Doctoral Candidate Positions

Marie Skłodowska-Curie Actions – Doctoral Network (MSCA DN)

UNVEIL – Unified Nondestructive Evaluation of Historical Artifacts

HORIZON-MSCA-2024-DN-01 • Grant Agreement No. 101226363

Project start: 1 March 2026 • Duration: 48 months

12 fully funded PhD positions across Europe at the intersection of advanced imaging, data fusion and cultural heritage.

Funded by the European Union

Funded by the European Union under grant agreement No 101226363.

About UNVEIL

UNVEIL aims to transform the diagnostics and preservation of cultural heritage by developing innovative non-destructive evaluation (NDE) techniques and advanced digital tools for diagnostics, conservation and public engagement. The network brings together academic, industrial and cultural institutions to (i) enhance surface and subsurface analysis of multi-layered and 3D artworks using techniques such as terahertz imaging, thermography and ultrasonics; and (ii) integrate and visualise multimodal NDE data using data fusion, digital twins and augmented reality to provide a holistic understanding of artworks' condition and structure.

More information: https://unveil-dn.eu/

What UNVEIL offers

- 36-month full-time employment contract and PhD enrolment (Doctoral Candidate position).
- Structured training programme: network-wide schools, workshops, seminars and transferable skills training.
- International and intersectoral experience through secondments (academia, industry, museums/restoration centres).
- Access to real artworks, mock-ups and state-of-the-art imaging and computation facilities across Europe.
- Close supervision and Career Development Plan (CDP) tailored to your research and career goals.

Eligibility requirements (MSCA DN rules)

- At the date of recruitment, you must NOT have been awarded a doctoral degree.
- You must comply with the MSCA mobility rule: you must not have resided or carried out your main activity (work, studies, etc.) in the country of the recruiting organisation for more than 12 months in the 36 months immediately before recruitment (short stays such as holidays are not taken into account).
- Researchers of any nationality are eligible.
- You must be enrolled (or be eligible to enrol) in the doctoral programme of the PhD-awarding institution linked to each position.
- You will be recruited under an employment contract (or equivalent) as a full-time Doctoral Candidate and work exclusively on the UNVEIL project during the contract.

How to apply

UNVEIL positions are advertised internationally. The consortium follows a coordinated recruitment process, while each recruiting organisation applies its official institutional procedures.

1. Consult the UNVEIL website for the list of open positions and links to the official vacancies.
2. Apply via the channel indicated in the official vacancy (e.g., institutional HR portal).
3. In addition, the consortium may use a UNVEIL expression-of-interest form to support eligibility checks and to route applications to the appropriate selection panel, in line with local rules.
4. Shortlisted candidates will be invited to interviews. Selection is based on merit in an open, transparent and non-discriminatory process.

UNVEIL is committed to equal opportunities and encourages applications from all qualified candidates.

Open Doctoral Candidate positions (DC1–DC12)

DC	Research topic	Recruiting org. / Location	PhD-awarding institution
DC1	Super-resolution depth and transverse profiling for multi-layer cultural heritage artworks	CNRS-Georgia Tech (Metz, FR)	UL (FR)
DC2	Pseudo-noise pulse-compression thermography with multi-wavelength LED excitation for painting stratigraphy	CAL (IT)	CAL (IT)
DC3	Lamb-wave and through-transmission air-coupled ultrasonic tomography	WA (UK)	WA (UK)
DC4	Evaluation of ceramic cultural heritage artefacts with THz imaging and tomography	CNRS-Georgia Tech (Metz, FR)	UL (FR)
DC5	Development of new ultrasonic techniques for imaging sculptures and ceramic artefacts	FRAU-IKTS (Dresden, DE)	TUD (DE)
DC6	Verifying the feasibility of nondestructive, non-contact Surface Acoustic Wave depth profiling and bulk acoustic wave-based imaging by laser ultrasonics for structural information extraction on art samples	KUL (Leuven, BE)	KUL (BE)
DC7	Multiscale and multimodal spectral image acquisition, integration, analysis and visualisation	NTNU (Trondheim, NO)	NTNU (NO)
DC8	Processing and fusion of data coming from a variety of techniques for improved material characterisation and pigments identification.	CNRS-C2RMF (Paris/Gif, FR)	SAC (FR)
DC9	Fusion of multispectral imaging with multi-source subsurface NDE imaging	PCO (Rome, IT)	SAP (IT)
DC10	Features extraction from multi-modal multi-dimensional NDE measurements.	NEW (Newcastle, UK)	NEW (UK)
DC11	User-centred design of digital twins for data integration and interactive visualisation of fused NDE data	RWTH (Aachen, DE)	RWTH (DE)
DC12	Augmented reality-based integration of digital twins into museum exhibitions	TRI (Trier, DE)	TRI (DE)

