SPARE Project

Horizon Europe's
Marie Skłodowska-Curie Actions (MSCA)

Doctoral Networks - Industrial Doctorates

PhD **OPENINGS**

space responsible

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Project Consortium

Academic partners

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HERIOT WATT UNIVERSITY

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UNIVERSITY OF PUBLIC SERVICE
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DYCSYT
GNC Solutions

ISAE
Institut Supérieur de l'Aéronautique et de l'Espace
SUPAERO

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SPARE Project

Orbiting satellites and space infrastructure are becoming inseparable from modern life, powering everything from communications to emerging technologies. As activity in low Earth orbit accelerates, Europe faces mounting challenges such as environmental strain on terrestrial and orbital ecosystems, growing competition from global players, and the risk of technical failures or security threats. Supported by the Marie Skłodowska-Curie Actions programme, the SPARE project aims to turn these challenges into opportunities. Focusing on sustainability, resilience, and competitiveness, SPARE promotes responsible growth in space. Its world-class training programme will equip the next generation of engineers and scientists to integrate technological innovation with environmental stewardship, regulatory insight, and economic strategy, ensuring that Europe's expanding presence in orbit is safe, sustainable, and strategically strong.

The SPARE project kicked off in November 2025 and is now recruiting 11 Doctoral Candidates with Engineering background for an equivalent number of projects. Description of the projects and their implementation is provided below.

To apply, please send your CV, Motivation letter and a link to a video of up to 3 minutes explaining your background and interests to dsp-jv-spare@thalesaleniaspace.com.
The SPARE Consortium will consider your application for your preferred position as well as other possible positions that fit your profile.

DC Project 1

Digital Twin for In-Space Assembly and Manufacturing

Large-aperture antennas are key technologies for communications, radar, sensing, and space exploration, offering higher resolution and sensitivity. Their development, especially for high-frequency Ka- and X-band missions, faces challenges due to required apertures over 30 m. On-orbit manufacturing enables building large, lightweight antennas in space, but surface accuracy and deployment reliability remain issues. An alternative is using swarms of small satellites phased together to form a coherent antenna array. JPL research has shown this method is promising for high data-rate communications, relying on precise intra-swarm metrology. Swarm antennas are also reconfigurable, allowing one formation to serve multiple missions through coordinated maneuvers. However, maintaining formation and synchronization is complex due to coupled attitude and position dynamics. Control systems must ensure accurate timing, phase, and orientation among satellites. Tethered configurations add further complexity from structural flexibility in tethers and appendages. Precise dynamic modeling is needed to handle orbital perturbations affecting performance. Tethered systems can also generate controllable forces via electrodynamic tether currents. This concept, though studied for de-orbiting, remains unexplored for swarm control and merits further research.

By leveraging skills available in the team on modeling and control of large flexible structures and antenna technology, this project will focus on:

1. Modeling and high-fidelity simulation of the coupled flexible translational/rotational dynamics of swarms of tethered satellites
2. Proposing innovative attitude and orbital control algorithms that take into account all gravitational, thermal, radiation, structural flexibility and distributed control coordination and actuator saturation
3. Assessing the use of the radio-frequency (RF) diagnostic of received/transmitted signal as intra-swarm metrology system
4. Assessing the use of innovative orbital/attitude maneuvers with both classical and non-classical (i.e. conductive tethers) actuators for reconfiguration and de-orbiting

Research field:

- ***Dynamical System Modelling***
- ***Control Theory***
- ***Aerospace engineering***
- ***Electrical Engineering***

Required skills:

- ***Automatic Control***
- ***Dynamical System Modelling***
- ***Antenna and Signal Processing***
- ***Numerical simulation programming (e.g., Python, Matlab, C++, …)***

Further information on the DC1 position is available on the following page

Recruitment and secondment plan:

Recruiting beneficiary	Gross salary	Period	Planned Secondment
DYCSYT, France, Toulouse	€3,667/Month	36 months	6 months at Thales Alenia Space France, Toulouse 6 months at ISAE Supaero, France, Toulouse

PhD awarding institution: **Institut Supérieur de l'Aéronautique et de l'Espace (ISAE-SUPAERO), Toulouse, France**

MSCA Mobility rule: **To be eligible for this PhD position, applicants must not have resided or carried out their main activity (work, studies, etc.) in France (country of the recruiting beneficiary) for more than 12 months during the 36 months immediately preceding the recruitment date — unless this period was part of compulsory national service or a procedure for obtaining refugee status under the Geneva Convention.**

