI-assisted microbial cultivation methodologies;
- synthetic biology to harness the metabolism of unculturable microbial systems;
- marine symbioses for ecosystem health, climate resilience, and drug discovery;
- microbiomes for sustainable aquaculture and biotechnology.

Candidate Profile

- Microbiology
- Biotechnology
- Metagenomics
- Bioinformatics
- Environmental Sciences
- Data Science
- Microbial Ecology
- microbiome analysis;
- computational biology;
- AI for biological applications;
- or marine microbiology

[More Information](#)

Why This Opportunity Matters

The project contributes to advancing One Health microbiology and AI-assisted biodiscovery, supporting research with potential implications for ecosystem health, climate resilience and sustainable biotechnological innovation.

Keywords: [AI-Assisted Microbial Cultivation](#) | [Microbiomes](#) | [Marine Symbiosis](#) | [Biodiscovery](#) | [Blue Biotechnology](#) | [One Health](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

This MSCA-PF opportunity focuses on combining advanced microbiological techniques with AI-supported analytical approaches to uncover insights into marine symbioses as pillars of ecosystem health and sources of sustainable biotechnologies.

Potential research topics include: AI-assisted microbial cultivation methodologies; synthetic biology to harness the metabolism of unculturable microbial systems; marine symbioses for ecosystem health, climate resilience, and drug discovery; and microbiomes for sustainable aquaculture and biotechnology.

The project aims to advance the integration of microbiology, AI and synthetic biology, contributing to ecosystem health, climate resilience and the development of sustainable biotechnologies.

Research activities may involve: AI-assisted microbial cultivation; synthetic biology approaches; microbiome and metagenomic analyses; computational biology; and marine symbiosis studies.

The research environment promotes interdisciplinary collaboration across microbiology, biotechnology and AI for biological systems, supporting innovative research at the interface of marine ecology and sustainable biotechnology.

What type of candidate profile are you looking for?

Researchers with backgrounds in:

- Biotechnology;
- Bioinformatics;
- Data Science;
- Environmental Sciences;
- Microbial Ecology;
- Microbiology;
- Metagenomics;

or related life science disciplines.

Candidates with experience in:

- microbiome analysis;
- computational biology;
- AI for biological applications;

or marine microbiology are particularly encouraged to apply.

Environmental Microbiomes and Bioremediation for Ecosystem Health and Climate Resilience

[Tina Koller-Costa](#) — iBB, IST-ID

Research Domain: Environmental Microbiology / Bioremediation / Ecosystem Resilience



Research Overview

This MSCA-PF opportunity focuses on environmental microbiomes and microbial-driven bioremediation strategies for improving ecosystem health and climate resilience through advanced environmental biotechnology approaches.

Research Topics

- Environmental microbiomes
- Bioremediation
- Microbial ecology
- Ecosystem resilience
- Environmental monitoring

Candidate Profile

- Environmental Microbiology
- Biotechnology
- Environmental Sciences
- Microbial Ecology
- Biology

[More Information](#)

Why This Opportunity Matters

The project contributes to sustainable microbiome-based approaches for ecosystem restoration and environmental resilience.

Keywords: Environmental Microbiomes | Bioremediation | Microbial Ecology | Ecosystem Resilience | Climate Resilience

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Brief description of the proposed research topic(s) for MSCA-PF candidates

This MSCA-PF opportunity focuses on exploring marine invertebrate microbiomes, especially octocoral-associated communities, to unlock novel enzymes and natural products, and to design microbiome-based solutions for host health and climate resilience.

Potential research topics include: discovery of novel chitin-degrading enzymes from marine microbiomes; bioprospection of marine-derived natural products and biosynthetic gene clusters; profiling of octocoral holobionts via multi-omics to identify microbial signatures of health, disease, and thermal stress; and development of microbiome-guided solutions (e.g., probiotics, BMCs) to counter emerging pathogens and boost coral resilience to climate change.

The project aims to advance the understanding of marine microbiomes and host–microbe symbioses, contributing to the discovery of novel bioactive compounds and the development of microbiome-based solutions for ecosystem health and climate resilience.

Research activities may involve: multi-omics data analysis (metagenomics, meta-transcriptomics, metabolomics); enzyme and natural product biochemistry; marine microbiome characterisation; bioprospection of biosynthetic gene clusters; and microbiome engineering approaches.

The research environment promotes interdisciplinary collaboration across marine microbiology, biotechnology and biochemistry, supporting innovative research at the interface of host–microbe symbioses and blue biotechnology.