Doctoral Candidate DC1

Super-resolution depth and transverse profiling for multi-layer cultural heritage artworks

Recruiting organisation	CNRS – International Research Lab Georgia Tech-CNRS (CNRS-GT)
Location	Metz, France
PhD-awarding institution	Université de Lorraine (UL)
Contract	36 months (full-time employment contract)
Start date	Expected start: around Oct 2026 (UNVEIL Month 8), flexible
Main supervisor(s)	Dr Alexandre Locquet (CNRS-GT)
Keywords	Terahertz imaging, super-resolution, inverse problems, signal processing, cultural heritage

Research project

Join UNVEIL to push the limits of terahertz (THz) imaging for cultural heritage diagnostics. This PhD will develop advanced signal-processing methods that reconstruct the 3D stratigraphy of multi-layer artworks (e.g., canvas and wall paintings) from THz pulsed measurements. Building on state-of-the-art depth (axial) super-resolution, you will extend super-resolution to the transverse direction by exploiting spatial processing and physics-informed priors on layered structures. A second pillar is usability: you will design semi-automated decision-support tools that help non-experts choose reconstruction parameters and obtain robust results in real-world conditions. The methods will be validated on mock-ups and selected artworks in collaboration with museum and heritage science partners, enabling improved detection of hidden layers and defects while keeping the object safe. The project sits at the interface of photonics, inverse problems and heritage science, and offers access to a strong European network, secondments, and hands-on campaigns on real artworks.

Foreseen secondments

- Profilocolore Srl (PCO) (Italy)
- CNRS-SATIE / Université Paris-Saclay (France)

Candidate profile

- MSc (or equivalent) in signal processing, physics, electrical engineering, applied mathematics, or related field
- Interest in imaging/inverse problems; familiarity with numerical methods is a plus
- Programming skills (e.g., Python/Matlab) and ability to work in an interdisciplinary environment

Link to Research Group

https://irl2958.georgiatech-europe.eu/

MSCA Doctoral Salary (monthly, gross)

The salary consists of three components which are added together:

- **Living Allowance –** Approx. 4 736 € (base 4 010 € × 118,1% CCC; see European Commission document, page 156)
- **Mobility Allowance –** 710 € (fixed for all doctoral researchers)
- **Family Allowance –** 495 € (if applicable)

Total gross monthly salary:

- With family allowance: 5 941 €
- Without family allowance: 5 446 €

Note: Net salary depends on social contributions and local taxes.

Contact

alocquet@georgiatech-metz.fr

Recruitment procedure

1) Demonstration of Interest (UNVEIL Website)
Candidates must upload the following documents in English:

- Academic certificates and full transcripts
- A detailed CV
- A motivation letter

The CV must include all academic degrees (with dates and institutions) to verify eligibility and must clearly indicate the country of residence and main activity during the 36 months prior to recruitment to ensure compliance with the MSCA mobility rule.

Uploading documents on UNVEIL constitutes a Demonstration of Interest only.

2) Formal Application
Formal applications must be submitted directly to the recruiting beneficiary. The official application link will be provided at a later stage.