DC Project 2

Large ISAM Antenna and De-orbiting Sail

In-orbit assembly and manufacturing (ISAM) of large antennas are critical for advancing next-generation space capabilities because they overcome the size and launch constraints of current rockets. Building and deploying large, high-precision antennas directly in space enables the creation of structures far larger and more sensitive than those that can be stowed within a launch fairing, dramatically improving communication bandwidth or Earth observation resolution. This approach also allows for modular upgrades, on-orbit repairs, and adaptive reconfiguration, ultimately reducing long-term mission costs and extending the operational lifespan of space infrastructure.
Several open challenges remain in advancing ISAM of large antennas. One key issue is the design of suitable building blocks for ISAM reflectors, including the optimization of their dimensions and geometry to enable efficient assembly patterns. Trade-offs may include a simpler antenna configuration with compensation at the feed array. In-orbit calibration also remains a critical technical challenge, particularly in case when the antenna is fed by an active array. Radio Resource Management (RRM) could be exploited to maximize the capacity of the system based on the real beams characteristics produced by the geometry of the reflector.

The project will include the following core activities:

1. Define and investigate a scenario of a large ISAM reflector antenna in terms of its architecture and assembly
2. Co-develop manufacturing, radio frequency, digital techniques as well as RRM methodologies to optimise the trade-off between complexity cost and performance

Research field:

- ***Electrical engineering***
- ***RF/Antenna engineering***
- ***Aerospace engineering***
- ***Telecommunications***

Required skills:

- ***Electromagnetics***
- ***Antenna modelling and design***
- ***Antenna arrays and beamforming***
- ***Experience with programming (Matlab)***

Further information on the DC2 position is available on the following page

Recruitment and secondment plan:

Recruiting beneficiary	Gross salary	Period	Planned Secondment
Thales Alenia Space France, Toulouse	€3,667/Month	18 months	6 months at ISAE Supaero, France, Toulouse
Heriot-Watt University, United Kingdom, Edinburgh	£3,279/Month	18 months	6 months at DYCSYT, France, Toulouse

PhD awarding institution: Heriot-Watt University, Edinburgh, United Kingdom

MSCA Mobility rule: To be eligible for this PhD position, applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of their first recruiting beneficiary (France or United Kingdom) for more than 12 months during the 36 months immediately preceding the recruitment date — unless this period was part of a compulsory national service or a procedure for obtaining refugee status under the Geneva Convention.

DC Project 3

Space-Based Data Centre

The space market is undergoing rapid transformation, with new technologies increasing accessibility across all levels. New launchers are lowering costs while enabling higher launch frequency and greater payload capacity to orbit. Technological advances driven by NewSpace are delivering higher performance at reduced cost and on shorter timelines. Both NewSpace and traditional space actors are adopting these innovations to maintain reliability and availability while reducing schedule and cost. Among other outcomes, these developments have significantly enhanced onboard computing capabilities without compromising system performance or reliability. As a result, the industry now has access to technologies with the potential to unfold truly integrated space infrastructures.
On the ground, data centres represent the state of the art in computing integration, supporting telecommunications, image and video processing, and AI workloads in versatile environments. Previous studies have examined the deployment of data centres in space, indicating both growing interest and near-term feasibility. Space-based data centres could provide sustainability benefits by eliminating the need for water cooling and instead harnessing solar power while exploiting deep-space radiation for heat dissipation.
Nonetheless, significant technical challenges remain and require further development to demonstrate feasibility. Continued technological research is therefore essential to advance these concepts and bring space-based data centres closer to realization. This PhD research will examine the key technological gaps and challenges and propose approaches to overcome them.