What type of candidate profile are you looking for?

Researchers with backgrounds in:

- Marine Microbiology or Ecology;
- Microbial Biotechnology;
- Molecular Biology;
- Biochemistry;
- Bioinformatics;

or related life science disciplines.

Candidates with experience in:

- multi-omics data analysis (metagenomics, meta-transcriptomics, metabolomics);
- enzyme or natural product biochemistry;
- marine microbiomes;

or microbial biotechnology methodologies are particularly encouraged to apply.

Wastewater-Based Surveillance and Environmental Virology for Public Health Resilience

[Silvia Monteiro](#) — CERIS, IST-ID

Research Domain: [Environmental Virology](#) / [Microbiology](#) / [Public Health](#)

Research Overview

This MSCA-PF opportunity focuses on environmental virology and wastewater-based surveillance systems for monitoring antimicrobial resistance, emerging pathogens and public health resilience using advanced molecular biology and metagenomics.

Research Topics

- Wastewater-based epidemiology
- Environmental virology
- Antimicrobial resistance
- Metagenomics
- Microbial risk assessment

Candidate Profile

- environmental or molecular biology, or biotechnology;
- nucleic acid extraction;
- q(RT)PCR methodologies, preferably viability-PCR or NGS bioinformatics;
- metagenomics cell culture for viral infectivity assays;
- bioinformatics;
- wastewater-based epidemiology;
- or quantitative microbial risk assessment (QMRA)

[More Information](#)

Why This Opportunity Matters

The project contributes to next-generation environmental surveillance systems supporting public health resilience and early-warning strategies.

Keywords: [Antimicrobial Resistance](#) | [Environmental Virology and Microbiology](#) | [Wastewater-Based Surveillance](#) | [Molecular Biology](#) | [Source Tracking](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

This research programme explores the intersection of environmental virology and microbiology to address global health challenges through innovative wastewater-based surveillance. The primary focus is the characterization of antimicrobial resistance (AMR) and viral persistence within complex aquatic matrices. Utilizing advanced molecular biology tools—including viability-q(RT)PCR and high-throughput metagenomics—candidates will quantify infectious pathogen fractions and identify resistance genes (ARGs) to bridge the gap between genomic detection and actual public health risk. A significant component involves integrated source tracking, employing faecal source markers to differentiate between human and animal contamination sources. This data is critical for refining quantitative microbial risk assessment (QMRA) and fate-and-transport models in urban water cycles. By establishing robust conversion factors between nucleic acid signals and culturable infectivity/viability, the research aims to provide a more accurate estimation of infectious/viable loads in environmental compartments. Candidates will work at the cutting edge of surveillance technology, developing standardized protocols that transform raw wastewater data into actionable epidemiological insights. This interdisciplinary approach not only monitors current outbreaks but also acts as an early-warning system for emerging environmental pathogens and the evolving landscape of global antibiotic resistance.

What makes your research group and environment attractive to candidates?

Our research group at Instituto Superior Técnico (IST) provides a premier environment for MSCA-PF candidates by combining state-of-the-art infrastructure with a highly collaborative international network. Based at the Laboratório de Análises (LAIST), our facility is fully equipped for high-resolution molecular biology, cell culture assays, and advanced genomic sequencing. This technical capacity is amplified by our active involvement in major European and global consortia, providing candidates with direct access to leading experts at institutions such as the University of Barcelona, TU Wien and Tokyo University. Furthermore, our environment is uniquely positioned at the interface of academia and industry, maintaining long-standing partnerships with major water utilities like Águas de Portugal and national health authorities. These links ensure that research into antimicrobial resistance and wastewater-based surveillance has immediate real-world applications in public health policy. Candidates benefit from a diverse, English-speaking laboratory setting that prioritizes career development, scientific independence, and the translation of complex environmental virology data into actionable epidemiological insights.

What type of candidate profile are you looking for?

We are seeking a highly motivated researcher with a strong background in environmental microbiology, molecular biology, or biotechnology. The ideal candidate should possess hands-on expertise in nucleic acid extraction and q(RT)PCR, with a preference for those experienced in viability-PCR or NGS bioinformatics. Familiarity with cell culture for viral infectivity assays or wastewater-based epidemiology is highly valued. Beyond technical skills, we look for a profile demonstrating scientific independence, excellent communication in English, and a collaborative mindset capable of bridging the gap between raw genomic data and quantitative microbial risk assessment (QMRA).