Doctoral Candidate DC2

Pseudo-noise pulse-compression thermography with multi-wavelength LED excitation for painting stratigraphy

Recruiting organisation	University of Calabria (CAL)
Location	Rende/Cosenza, Italy
PhD-awarding institution	University of Calabria (CAL)
Contract	36 months (full-time employment contract)
Start date	Expected start: from 1st november 2026 (UNVEIL Month 9), flexible
Main supervisor(s)	Dr. Stefano Laureti (CAL), Prof. Marco Ricci (Sapienza University of Rome)
Keywords	Thermography, pulse-compression, LED excitation, signal processing, painting diagnostics

Research project

DC2@Unical will develop pulse-compression thermography (PuCT) procedures for non-contact stratigraphic inspection of paintings. The project combines advances signal processing and a modular heating system relying on LEDs that will be designed and realised in the lab. LEDs from UV to NIR range will enable the selective heating of the varnish, the pictorial layer, and the layer underneath to improve multi-layer resolution, especially for easel paintings, while pseudo-noise excitation combined with PuCT will allow using low heating powers and an efficient driving of the LEDs. Mostly important, it allows increasing the sensitivity in detecting small thermal changes and an easy tuning of the excitation to tailor the procedure for different painting types, from easel paintings to wall paintings.

DC2 will also develop, implement and benchmark advanced post-processing (e.g., deconvolution/virtual-wave type approaches) to increase SNR and obtain reliable thermal “depth” information enabling a thermal stratigraphy of the artwork.

The system will be optimised on mock-ups and then translated into a portable setup for field validation with heritage partners. Multimodal integration with complementary imaging (e.g., multispectral imaging, ultrasonics and THz) within the UNVEIL network will be also pursued.

Foreseen secondments

- CNRS – International Research Lab Georgia Tech-CNRS (CNRS-GT) (France)
- Conservation and Restoration Centre “La Venaria Reale” (VEN) (Italy)

Candidate profile

- MSc (or equivalent) in electrical engineering, electronics, imaging science, physics, or other fields related to Science and Technology for the Conservation of Cultural Heritage or Nondestructive evaluation.
- Interest in thermography and nondestructive evaluation, experimental work and signal processing
- Programming skills (e.g., Python/Matlab); ability to collaborate across disciplines; Welcome skill: Background knowledge/ experience on thermography measurements and nondestructive testing

Link to Research Group

https://dimes.unical.it/

Contact

marco.ricci2@uniroma1.it

MSCA Doctoral Salary (monthly, gross)

The salary consists of three components which are added together:

- **Living Allowance –** Approx. 3 822 € (base 4 010 € × 95,3 % CCC; see European Commission document, page 156)
- **Mobility Allowance –** 710 € (fixed for all doctoral researchers)
- **Family Allowance –** 495 € (if applicable)

Total gross monthly salary:

- With family allowance: 5 027 €
- Without family allowance: 4 532 €

Note: Net salary depends on social contributions and local taxes.

Recruitment procedure

1) Demonstration of Interest (UNVEIL Website)

Candidates must upload the following documents in English:

- Academic certificates and full transcripts
- A detailed CV
- A motivation letter

The CV must include all academic degrees (with dates and institutions) to verify eligibility and must clearly indicate the country of residence and main activity during the 36 months prior to recruitment to ensure compliance with the MSCA mobility rule.

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2) Formal Application

Formal applications must be submitted directly to the recruiting beneficiary. The official application link will be provided at a later stage.

Doctoral Candidate DC3

Lamb-wave and through-transmission air-coupled ultrasonic tomography

Recruiting organisation	University of Warwick (WA)
Location	Coventry, United Kingdom
PhD-awarding institution	University of Warwick (WA)
Contract	36 months (full-time employment contract)
Start date	Expected start: around Oct 2026 (UNVEIL Month 8), flexible
Main supervisor(s)	Prof. David A. Hutchins (WA)
Keywords	Air-coupled ultrasound, tomography, Lamb waves, non-contact NDE, cultural heritage

Research project

Objective: This project will investigate the use of non-contact methods for the characterisation of cultural heritage objects and the production of images via tomographic or other types of image reconstruction schemes.