The project will include the following core activities:

1. A detailed definition of system scenarios, balancing computing and storage performance, availability, reliability, thermal and mechanical aspects, and electrical approaches
2. Explore the design of solutions based on AMD / Intel massive processors (Ryzen, Xeon) plus accelerators such as GPUs, state of the art FPGAs and SoCs. Key questions to be investigated are how to ensure large performance and availability along the mission with no disruptions even in the case where electronics may present major events in front of radiation or thermal cycles. The candidate should research on different techniques such as hyper-converged architectures, distributed computing, graceful degradation, to enhance system availability with attention to connectivity, radiation tolerance, thermal and mechanical constraints, and the supporting software ecosystem

Research field:

- ***Electrical engineering***
- ***Computing engineering***

Required skills:

- ***Embedded systems***
- ***System engineering***
- ***Reliability concepts***
- ***Electro-thermal-mechanical concepts***
- ***Numerical simulation programming (e.g. Python, Matlab, C++,…)***

Further information on the DC3 position
is available on the following page

Recruitment and secondment plan:

Recruiting beneficiary	Gross salary	Period	Planned Secondment
Thales Alenia Space Spain, Madrid	€3,350.21/Month	24 months	3 months at Thales Alenia Space France, Toulouse
University of the Bundeswehr Munich, Germany	Based on the German public sector collective agreement (TVöD E13/1): €4,767.62/Month	12 months	

PhD awarding institution: University of the Bundeswehr Munich, Germany

MSCA Mobility rule: To be eligible for this PhD position, applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of their first recruiting beneficiary (Spain or Germany) for more than 12 months during the 36 months immediately preceding the recruitment date — unless this period was part of a compulsory national service or a procedure for obtaining refugee status under the Geneva Convention.

DC Project 4

Distributed Spectrum Sensing for Satellite Systems

Frequency spectrum has become an extremely scarce resource for satellite systems. The growing need to share this valuable asset with terrestrial wireless networks has significantly increased the urgency for advanced radio resource management solutions. A highly timely example of this trend toward greater spectrum coexistence is the effort by radio regulators to enable joint use of frequencies allocated to both terrestrial Mobile Services (MS) and Mobile Satellite Services (MSS)—for instance, in the context of direct-to-device connectivity use cases in fully integrated terrestrial/non-terrestrial 6G networks. While current radio regulations restrict access for secondary users in these bands, future spectrum policies may establish symmetrical access rights for both terrestrial and satellite systems. In this evolving context, spectrum sensing—the detection and localization of spectrum usage—has emerged as a key enabler for flexible spectrum sharing strategies. Although collaborative (or cooperative) spectrum sensing has been extensively studied in terrestrial networks, space-based systems still face significant limitations in this regard. This PhD research will explore the potential of a sparse array of satellite platforms, interconnected via inter-satellite links, to produce high-resolution spectrum usage maps. Information exchange between satellites will be used to fuse sensing data and to enable accurate localization of RF sources.

The project will include the following core activities:

1. Detailed definition of the considered scenarios, including relevant frequency bands, satellite orbits, interference patterns, channel impairments and on-board processing capabilities
2. Design of collaborative spectrum sensing schemes, focusing on the collection and evaluation of sensing data at the individual satellite level and the fusion of this data to generate high-resolution spectrum usage maps in real time.

Research field:

- ***Electrical engineering,***
- ***Communication engineering***

Required skills:

- ***Signal processing techniques,***
- ***Wireless communication systems,***
- ***Numerical simulation programming (e.g. Python, Matlab, C++,...),***
- ***Embedded systems***

Further information on the DC4 position is available on the following page

Recruitment and secondment plan:

Recruiting beneficiary	Gross salary	Period	Planned Secondment
University of the Bundeswehr Munich, Germany	Based on the German public sector collective agreement (TVöD E13/1): €4,767.62/Month	18 months	6 months at Thales Alenia Space France, Toulouse
Thales Alenia Space Spain, Madrid	€3,350.21/Month	18 months	

PhD awarding institution: University of the Bundeswehr Munich, Germany

MSCA Mobility rule: To be eligible for this PhD position, applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of their first recruiting beneficiary (Germany or Spain) for more than 12 months during the 36 months immediately preceding the recruitment date — unless this period was part of a compulsory national service or a procedure for obtaining refugee status under the Geneva Convention.

DC Project 5

Spectrum Sharing between Mobile Services (MS) and Mobile Satellite Services (MSS)