Environmental Virology, Biodiversity and Emerging Pathogen Surveillance

Ricardo Santos — CERIS, IST-ID

Research Domain: [Environmental Microbiology](#) / [Environmental Virology](#) / [Global Health](#)



Research Overview

This MSCA-PF opportunity focuses on emerging pathogens and environmental surveillance at the intersection of biodiversity, environmental microbiology and global health resilience using advanced molecular biology methodologies.

Research Topics

- Emerging pathogens;
- Environmental virology;
- Source tracking methodologies;
- Biodiversity and ecosystem health;
- Zoonotic agents;
- Molecular biology methodologies.

Candidate Profile

- Environmental microbiology;
- Environmental virology;
- Microbial ecology;
- Emerging pathogens;
or biodiversity studies;

[More Information](#)

Why This Opportunity Matters

The project contributes to next-generation environmental surveillance and pandemic prevention strategies supporting global health resilience.

Keywords: [Emerging Pathogens](#) | [Source Tracking](#) | [Biodiversity](#) | [Environmental Microbiology](#) | [Environmental Virology](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

The global shift in climate and land use has accelerated the spillover of emerging pathogens, necessitating a paradigm shift in how we monitor biological threats. This project sits at the intersection of environmental microbiology and environmental virology, focusing on the ecological reservoirs that harbour potentially zoonotic agents. By integrating different molecular biology methodologies, we aim to map the viral and bacterial landscape of previously understudied niches. Central to our methodology is the concept of source tracking. Rather than reacting to outbreaks after they reach human populations, we utilize molecular signatures to identify the environmental origins of these pathogens. This proactive surveillance allows us to pinpoint specific geographic or biological "hotspots" where the risk of transmission is highest. Furthermore, we explore the critical link between biodiversity and pathogen prevalence. We hypothesize that intact ecosystems act as a "dilution" buffer, whereas degraded environments with low biodiversity facilitate the dominance of resilient, high-risk pathogens. By quantifying these relationships, this research provides essential data for public health policy and conservation efforts, illustrating that protecting our natural world is a fundamental requirement for global health security. Through this lens, the environment is no longer seen merely as a background setting, but as the primary frontier in pandemic prevention.

What makes your research group and environment attractive to candidates?

Our research group offers a dynamic, multidisciplinary environment where cutting-edge technology meets meaningful ecological impact. We pride ourselves on a culture of collaborative innovation, breaking down the traditional silos between environmental microbiology and molecular biology approaches. Candidates gain hands-on experience with state-of-the-art molecular biology methodologies and containment laboratory facilities, ensuring they stay at the forefront of the field. Beyond the technical suite, we emphasize professional agency. We treat our researchers as independent thinkers, providing the mentorship and funding necessary to pursue high-risk, high-reward questions regarding emerging pathogens and biodiversity. Situated within a world-class institution, our group benefits from a diverse, international cohort that fosters creative problem-solving and global networking. We don't just study the future of global health; we actively build the tools to protect it.

What type of candidate profile are you looking for?

We are seeking visionary researchers who possess an uncompromising drive for scientific excellence and a profound commitment to addressing global health challenges. The ideal candidate is not just technically proficient in environmental microbiology, but is also an intellectually curious "big-picture" thinker. We look for individuals who demonstrate exceptional professional agency, showing a proven track record of taking initiative and leading projects to completion. Top-tier candidates will exhibit a deep passion for exploring the nexus of biodiversity and disease, bringing an energetic, collaborative spirit to our multidisciplinary team. We prioritize those who are resilient, highly engaged, and eager to master the complexities of emerging pathogens. If you are a high-achiever looking to push the boundaries of environmental virology and leave a lasting mark on the field, we want your expertise and ambition in our lab.

Veterinary Sciences, Surgery and Inner Ear Biology

Ricardo Araújo — CERENA, IST

Research Domain: [veterinary sciences, surgery](#)



Research Overview

The candidate would contribute to the ERC (Consolidator Grant) DAEDALUS project, which investigates the evolution of endothermy through the biomechanics and rheology of the vertebrate inner ear.

Potential Research Topics

- Inner ear surgical access in vertebrate models;
- anesthesia and sedation for unusual animal models;
- endolymph sampling and preservation;
- comparative vestibular anatomy;
- anatomical validation of bony and membranous labyrinth relationships.