Methods: This research will use ultrasound which will be generated and detected without the need to contact the sample. This will use various approaches, including individual transducers operating in air, haptic air-coupled arrays and optical detectors. Various image reconstruction techniques will then be used to provide information on the properties of various artworks. We will also investigate the use of metamaterials within our imaging systems, the aim being to enhance the resolution that is available. One aspect of our research will be the fusion of data from the same sample obtained by other techniques such as THz imaging and thermography. This will use cooperation with other labs within UNVEIL who have advanced facilities for such measurements, as well as in-house facilities.

Impact/application: Ultrasound is not often used for the characterisation of cultural heritage objects, but it can in principle lead to information that is difficult to obtain by other non-destructive evaluation methods. The immediate application will be to the characterisation of paintings and wooden objects, but it may be possible to extend this to larger objects at lower frequencies.

Foreseen secondments

- University of Calabria (CAL) (Italy)
- CNRS – Historical Monuments Research Laboratory (CNRS-LRMH) (France)

Candidate profile

- This project would suit applicants with a background in Engineering, Physics or other scientific disciplines.
- An MSc is preferred but is not essential.

Link to Research Group

https://warwick.ac.uk/fac/sci/eng/engresearch/materialsandmeasurementscluster/

Contact

d.a.hutchins@warwick.ac.uk

MSCA Doctoral Salary (monthly, gross)

The salary consists of three components which are added together:

- **Living Allowance –** Approx. 5 683 € (base 4 010 € × 141,7 % CCC; see European Commission document, page 156)
- **Mobility Allowance –** 710 € (fixed for all doctoral researchers)
- **Family Allowance –** 495 € (if applicable)

Total gross monthly salary:

- With family allowance: 6 888 €
- Without family allowance: 6 393 €

Note: Net salary depends on social contributions and local taxes.

Recruitment procedure

1) Demonstration of Interest (UNVEIL Website)

Candidates must upload the following documents in English:

- Academic certificates and full transcripts
- A detailed CV
- A motivation letter

The CV must include all academic degrees (with dates and institutions) to verify eligibility and must clearly indicate the country of residence and main activity during the 36 months prior to recruitment to ensure compliance with the MSCA mobility rule.

Uploading documents on UNVEIL constitutes a Demonstration of Interest only.

2) Formal Application

Formal applications must be submitted directly to the recruiting beneficiary. The official application link will be provided at a later stage.

Doctoral Candidate DC4

Evaluation of ceramic cultural heritage artefacts with THz imaging and tomography

Recruiting organisation	CNRS – International Research Lab Georgia Tech-CNRS (CNRS-GT)
Location	Metz, France
PhD-awarding institution	Université de Lorraine (UL)
Contract	36 months (full-time employment contract)
Start date	Expected start: around Oct 2026 (UNVEIL Month 8), flexible
Main supervisor(s)	Prof. David S. Citrin (CNRS-GT)
Keywords	Terahertz imaging, tomography, ceramics, inverse problems, 3D reconstruction

Research project

This PhD will apply terahertz (THz) imaging and tomographic reconstruction to ceramic cultural heritage artefacts such as amphorae and statues. You will develop THz acquisition and processing workflows to extract structural and compositional information non-destructively, including thickness mapping of surface layers (e.g., glazes, slips, paints) and estimation of dielectric properties linked to provenance, firing conditions and preservation state. For highly non-planar objects, you will integrate multi-angle THz measurements with 3D surface models (e.g., structured-light scanning/photogrammetry) to support full 3D interpretation. The project includes museum-driven case studies (e.g., Roman ceramics and a complex-shaped statue) and will involve close collaboration with heritage professionals to interpret results. Through network secondments you will compare and combine THz with complementary methods (e.g., ultrasound tomography, micro-CT) and gain first-hand experience working with real museum collections.