The growing demand for wireless connectivity is driving increasing pressure on the radio frequency spectrum, leading to the need for more efficient spectrum use and coexistence strategies between different services. An immediate concern arises in the coordination between heritage Geostationary Satellite Orbit and the rapidly growing Low Earth Orbit constellations operating at the same frequency band. Looking ahead, an emerging research area focuses on frequency sharing between terrestrial mobile services (such as 5G and future 6G networks) and mobile satellite services (MSS), which operate in overlapping or adjacent frequency bands. This topic explores how these systems can coexist without harmful interference, enabling both to deliver high-performance communication capabilities. It involves studying propagation characteristics, interference management, dynamic spectrum access, and coordination mechanisms between ground and space segments to ensure reliable, efficient, and equitable spectrum utilization in an increasingly congested radio environment.
These aspects have been the focus of both emerging regulation as well as research. Regulators, such as the ITU and national spectrum authorities, are developing frameworks that support dynamic and coordinated spectrum use across satellite and terrestrial networks. On the research side, state-of-the-art efforts are focusing on interference modelling, cognitive radio techniques, and advanced beamforming and power control algorithms to enable real-time coexistence between terrestrial and satellite systems. Emerging studies also explore the use of artificial intelligence and machine learning for adaptive spectrum management, as well as network access and optimization across space and ground segments.

The project will include the following core activities:

1. Identify an emerging use case where frequency coordination across satellite and terrestrial networks is emerging as a priority
2. Develop a modelling framework for the associated use case that enables to predict interference
3. Investigate interference management techniques across radio, digital and network technologies

Research field:

- ***Telecommunication engineering***
- ***Electrical engineering***
- ***Aerospace engineering***

Required skills:

- ***Orbital analysis***
- ***Wireless communication systems***
- ***Numerical simulation programming (Matlab)***

Further information on the DC5 position is available on the following page

Recruitment and secondment plan:

Recruiting beneficiary	Gross salary	Period	Planned Secondment
Thales Alenia Space France, Toulouse	€3,667/Month	18 months	
Heriot-Watt University, United Kingdom, Edinburgh	£3,279/Month	18 months	6 months at University of the Bundeswehr Munich, Germany

PhD awarding institution: Heriot-Watt University, Edinburgh, United Kingdom

MSCA Mobility rule: To be eligible for this PhD position, applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of their first recruiting beneficiary (France or United Kingdom) for more than 12 months during the 36 months immediately preceding the recruitment date — unless this period was part of a compulsory national service or a procedure for obtaining refugee status under the Geneva Convention.

DC Project 6

Radio Resource Management (RRM) for LEO Constellations

Emerging Low Earth Orbit (LEO) satellite constellations are increasingly adopting direct radiating arrays (DRAs) as a key technology for next-generation communications. Unlike traditional reflector-based antennas, DRAs consist of electronically controlled arrays of radiating elements that can steer multiple beams dynamically without mechanical movement. This shift is driven by the need for greater flexibility, higher frequency reuse, and improved coverage agility to support broadband services and dynamic user demand on a global scale. Enabled by advances in digital as well as radio frequency and solid state technologies, emerging LEO constellations relying on DRA payloads offer unprecedented agility but also significantly increases the complexity of managing spectrum and power resources across thousands of beams and satellites. Consequently, the development of advanced radio resource management (RRM) techniques becomes essential to fully exploit the potential of DRAs—enabling efficient beam coordination, adaptive interference mitigation, and optimized spectrum sharing between satellites and terrestrial networks. As a result, DRAs combined with intelligent RRM approaches are set to redefine how LEO constellations deliver seamless, high-performance connectivity within the evolving 5G and 6G ecosystem.
A number of research questions remain open when it comes to the RRM of LEO networks with DRA payloads. RF hardware imperfections such as nonlinearities and load-pull effects at the power amplifiers may contaminate the spectral emissions and complicate the modelling of the DRA. This topic has recently been addressed in the framework of the HARMONY MSCA project (https://www.harmony-horizoneurope.eu/papers.html), where tools enabling the end-to-end modelling of a satellite link have been developed for direct-to-device use cases. Extending these tools to broadband satellite links in the Ku- and Ka-bands remain an open question. Accounting for the aforementioned hardware imperfections in a constellation where the satellite experiences rapidly varying traffic as it orbits the Earth raises open questions about which coverage and radio resource management (RRM) strategies will best optimise service delivery.