Expected Candidate Profile

- veterinary sciences, animal surgery and anesthesia,
- comparative anatomy, neuroanatomy or related fields
- small animal surgery,
- inner ear anatomy, histology,
- imaging,
- animal ethics,
- surgical protocol development or biological sample handling

[More Information](#)

Why This Opportunity Matters

This project offers a rare opportunity to work at the interface between comparative anatomy, experimental biology and deep-time evolution, while contributing to a major question in vertebrate evolution: when and how warm-bloodedness emerged.

Keywords: [Veterinary Sciences](#) | [Surgery](#) | [Inner Ear](#) | [Endolymph](#) | [Vestibular System](#) | [Comparative Anatomy](#)
[Animal Models](#) | [Evolution of Endothermy](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

The candidate would contribute to the ERC (Consolidator Grant) DAEDALUS project, which investigates the evolution of endothermy through the biomechanics and rheology of the vertebrate inner ear. This research profile would focus on developing and refining experimental protocols for accessing the inner ear in extant animals, with particular emphasis on minimally invasive surgical approaches, endolymph sampling, anatomical validation and post-mortem dissection. The work would support comparative studies across mammals, birds, reptiles and amphibians, linking inner ear anatomy, endolymph properties and body temperature regulation.

Potential Research Topics

- Inner ear surgical access in vertebrate models;
- anesthesia and sedation for unusual animal models;
- endolymph sampling and preservation;
- comparative vestibular anatomy;
- anatomical validation of bony and membranous labyrinth relationships.

This project offers a rare opportunity to work at the interface between comparative anatomy, experimental biology and deep-time evolution, while contributing to a major question in vertebrate evolution: when and how warm-bloodedness emerged. The candidate would join a strongly interdisciplinary environment combining palaeontology, veterinary sciences, otolaryngology, biomechanics, microfluidics, nanotomography and evolutionary biology. DAEDALUS is built around collaborations with veterinary anatomists, animal facilities, clinical otolaryngologists, microfluidics specialists and tomography laboratories.

What type of candidate profile are you looking for?

A candidate with experience in veterinary sciences, animal surgery and anesthesia, comparative anatomy, neuroanatomy or related fields. Experience with small animal surgery, inner ear anatomy, histology, imaging, animal ethics, surgical protocol development or biological sample handling would be especially valuable.

Mathematics, Modelling & Decision Sciences

Cláudia Nunes — CEMAT, IST-ID

[Strategic Investment and Innovation under Uncertainty](#)

Conceição Amado - CEMAT, IST-ID

[Breaking the Zero Barrier: Robust Hurdle Models Meet Deep Learning](#)

Jorge Tiago — CEMAT, IST-ID

[Control of Differential Systems and Biomedical Applications for Blood Flow and Fluid Dynamics](#)

M. Rosário Oliveira — CEMAT, IST-ID

[Statistical Methodologies for Complex and Symbolic Data](#)

Rui Ferreira — CERIS, IST-ID

[High-Performance Computing and Digital Twins for Hazard and Resilience Modelling](#)

Teresa Pinheiro — iBB, IST-ID

[Monte Carlo Methods and Data Analysis for Biological Imaging and Complex Systems](#)

Strategic Investment and Innovation under Uncertainty

[Cláudia Nunes](#) — CEMAT, IST-ID

Research Domain: Technology Management & Entrepreneurship



Research Overview

This project explores how technological uncertainty, strategic interaction and market dynamics shape investment decisions in innovation-driven sectors through quantitative modelling and decision analysis.

Research Topics

- Real options
- Innovation economics
- Strategic investment
- Uncertainty modelling
- Industrial competition

Candidate Profile

- Optimization
- Operations Research
- Applied Mathematics
- Quantitative Finance

[More Information](#)

Why This Opportunity Matters

The project addresses key challenges in innovation management and technology investment under uncertainty.

Keywords: Innovation | Strategic Investment | Real Options | Decision Sciences | Stopping Problems

Brief description of the proposed research topic(s) for MSCA-PF candidates

Real investment decisions in oligopolistic markets are increasingly shaped by technological uncertainty, strategic interaction, and capacity flexibility. This project proposes the development of a dynamic real options framework combining elements from the Hotelling spatial competition model and the strategic investment approach of Grenadier model. The objective is to study how firms optimally time investment, technology adoption, and capacity expansion under uncertainty and competitive pressure.

The project will analyze stochastic demand and technological progress using continuous-time models driven by diffusion processes. Firms will strategically choose investment timing, production capacity, and possibly product differentiation, while accounting for preemption incentives and waiting options. The interaction between operational flexibility and market competition will be modeled through dynamic games and equilibrium analysis.