Foreseen secondments

- KU Leuven (KUL) (Belgium)
- Universität Leipzig – Museum partner (MusULEI) (Germany)

Candidate profile

- MSc (or equivalent) in physics, photonics, electrical engineering, applied mathematics, or related field
- Interest in imaging reconstruction and inverse problems; experience with numerical modelling is a plus
- Programming/data-processing skills; willingness to work with museum partners and real artefacts

Link to Research Group

https://irl2958.georgiatech-europe.eu/

Contact

alocquet@georgiatech-metz.fr

MSCA Doctoral Salary (monthly, gross)

The salary consists of three components which are added together:

- **Living Allowance –** Approx. 4 736 € (base 4 010 € × 118,1% CCC; see European Commission document, page 156)
- **Mobility Allowance –** 710 € (fixed for all doctoral researchers)
- **Family Allowance –** 495 € (if applicable)

Total gross monthly salary:

- With family allowance: 5 941 €
- Without family allowance: 5 446 €

Note: Net salary depends on social contributions and local taxes.

Recruitment procedure

1) Demonstration of Interest (UNVEIL Website)

Candidates must upload the following documents in English:

- Academic certificates and full transcripts
- A detailed CV
- A motivation letter

The CV must include all academic degrees (with dates and institutions) to verify eligibility and must clearly indicate the country of residence and main activity during the 36 months prior to recruitment to ensure compliance with the MSCA mobility rule.

Uploading documents on UNVEIL constitutes a Demonstration of Interest only.

2) Formal Application

Formal applications must be submitted directly to the recruiting beneficiary. The official application link will be provided at a later stage.

Doctoral Candidate DC5

Development of new ultrasonic techniques for imaging sculptures and ceramic artefacts

Recruiting organisation	Fraunhofer IKTS (FRAU-IKTS)
Location	Dresden, Germany
PhD-awarding institution	Technische Universität Dresden (TUD)
Contract	36 months (full-time employment contract)
Start date	Expected start: around Oct 2026 (UNVEIL Month 8), flexible
Main supervisor(s)	Dr Bernd Köhler (FRAU-IKTS)
Keywords	Ultrasonic testing, non-contact NDE, 3D imaging, sculptures, ceramics

Research project

The objects of interest in this project will be sculptures, architectural columns and porcelain parts. First step is to gain an overview of the most interesting defects in these types of objects, which are then compared with the capabilities of various modern ultrasonic techniques (UT) and imaging evaluation strategies. The techniques used will include Laser Doppler Vibrometry (LDV) and Air Coupled (AC) ultrasound detection. The candidate will design optimized setups for (i) vibration excitation by an impactor or ultrasonic transducers and (ii) non-contact detection by LDV or AC devices. He will optimize the image generation using modern ultrasonic methods as synthetic aperture focusing and total focusing.
The candidate will gain hands-on experience with modern NDT instrumentation and advanced NDE signal processing methods.
The ideal candidate will have a solid background in physics, acoustics or electrical engineering and be interested implementing own ideas experimentally and/or numerically. Programming skills are very adventurous.

Foreseen secondments

- Universität Leipzig – Museum partner (MusULEI) (Germany)
- University of Warwick (WA) (UK)

Candidate profile

The ideal candidate will have a solid background in physics, acoustics or electrical engineering and be interested implementing own ideas experimentally and/or numerically. Programming skills are desired.

Link to Research Group

https://www.ikts.fraunhofer.de/en/industrial_solutions/non-destructive_testing.html

Contact

bernd.koehler@ikts.fraunhofer.de

MSCA Doctoral Salary (monthly, gross)

The salary consists of three components which are added together:

- **Living Allowance –** Approx. 4 058 € (base 4 010 € × 101,2% CCC; see European Commission document, page 156)
- **Mobility Allowance –** 710 € (fixed for all doctoral researchers)
- **Family Allowance –** 495 € (if applicable)

Total gross monthly salary:

- With family allowance: 5 263 €
- Without family allowance: 4 768 €

Note: Net salary depends on social contributions and local taxes.