The project will include the following core activities:

1. Establish models for accurate and efficient modelling of broadband DRAs in the Ku- and Ka-bands considering hardware imperfections
2. Set up simulation frameworks for the satellite payload and the traffic scenarios enabling to predict system performance
3. Investigate optimum RRM techniques for given operational scenarios

Further information on the DC6 position is available on the following page

Research field:

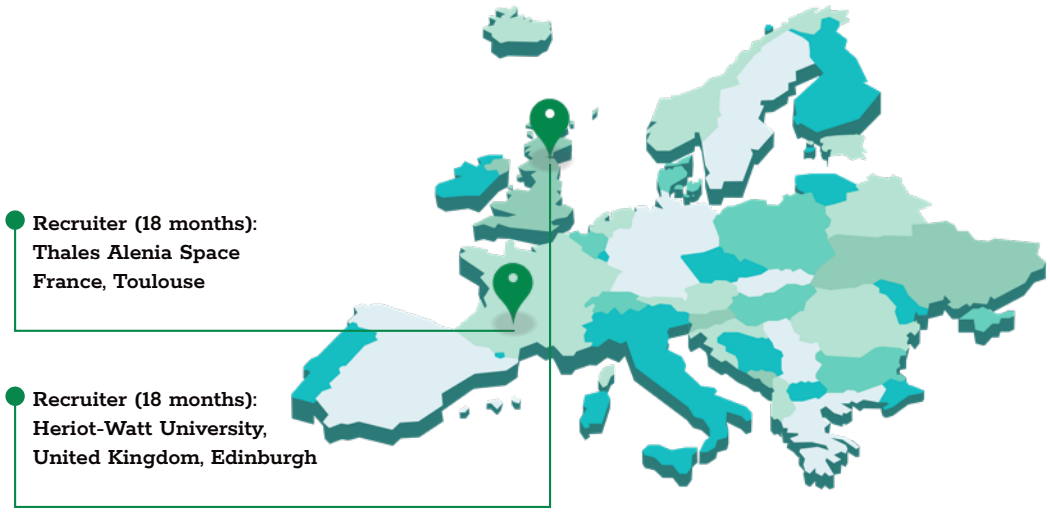
- *Telecommunication engineering*
- *Electrical engineering*
- *Aerospace engineering*

Required skills:

- *Orbital analysis*
- *Wireless communication systems*
- *Numerical simulation programming (Matlab)*

Recruitment plan:

Recruiting beneficiary	Gross salary	Period
Thales Alenia Space France, Toulouse	€3,667/Month	18 months
Heriot-Watt University, United Kingdom, Edinburgh	£3,279/Month	18 months



Further information on the DC6 position is available on the following page

PhD awarding institution: Heriot-Watt University, Edinburgh, United Kingdom

MSCA Mobility rule: To be eligible for this PhD position, applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of their first recruiting beneficiary (France or United Kingdom) for more than 12 months during the 36 months immediately preceding the recruitment date — unless this period was part of a compulsory national service or a procedure for obtaining refugee status under the Geneva Convention.

DC Project 7

Physical Layer Security using Directional Modulation

Physical layer security is becoming increasingly critical in emerging satellite networks, which support vital services like global communications, Earth observation, and resilient navigation. Unlike traditional encryption methods that rely on computational complexity and are vulnerable to future quantum attacks, physical layer wireless security technologies encrypt the conveyed information through the physical properties of radio signals themselves. This can be achieved by employing either the inherently random nature of wireless channels or the purposely generated random signals. This approach offers a quantum-resistant safeguard, as it does not depend on mathematical problems that quantum computers could crack efficiently. In satellite systems, where long-range links and open broadcast environments heighten exposure to eavesdropping and jamming, physical layer security provides a lightweight, scalable, and inherently robust defence mechanism. As satellite constellations expand and interconnect, embedding security directly into the physical transmission layer ensures enduring protection against both current and next-generation threats.
Advancing physical layer security in satellite networks requires an interdisciplinary approach, with a strong emphasis on the joint development of radio frequency (RF) hardware and signal processing techniques. Unlike terrestrial systems, satellites operate in highly dynamic and often unpredictable environments, where rapidly changing channel conditions and long-range vulnerabilities can be exploited by adversaries. Achieving secure and reliable communication under these conditions demands RF front-ends capable of adapting to environmental variations while maintaining signal integrity and confidentiality—necessitating innovations in antenna design, beamforming, and frequency agility. At the same time, signal processing methods must evolve to compensate hardware imperfection and signal dynamics, e.g. the changing Doppler effects. The role of AI is also an emerging enabler. Because hardware performance and algorithmic strategies are deeply interdependent, independent development is inadequate; instead, integrated design methodologies are essential to create practical and resilient physical layer security solutions across diverse satellite architectures and mission requirements.