Particular attention will be given to the effects of technological innovation, asymmetric information, and market structure on equilibrium investment strategies. The project aims to derive analytical characterizations of optimal thresholds and equilibrium regions, complemented by numerical methods and simulations. Applications may include energy markets, platform competition, green technologies, and infrastructure investment under uncertainty.

What makes your research group and environment attractive to candidates?

The work will be developed within CEMAT – Center for Computational and Stochastic Mathematics, a research unit of Instituto Superior Técnico rated Very Good by FCT. CEMAT offers a strong research environment in statistics, stochastic modelling, data science, and computational methods, as well as seminar programmes, international collaborations, and computing resources that will support the development and dissemination of the doctoral research.

Overall, the combination of complementary academic supervision, institutional support from CEMAT, and close interaction with an industrial partner creates a favourable framework for achieving the scientific and technological objectives of the project and for promoting its impact and applicability.

What type of candidate profile are you looking for?

Applicants should have a strong background in applied mathematics, quantitative economics, operations research, financial mathematics, or a related field. Experience in stochastic optimization, dynamic programming, real options analysis, or differential games is highly desirable. Familiarity with continuous-time stochastic processes, optimal stopping problems, equilibrium analysis, and numerical methods will be considered an advantage.

Candidates should demonstrate the ability to work on mathematically rigorous models with economic applications. Proficiency in programming and numerical implementation (e.g., MATLAB, Python, Julia, or Mathematica) is also desirable. The ideal candidate should be interested in interdisciplinary research at the interface of economics, finance, operations research, and applied probability.

Statistical Methodologies for Complex and Symbolic Data

[M. Rosário Oliveira](#) — CEMAT, IST-ID

Research Domain: [Mathematics](#) / [Data Science](#)



Research Overview

This project develops innovative statistical methodologies for histogram-valued data bridging symbolic data analysis, robust statistics, clustering and high-dimensional analytical methodologies.

Research Topics

- Symbolic data analysis
- Statistical modelling
- Clustering analysis
- Anomaly detection
- High-dimensional analysis

Candidate Profile

- Statistics
- Applied Mathematics
- Data Science
- Statistical Learning
- Computational Methods

[More Information](#)

Why This Opportunity Matters

The project advances statistical tools for distributional data and modern high-impact applications in data science.

Keywords: [Statistics](#) | [Symbolic Data Analysis](#) | [Data Science](#) | [Robustness](#) | [Outlier Detection](#)

Brief description of the proposed research topic(s) for MSCA-PF candidates

This postdoctoral project develops new statistical methodology for histogram-valued data, a central class of symbolic data in which observations are distributions rather than single values. The project aims to make a significant contribution by producing novel, theoretically grounded results that advance the mathematical foundations of Symbolic Data Analysis (SDA), while ensuring clear interpretability and practical applicability in real-world problems.

A core objective is to build a rigorous framework linking aggregated histogram-valued data to an underlying microdata-generating model. Building on Wasserstein L_1 and L_2 metrics, the research will revisit fundamental operations and distances between histograms and develop new tools for symbolic principal component analysis (variance- and kernel-based), together with robust notions of depth, location, association, and covariance.

Clustering techniques will be adapted to this symbolic setting using robust distances and depth-based tools. All methods will be validated on real applications and released in an open-source R package.

The successful candidate will work at the interface of symbolic data analysis, robust statistics, dimensionality reduction, outlier detection, and clustering.

What makes your research group and environment attractive to candidates?

The position is hosted at Instituto Superior Técnico (IST), Universidade de Lisboa — Portugal's leading school of engineering, science, and technology, with a strong international reputation in mathematics and statistics. The successful candidate will join a friendly group of PhD and master's students who actively collaborate with each other and with senior researchers in a supportive and stimulating working atmosphere.

The group regularly hosts visiting researchers, mainly in Symbolic Data Analysis, whose seminars and informal discussions offer valuable scientific exchange and exposure to current developments in the field. Established international collaborations and cross-disciplinary links also support real-world applications in areas such as health, and environmental sciences.

Located in the heart of Lisbon, IST offers a lively international setting, excellent European connectivity, and a high quality of life at a competitive cost — an attractive base for early-career researchers.

What type of candidate profile are you looking for?

We are looking for a candidate with a PhD in Statistics, Mathematics, Data Science, Machine Learning, or a closely related field, and a strong interest in modelling real-world data. Solid theoretical foundations in statistics are essential, together with the ability to develop and analyse new methodology rigorously.