Recruitment procedure

1) Demonstration of Interest (UNVEIL Website)

Candidates must upload the following documents in English:

- Academic certificates and full transcripts
- A detailed CV
- A motivation letter

The CV must include all academic degrees (with dates and institutions) to verify eligibility and must clearly indicate the country of residence and main activity during the 36 months prior to recruitment to ensure compliance with the MSCA mobility rule.

Uploading documents on UNVEIL constitutes a Demonstration of Interest only.

2) Formal Application

Formal applications must be submitted directly to the recruiting beneficiary. The official application link will be provided at a later stage.

Doctoral Candidate DC6

Verifying the feasibility of nondestructive, non-contact Surface Acoustic Wave depth profiling and bulk acoustic wave-based imaging by laser ultrasonics for structural information extraction on art samples

Recruiting organisation	KU Leuven (KUL)
Location	Leuven, Belgium
PhD-awarding institution	KU Leuven (KUL)
Contract	36 months (full-time employment contract)
Start date	Expected start: around Oct 2026 (UNVEIL Month 8), flexible
Main supervisor(s)	Prof. Christ Glorieux (KUL)
Keywords	Laser ultrasonics, guided waves, depth profiling, inverse problems, cultural heritage

Research project

DC6@KUL will harness lasers to both excite and detect Guided acoustic Waves (GWs) along an object's surface, leveraging photoacoustic effects. By analysing the frequency-dependent GW velocity, elastic and structural depth information will be extracted. This laser-based method also facilitates the generation and analysis of bulk ultrasound waves, producing cross-sectional images that reveal acoustic impedance changes, akin to traditional ultrasound echography but in a fully contactless manner. By choice of the used laser type and detected acoustic wave type, the spatial resolution of the delivered mechanical contrast based tomographic map will vary from 10 nanometer till millimeter, and the respective depth range from microns till several cm. Similarly to x-ray tomography, IR thermography, and, mainly, ultrasound echography, the maps will reveal the internal structure of, and defects inside of, art objects, in a fully non-contact, non-destructive way. The early stage researcher will develop technical skills in laser optics, ultrasound, waves and vibrations, the physics and mathematics of the inverse problem of depth profiling and in art work investigation.

Foreseen secondments

- Fraunhofer IKTS (FRAU-IKTS) (Germany)
- CNRS – Historical Monuments Research Laboratory (CNRS-LRMH) (France)

Candidate profile

- The preferred academic background is in physics.

Contact

https://www.kuleuven.be/wieiswie/en/person/00005780

MSCA Doctoral Salary (monthly, gross)

The salary consists of three components which are added together:

- **Living Allowance –** Approx. 4 010 € (base 4 010 € × 100 % CCC; see European Commission document, page 156)
- **Mobility Allowance –** 710 € (fixed for all doctoral researchers)
- **Family Allowance –** 495 € (if applicable)

Total gross monthly salary:

- With family allowance: 5 215 €
- Without family allowance: 4 720 €

Note: Net salary depends on social contributions and local taxes.

Recruitment procedure

1) Demonstration of Interest (UNVEIL Website)

Candidates must upload the following documents in English:

- Academic certificates and full transcripts
- A detailed CV
- A motivation letter

The CV must include all academic degrees (with dates and institutions) to verify eligibility and must clearly indicate the country of residence and main activity during the 36 months prior to recruitment to ensure compliance with the MSCA mobility rule.

Uploading documents on UNVEIL constitutes a Demonstration of Interest only.

2) Formal Application

Formal applications must be submitted directly to the recruiting beneficiary. The official application link will be provided at a later stage.