The project will include the following core activities:

1. Identify a use case where physical layer security can provide added value to existing or emerging satellite services
2. Investigate suitable analogue, RF and digital technologies that provide pertinent solution for this use case
3. Demonstrate by means of experimental and simulated results the performance of the proposed physical layer security system

Further information on the DC7 position is available on the following page

Research field:

- *Electronic engineering*
- *Telecommunication Engineering*

Required skills:

- *Antenna and Microwave Engineering*
- *Signal processing*
- *Embedded systems*
- *Programming (Matlab, C, C++, Python, LabVIEW)*

Recruitment and secondment plan:

Recruiting beneficiary	Gross salary	Period	Planned Secondment
Thales Alenia Space France, Toulouse	€3,667/Month	12 months	
Heriot-Watt University, United Kingdom, Edinburgh	£3,279/Month	24 months	6 months at Thales Alenia Space France, Toulouse

Further information on the DC7 position is available on the following page

PhD awarding institution: **Heriot-Watt University, Edinburgh, United Kingdom**

MSCA Mobility rule: **To be eligible for this PhD position, applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of their first recruiting beneficiary (France or United Kingdom) for more than 12 months during the 36 months immediately preceding the recruitment date — unless this period was part of a compulsory national service or a procedure for obtaining refugee status under the Geneva Convention.**

DC Project 8

Space Situational Awareness with Distributed Sensing

Space situational awareness (SSA), i.e., the identification, tracking and monitoring of space-borne objects, has traditionally been supported by ground-based systems, such as the EU Space Surveillance and Tracking (EU SST) system. However, expanding SSA capabilities through space-based surveillance is crucial for enhancing both the resolution and real-time responsiveness of these systems. Space-based surveillance is for example a key component of the EU SST's long-term R&D roadmap, underscoring its critical importance. Given the severe limitations on spectrum availability, space-based SSA must rely on technologies that do not require dedicated RF frequency allocations. Therefore, situational awareness should leverage passive sensing methods - such as radar systems utilizing signals of opportunity, as well as visible and/or thermal imaging - and active sensing technologies that operate within unregulated spectrum, such as LIDAR. This PhD project aims to develop a distributed satellite system solution that integrates both sensing and processing capabilities to advance space-based situational awareness. In particular, the work will investigate the benefits of incorporating integrated sensing and communication (ISAC) techniques within the satellite sensor network.

The project will include the following core activities:

1. Detailed definition of the reference scenarios, including the type and spatial distribution of sensors, the on-board processing capabilities and the desired detection and tracking resolution
2. Selection and optimization of sensor data processing and fusion techniques to enable a space-based multisensor system that significantly enhances object detection and tracking performance

Research field:

- ***Electrical engineering***
- ***Communication engineering***

Required skills:

- ***Signal and data processing techniques,***
- ***Wireless communication systems,***
- ***Numerical simulation programming (e.g. Python, Matlab, C++,...),***
- ***Embedded systems***

Further information on the DC8 position is available on the following page

Recruitment and secondment plan:

Recruiting beneficiary	Gross salary	Period	Planned Secondment
University of the Bundeswehr Munich, Germany	Based on the German public sector collective agreement (TVöD E13/1): €4,767.62/Month	18 months	3 months at Thales Alenia Space France, Toulouse
Thales Alenia Space Spain, Madrid	€3,350.21/Month	18 months	

PhD awarding institution: University of the Bundeswehr Munich, Germany

MSCA Mobility rule: To be eligible for this PhD position, applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of their first recruiting beneficiary (Germany or Spain) for more than 12 months during the 36 months immediately preceding the recruitment date — unless this period was part of a compulsory national service or a procedure for obtaining refugee status under the Geneva Convention.

DC Project 9

Position Navigation and Timing (PNT) using LEO Signals of Opportunity (LEO SoOP)