Good programming skills in R are required, and experience with Python is a plus.

Prior knowledge of topics related to the project, such as Symbolic Data Analysis, robust statistics, dimensionality reduction, outlier detection, or clustering will be positively considered. Good scientific writing skills in English and the motivation to publish in international journals are expected.

Control of Differential Systems and Biomedical Applications for Blood Flow and Fluid Dynamics

[Jorge Tiago](#) — CEMAT, IST-ID

Research Domain: [Applied Mathematics](#) / [Biomedical Modelling](#) / [Differential Systems](#)



Research Overview

This MSCA-PF opportunity focuses on the mathematical modelling and control of differential systems with applications in biomedical and fluid dynamics contexts. The project aims to develop advanced mathematical and computational methodologies to implement disease control strategies.

The research project promotes interdisciplinary collaboration with strong international scientific connections.

Research Topics

- control of differential systems;
- epidemiology;
- numerical methods for partial differential equations;
- mathematical modelling of complex physiological systems.

Candidate Profile

- Applied Mathematics
- Mathematical Modelling
- Physics
- Computational Engineering
- Biomedical Engineering

[More Information](#)

Why This Opportunity Matters

The project contributes to advanced mathematical and computational methods for biomedical systems and disease control modelling.

Keywords: [Control of Differential Systems](#) | [Numerical Methods for PDEs](#) | [Biomedical Modelling](#) | [Fluid Dynamics](#) | [Epidemiology](#)

Brief description of the proposed research topic(s) for MSCA-PF candidates

The project develops partial differential equations-based models to describe the dynamics and the control of vector-borne diseases. Mathematical and numerical analysis will be used to obtain an execution certificate for a control protocol to be implemented in the field. The project will run in collaboration with national health institutions and with the Sorbonne University.

What makes your research group and environment attractive to candidates?

CEMAT (at IST-ID) has a strong research track in Mathematical Biology and applications in Biomedicine. It also has a strong history of collaboration with medical and other public entities.

CEMAT has a strong computational infrastructure with more than 200 computational nodes and 1.5 TB of RAM available.

Besides the collaboration with the members from CEMAT, this particular research project will be done in collaboration with Jean-Michel Coron from the Control and Inverse Problems group of the Laboratory Jacques-Louis Lions and Luis Almeida from the Stochastic and Biology Group of the Laboratoire de Probabilités, Statistique et Modélisation, both at the Sorbonne University.

What type of candidate profile are you looking for?

Techniques of Control/Optimal Control in Differential Systems, with preference to experience in PDE constrained optimization. Also experience with Numerical Methods in PDEs is a plus. Use of Neural Networks or PINNs will be also valorated

Breaking the Zero Barrier: Robust Hurdle Models Meet Deep Learning

Conceição Amado — CEMAT, IST-ID

Research Domain: [Mathematics](#) / [Data Science](#)

Research Overview

This project develops innovative robust general hurdle models for zero-heavy data by combining robust statistics and deep learning methodologies for complex and high-dimensional applications.

Research Topics

- Robust hurdle models
- Zero-inflated data
- Deep learning architectures
- Minimum distance estimation
- Scalable computation

Candidate Profile

- Statistics
- Applied Mathematics
- Data Science
- Statistical Learning
- Programming

Why This Opportunity Matters

The project contributes to interpretable and scalable analytical tools for modern zero-heavy data applications.

Keywords: [Hurdle Models](#) | [Zero-Inflated Data](#) | [Robustness](#) | [Minimum Distance Estimation](#) | [Deep Learning](#)

Monte Carlo and AI for Biological Imaging and Organotypic Models of Targeted Radiotherapy

Teresa Pinheiro — iBB, IST-ID

Research Domain: [Bioimaging / Radiosensitizers / Targeted Radiotherapy](#)



Research Overview

This MSCA-PF opportunity focuses on the design of innovative targeting strategies for radiotherapy, integrating therapeutic validation, bio-effect evaluation, and mechanistic studies in 3D organotypic models to enable response-driven cancer treatments.

Research Topics

- targeted cancer therapy and radiosensitizers for tissue-specific delivery;
- biological image processing;
- Monte Carlo nanodosimetry;
- AI for scaling complex 3D cell models and translating knowledge to clinical imaging.