Doctoral Candidate DC7

Multiscale and multimodal spectral image acquisition, integration, analysis and visualisation

Recruiting organisation	Norwegian University of Science and Technology (NTNU)
Location	Trondheim, Norway
PhD-awarding institution	Norwegian University of Science and Technology (NTNU)
Contract	36 months (full-time employment contract)
Start date	Expected start: around Oct 2026 (UNVEIL Month 8), flexible
Main supervisor(s)	Prof. Jon Yngve Hardeberg (NTNU)
Keywords	Hyperspectral imaging, multispectral imaging, material mapping, machine learning, visualisation

Research project

Objectives: This project will develop strategies for the acquisition, integration, analysis and visualisation of spectral images, for scientific analysis of wall paintings. The data for this study will come from various multispectral/hyperspectral imaging technologies, covering various spectral ranges, such as VNIR, SWIR, and MWIR. Based on these heterogeneous datasets, spectral libraries with an extended spectral range will be generated and used for material mapping and classification, employing multivariate analysis (MVA) and advanced data-driven approaches, including artificial intelligence (AI) methods. The material mapping results will be validated using complementary analytical techniques applied to the same artworks. In addition, style characterization of the paintings will be conducted by extracting both local and global features, such as texture, brushstrokes, cracks, and other surface patterns. This will support the study of artists' techniques, enable enhanced visualization, and facilitate change monitoring over time. The project will also develop a visualization architecture for presenting multiscale and multi-range hyperspectral datasets, tailored to the needs of different user groups including conservation professionals. The fused HSI data will be applied to investigate painting stratigraphy and to detect superficial as well as subsurface disorders, supporting improved understanding of the artworks' condition and conservation needs.

Expected Results: 1) Multimodal and multiscale spectral imaging framework, including acquisition methodology, data architecture, analysis, visualisation tool 2) A new method for mapping materials (substrate, pigments, binders...) from spectral image data and a combination of traditional material/imaging models and modern ML-based approaches; 3) Spectral library of painting materials over VNIR-SWIR-MWIR ranges

Key exploitable results (KER): Open-source software suite for material mapping based on multimodal-multiscale spectral imaging

Foreseen secondments

- CNRS – Historical Monuments Research Laboratory (CNRS-LRMH) (France)
- Newcastle University (NEW) (UK)

Candidate profile

- Must have a professionally relevant background with competence in imaging, image processing, and/or visualization.
- Education must correspond to a five-year Norwegian degree programme, where 120 credits are obtained at master's level.
- Must have a strong academic background from your previous studies and an average grade from the master's degree program, or equivalent education, which is equal to B or better compared with NTNU's grading scale. If you do not have letter grades from previous studies, you must have an equally good academic basis. (https://i.ntnu.no/wiki/-/wiki/English/Grading+scale)

- Must meet the requirements for admission to the faculty's doctoral program in computer science. (https://www.ntnu.edu/studies/phcos)
- Excellent oral and written communication skills in English and an ability to communicate effectively
- Excellent programming skills (Python/MATLAB).

Preferred

- Knowledge and experience with spectral imaging
- Knowledge and experience in conservation science will be an added advantage.
- Experience working in an interdisciplinary and international research environment.

Personal characteristics

- A high level of personal responsibility, initiative, motivation and ability to work in a project team as well as independently.
- Flexibility and ability to take direction and accommodate feedback from diverse stakeholders.
- Ability to meet deadlines and produce work of a consistently high standard.
- Eager to disseminate research results through publications and presentations at international conferences, and through other venues of scientific communication.
- Ability to think and code creatively and outside the box.

Links to Research Group

https://www.ntnu.edu/idi/people/colourlab

Contact

jon.hardeberg@ntnu.no

MSCA Doctoral Salary (monthly, gross)

The salary consists of three components which are added together:

- **Living Allowance –** Approx. 5 438 € (base 4 010 € × 135,6 % CCC; see European Commission document, page 156)
- **Mobility Allowance –** 710 € (fixed for all doctoral researchers)
- **Family Allowance –** 495 € (if applicable)

Total gross monthly salary:

- With family allowance: 6 643 €
- Without family allowance: 6 148 €

Note: Net salary depends on social contributions and local taxes.

Recruitment procedure

1) Demonstration of Interest (UNVEIL Website)
Candidates must upload the following documents in English:

- Academic certificates and full transcripts
- A detailed CV
- A motivation letter

The CV must include all academic degrees (with dates and institutions) to verify eligibility and must clearly indicate the country of residence and main activity during the 36 months prior to recruitment to ensure compliance with the MSCA mobility rule.