Positioning, Navigation, and Timing (PNT) services underpin critical infrastructure across transportation, telecommunications, energy, and defense. However, traditional PNT systems—primarily reliant on Global Navigation Satellite Systems (GNSS)—face growing vulnerabilities from signal jamming, spoofing, and environmental obstructions like urban canyons or dense foliage. These threats highlight the urgent need for resilient alternatives that can maintain service continuity under adverse conditions. Low Earth Orbit (LEO) Signals of Opportunity (SoOp) offer a compelling solution by repurposing signals from non-navigation satellites, such as those used for communications or Earth observation. With their lower altitude, stronger signal strength, and rapid orbital movement, LEO SoOp can enhance coverage, reduce latency, and provide redundancy, making them a vital component in building robust, next-generation PNT architectures.
Despite its promise, delivering reliable PNT services from LEO Signals of Opportunity presents several complex research challenges. First, the non-dedicated nature of SoOp signals means they were not designed for navigation, leading to variability in signal structure, timing, and availability that complicates receiver design and signal processing. Additionally, the rapid motion of LEO satellites introduces high Doppler shifts and frequent handovers, requiring sophisticated tracking algorithms and real-time adaptation. Developing adequate receivers co-designed with the signal processing algorithms is another open problem. Ensuring precise orbit and clock knowledge of the signal sources is another hurdle. Furthermore, integrating LEO SoOp into existing PNT frameworks demands robust fusion techniques to reconcile data from disparate sources while maintaining accuracy and integrity.

The project will include the following core activities:

1. Define a use case for PNT services using Signal of Opportunity from LEO satellites and identify technological bottlenecks based on the performance requirements and current state-of-the-art
2. Investigate techniques and methodologies to address the identified challenges

Research field:

- ***Electronic engineering***

Required skills:

- ***Signal processing***
- ***Embedded systems, FPGA, RFSoC***
- ***Programming (Matlab, C, C++, Python)***

Further information on the DC9 position is available on the following page

Recruitment and secondment plan:

Recruiting beneficiary	Gross salary	Period	Planned Secondment
Celestia, United Kingdom, Edinburgh	£3,279/Month	36 months	3 months at Thales Alenia Space France, Toulouse
			9 months at Heriot-Watt University, United Kingdom, Edinburgh

PhD awarding institution: Heriot-Watt University, Edinburgh, United Kingdom

MSCA Mobility rule: To be eligible for this PhD position, applicants must not have resided or carried out their main activity (work, studies, etc.) in the United Kingdom (country of the recruiting beneficiary) for more than 12 months during the 36 months immediately preceding the recruitment date — unless this was part of a compulsory national service or a procedure for obtaining refugee status under the Geneva Convention.

DC Project 10

Eco-design Methodologies for Clean Space System Engineering

The project aims to define, develop and validate innovative methodologies based on Model-Based Systems Engineering (MBSE) and digital technologies for the sustainable development and optimisation of complex product lines in the space and industrial sectors. The key objective is to integrate environmental sustainability—through strategies such as Life Cycle Assessment (LCA)—and the digitalisation of manufacturing and verification activities—especially Assembly, Integration, and Test (AIT)—directly from the earliest stages of the design process. The candidate will investigate how MBSE tools and model-centric approaches can support the assessment of environmental impacts, enable efficient management of product variants, and drive virtualisation of traditionally hardware-intensive processes. The project will deliver a methodological framework and concrete use cases demonstrating the potential of this integrated approach for reducing time-to-market, costs, and the environmental footprint of industrial and space systems.

The project will include the following core activities:

1. Analyze state-of-the-art and future prospects for sustainable design using MBSE methodologies in space and industrial contexts
2. Explore MBSE strategies for integrating LCA and eco-design practices throughout planning, design, and manufacturing phases
3. Apply LCA-driven approaches to guide and optimise product and process choices for minimal environmental impact
4. Investigate industrial best practices related to eco-design and LCA to optimise sustainability across the entire product life cycle
5. Assess and experiment MBSE tools (such Capella and LCA plugin) and other methodologies for sustainable product family engineering and LCA data management
6. Identify key eco-design assets and their incorporation from the initial stages of product and process development
7. Conduct research from both system and product perspectives, ensuring a holistic approach to MBSE and LCA integration
8. Explore the digitalisation of AIT activities, focusing on model-driven virtual testing, simulation, and verification to reduce physical prototyping and dedicated hardware development

Further information on the DC10 position is available on the following page

Research field:

- *Model-Based Systems Engineering (MBSE)*
- *Life Cycle Assessment (LCA)*
- *Eco-design and sustainable engineering*
- *Digitalisation of industrial and space processes*
- *Assembly, Integration, and Test (AIT) process optimisation*

Required skills:

- *Experience in complex systems engineering*
- *Knowledge of MBSE tools (Capella, SysML, Matlab/Simulink)*
- *Programming skills (e.g., Python, Java, C++, or similar)*
- *Interest in digitalisation, environmental sustainability, and process optimisation*
- *Ability to work on both product and process research topics*

Recruitment and secondment plan:

Recruiting beneficiary	Gross salary	Period	Planned Secondment
Thales Alenia Space Italy, Turin	€3,150/Month	36 months	3 months at Thales Alenia Space France, Toulouse
			9 months at University of the Bundeswehr Munich, Germany

Further information on the DC10 position is available on the following page

PhD awarding institution: **University of the Bundeswehr Munich, Germany**

MSCA Mobility rule: **To be eligible for this PhD position, applicants must not have resided or carried out their main activity (work, studies, etc.) in Italy (country of the recruiting beneficiary) for more than 12 months during the 36 months immediately preceding the recruitment date — unless this was part of a compulsory national service or a procedure for obtaining refugee status under the Geneva Convention.**

DC Project 11

Dimensioning of Multi-Mission Ground Segment

Earth observation and monitoring satellites have become strategic assets for many key areas such as agriculture and environmental public policy. The observation data are handled on board the satellites by the so-called payload data handling and transmission (PDHT) subsystems, which are responsible for storing and forwarding the information to ground data centres for further processing and evaluation. The growing number of missions launched to provide Earth observation and monitoring services, together with the time-critical nature of data access, calls for a fundamental rethinking of the ground segment infrastructure. Whereas past missions were generally designed with dedicated ground infrastructures, a recent trend often referred to as Ground Segment as a Service (GSaaS) promotes the mutualization of ground assets among multiple missions. This approach allows mission operators to contract providers with existing global infrastructures, enabling significant capital expenditure savings and optimizing the use of ground stations. However, allocating ground segment resources under time and capacity constraints has become an increasingly complex problem given the ever-growing number of missions. Expanding the network with new ground segment sites to meet capacity demands is not a viable solution due to geographical, political, economic, and technical (e.g., interference) limitations. In this context, advanced real-time scheduling solutions must be developed to ensure that the service level agreements (SLAs) of the missions, such as required uplink and downlink data rates or the availability of contact windows, are fulfilled with the existing ground infrastructure. Consequently, this project aims to develop satellite range scheduling solutions for multi-mission ground segments dedicated to LEO/MEO Earth observation and monitoring systems. Unlike previous studies, this work will incorporate various ground antenna technologies (e.g., steerable reflectors, small- and large-scale sparse phased arrays) to thoroughly assess their impact on resource allocation. The potential of MIMO technology to enhance access to scarce spectrum resources will also be evaluated. The work will deliver an optimization framework for ground segment design that balances resource constraints with the need for resilient operations.

The project will include the following core activities:

1. Definition of representative scenarios for multi-mission ground segments operating in the S-, X-, and/or Ka-bands for Earth observation and monitoring missions, including the specification of required data rates, quality-of-service parameters, and data flow prioritization for Earth–space and space–Earth links
2. Development of optimization methods for the efficient dimensioning of multi-mission ground segments, aimed at ensuring sustainable and resilient support for increasing data traffic demands

Further information on the DC11 position is available on the following page

Research field:

- *Electrical engineering*
- *Communication engineering*

Required skills:

- *Optimization tools*
- *Wireless communication systems*
- *Numerical simulation programming (e.g., Python, Matlab, C++, …)*

Recruitment plan:

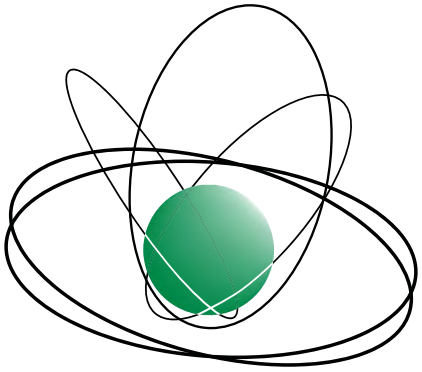
Recruiting beneficiary	Gross salary	Period
Thales Alenia Space France, Toulouse	€3,667/Month	18 months
University of the Bundeswehr Munich, Germany	Based on the German public sector collective agreement (TVöD E13/1): €4,767.62/Month	18 months

Further information on the DC11 position is available on the following page

PhD awarding institution: **University of the Bundeswehr Munich, Germany**

MSCA Mobility rule: **To be eligible for this PhD position, applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of their first recruiting beneficiary (France or Germany) for more than 12 months during the 36 months immediately preceding the recruitment date — unless this period was part of a compulsory national service or a procedure for obtaining refugee status under the Geneva Convention.**

Thank you!



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