Candidate Profile

- Bioinformatics;
- Biomedical Sciences;
- Bioengineering;
- Physics;
- Biophysics;
- Monte Carlo methods;
- machine learning;
- bioimage analysis and processing;
- 3D cell models research;
- or radiotherapy-related methodologies

[More Information](#)

Why This Opportunity Matters

The project contributes to advancing targeted radiotherapy and biological imaging, supporting research with potential implications for response-driven cancer treatments and the integration of AI into clinical practice.

Keywords: [Monte Carlo Methods](#) | [Biological Imaging](#) | [Radiosensitizers](#) | [Targeted Radiotherapy](#) | [Machine learning](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

This MSCA-PF opportunity focuses on the design of innovative targeting strategies for radiotherapy, integrating therapeutic validation, bio-effect evaluation, and mechanistic studies in 3D organotypic models to enable response-driven cancer treatments.

Potential research topics include: targeted cancer therapy and radiosensitizers for tissue-specific delivery; biological image processing; Monte Carlo nanodosimetry; and AI for scaling complex 3D cell models and translating knowledge to clinical imaging.

The project aims to advance targeted radiotherapy through the integration of Monte Carlo methods, AI and 3D organotypic models, contributing to response-driven cancer treatments and improved clinical imaging strategies.

Research activities may involve: Monte Carlo nanodosimetry; machine learning and AI for bioimaging; bioimage analysis and processing; 3D cell model development; and radiosensitizer evaluation.

The research environment promotes interdisciplinary collaboration across bioimaging, radiotherapy and computational sciences, supporting innovative research at the interface of physics, biology and translational oncology.

What type of candidate profile are you looking for?

Researchers with backgrounds in:

- Bioinformatics;
- Biomedical Sciences;
- Bioengineering;
- Physics;
- Biophysics;

or related interdisciplinary disciplines.

Candidates with experience in:

- Monte Carlo methods;
- machine learning;
- bioimage analysis and processing;
- 3D cell models research;

or radiotherapy-related methodologies are particularly encouraged to apply.

High-Performance Computing and Digital Twins for Hazard and Resilience Modelling

Rui Ferreira — CERIS, IST-ID

Research Domain: [High-Performance Computing](#) / [Digital Twins](#) / [Hazard Modelling](#)



Research Overview

This MSCA-PF opportunity focuses on the development of high-performance computing methodologies and digital twin frameworks for modelling natural and anthropic systems with applications in hazard assessment and operational resilience.

Research Topics

- High-performance computing
- Digital twins
- Tsunami and flood modelling
- Hazard risk mapping
- Operational intervention systems

Candidate Profile

- Applied Mathematics (numerical methods);
 - Geophysics (statistical physics);
 - Computational Engineering (computational methods);
 - Physics;
 - Computer Science;
- or related quantitative disciplines.

[More Information](#)

Why This Opportunity Matters

The project contributes to advanced computational methodologies for hazard prediction, territorial resilience and operational decision-support through the integration of HPC and digital twin technologies applied to complex natural and engineered systems.

Brief description of the proposed research topic(s) for MSCA-PF candidates

Development of high-performance-computing (HPC) modelling layers for digital twins of natural and anthropic systems, with applications to hazard risk mapping, territory planning or operational intervention. Specific applications include tsunami response, flood mapping and response, and survival of offshore structures.

What makes your research group and environment attractive to candidates?

HPC infrastructure and access to supercomputers; a well-connected group with vast interdisciplinary practice, with numerical and physical modelling capacity. Strong connections to the industry.

What type of candidate profile are you looking for?

Background of applied mathematics (numerical methods), geophysics (statistical physics), engineering (computational methods)

Sustainable Industry, Manufacturing & Bioprocessing

Miguel Prazeres — iBB, IST-ID

[*AI-Driven Biomolecular Modelling and Design for Precision Biotechnology*](#)

Tiago Matos — iBB, IST-ID

[*AI-Augmented Continuous Chromatography for Next-Generation Gene Therapy Manufacturing*](#)

Biomolecular Modelling and Design for Biomanufacturing

[Miguel Prazeres](#) — iBB, IST-ID

Research Domain: [Biomolecular Engineering](#) / [Computational Biotechnology](#) / [Molecular Design](#)



Research Overview

This MSCA-PF opportunity focuses on the development of structure-guided and docking-driven strategies to guide the design, optimization, and control of the biomanufacturing of proteins and nucleic acids.

Research Topics

- 3D-modelling of biomolecules;
- molecular docking of proteins and nucleic acids with ligands;
- in silico engineering of biomolecular interactions;
- model-informed development of biomanufacturing.

Candidate Profile

- Biotechnology
- Biomolecular Engineering
- Computational Biology
- Bioinformatics
- Biochemistry
- Molecular Biology
- Computational modelling;
- Protein engineering;
- Molecular simulation;
- or AI for life sciences

[More Information](#)

Why This Opportunity Matters

The project contributes to advancing computational biomolecular design and biomanufacturing, supporting research with potential implications for the optimised production of biotherapeutics, nucleic acids and next-generation biotechnologies.

Keywords: [Biomolecular Modelling](#) | [Protein Engineering](#) | [Computational Biotechnology](#) | [Molecular Design](#) | [Molecular Docking](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

This MSCA-PF opportunity focuses on the development of structure-guided and docking-driven strategies to guide the design, optimization, and control of the biomanufacturing of proteins and nucleic acids.

Potential research topics include: 3D-modelling of biomolecules; molecular docking of proteins and nucleic acids with ligands; in silico engineering of biomolecular interactions; and model-informed development of biomanufacturing.

The project aims to advance the integration of computational biomolecular design with biomanufacturing processes, contributing to the optimised production of proteins and nucleic acids for biotechnological applications.

Research activities may involve: 3D-modelling of biomolecules; molecular docking; in silico engineering of biomolecular interactions; and model-informed development of biomanufacturing processes.

The research environment promotes interdisciplinary collaboration across biomolecular engineering, computational biotechnology and molecular design, supporting innovative research at the interface of in silico methods and biomanufacturing.

What type of candidate profile are you looking for?

Researchers with backgrounds in:

- Biotechnology;
 - Biomolecular Engineering;
 - Computational Biology;
 - Bioinformatics;
 - Molecular Biology;
 - Biochemistry;
- or related life science disciplines.

Candidates with experience in:

- computational modelling;
 - protein engineering;
 - molecular simulation;
- or AI for life sciences are particularly encouraged to apply.

AI-Augmented Continuous Chromatography for Next-Generation Gene Therapy Manufacturing

[Tiago Matos](#) — iBB, IST-ID

Research Domain: [Bioprocess Engineering](#) / [Continuous Manufacturing](#) / [Gene Therapy](#)



Research Overview

This MSCA-PF opportunity focuses on AI-augmented continuous chromatography systems for advanced bioprocessing and next-generation gene therapy manufacturing through intelligent process optimisation and continuous production methodologies.

Research Topics

- Continuous chromatography
- AI-enhanced bioprocessing
- Gene therapy production
- Process analytical technologies
- Digital biomanufacturing

Candidate Profile

- Bioprocess Engineering
- Biotechnology
- Chemical Engineering
- Bioengineering
- Data Science

[More Information](#)

Why This Opportunity Matters

The project contributes to next-generation intelligent biomanufacturing systems supporting scalable and efficient gene therapy production.

Keywords: [Continuous Chromatography](#) | [AI for Bioprocessing](#) | [Gene Therapy Manufacturing](#) | [Process Optimisation](#) | [Bioprocess Engineering](#)

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Brief description of the proposed research topic(s) for MSCA-PF candidates

This MSCA-PF opportunity focuses on integrating AI and advanced process engineering to develop self-optimizing continuous chromatography platforms and cognitive digital twins for robust, scalable nucleic acid purification in next-generation gene therapy manufacturing.

Potential research topics include: AI-driven hybrid modelling for continuous chromatography and smart purification systems; real-time process monitoring and machine learning for bioprocess optimisation; continuous biomanufacturing and intensified downstream processing; and digital biomanufacturing and intelligent control systems.

The project aims to advance the integration of AI with continuous bioprocessing, contributing to the development of robust and scalable manufacturing platforms for next-generation gene therapies.

Research activities may involve: continuous chromatography development; AI-driven hybrid modelling; real-time process monitoring; machine learning for bioprocess optimisation; and digital twin design.

The research environment promotes interdisciplinary collaboration across bioprocess engineering, data science and gene therapy, supporting innovative research at the interface of AI and advanced biomanufacturing.

What type of candidate profile are you looking for?

Researchers with backgrounds in:

- Bioprocess Engineering;
- Biotechnology;
- Chemical Engineering;
- Bioengineering;
- Data Science;
- Pharmaceutical Engineering;

or related engineering disciplines.

Candidates with experience in:

- chromatography;
- machine learning;
- process optimisation;

or continuous manufacturing are particularly encouraged to apply.