Uploading documents on UNVEIL constitutes a Demonstration of Interest only.

2) Formal Application
Formal applications must be submitted directly to the recruiting beneficiary. The official application link will be provided at a later stage.

Doctoral Candidate DC8

Uncertainty-aware multimodal learning for pigment mapping via joint XRF and optical spectral imaging fusion

Recruiting organisation	CNRS – French Museums Research and Restoration Centre (CNRS-C2RMF)
Location	Paris & Gif-sur-Yvette, France
PhD-awarding institution	Université Paris-Saclay (SAC)
Contract	36 months (full-time employment contract)
Start date	Expected start: around Oct 2026 (UNVEIL Month 8), flexible
Main supervisor(s)	Dr Clotilde Boust (CNRS-C2RMF) & Prof. Sylvie Le Hégarat-Mascle (Université Paris-Saclay/CNRS-SATIE)
Keywords	XRF, hyperspectral imaging, multimodal fusion, uncertainty quantification, pigment mapping

Research project

This PhD will develop data-efficient and uncertainty-aware methods for pigment mapping in Cultural Heritage by combining XRF and optical spectral imaging. The project will rely on controlled painted mock-ups and real artworks to build multimodal datasets, and will design self-supervised and physics-guided learning strategies to obtain robust cross-sensor representations under scarce supervision and strong domain shifts. The final objective is to perform multimodal unmixing to estimate pigment abundances, together with uncertainty-aware fusion providing calibrated confidence maps. The developed methods will be validated on mock-ups and selected artworks in collaboration with partner teams of the UNVEIL network.

Expected Results:

A multimodal dataset combining controlled mock-ups and selected artworks, with standardized acquisition and documentation protocols; 2) A set of algorithms for multimodal representation learning and data fusion tailored to Cultural Heritage imaging; 3) A robust unmixing and pigment-mapping workflow producing interpretable abundance maps, allowing conservators and imaging scientists to apply the developed methods to new artworks.

Foreseen secondments

- Conservation and Restoration Centre “La Venaria Reale” (VEN) (Italy)
- Profilocolore Srl (PCO) (Italy)

Candidate profile

- High motivation for research work and ability to work independently; Interest for cultural heritage and arts;
- Ability to work both individually and in a (virtual) team environment and a high level of personal responsibility, initiative and leadership skills;
- Excellent oral and written communication skills and an ability to communicate effectively across different stakeholder groups;
- Flexibility and ability to take direction and accommodate feedback from diverse stakeholders;
- Ability to meet deadlines and produce work of a consistently high standard;
- Eager to disseminate research results through publications and presentations at international conferences;

Links to Research Group

https://c2rmf.fr/groupe-imagerie
https://satie.ens-paris-saclay.fr/fr/methodes-et-outils-pour-les-signaux-et-systemes

Contact

Contact both :
clotilde.boust@culture.gouv.fr
sylvie.le-hegarat@universite-paris-saclay.fr

MSCA Doctoral Salary (monthly, gross)

The salary consists of three components which are added together:

- **Living Allowance –** Approx. 4 736 € (base 4 010 € × 118,1% CCC; see European Commission document, page 156)
- **Mobility Allowance –** 710 € (fixed for all doctoral researchers)
- **Family Allowance –** 495 € (if applicable)

Total gross monthly salary:

- With family allowance: 5 941 €
- Without family allowance: 5 446 €

Note: Net salary depends on social contributions and local taxes.

Recruitment procedure

1) Demonstration of Interest (UNVEIL Website)
Candidates must upload the following documents in English:

- Academic certificates and full transcripts
- A detailed CV
- A motivation letter

The CV must include all academic degrees (with dates and institutions) to verify eligibility and must clearly indicate the country of residence and main activity during the 36 months prior to recruitment to ensure compliance with the MSCA mobility rule.

Uploading documents on UNVEIL constitutes a Demonstration of Interest only.

2) Formal Application
Formal applications must be submitted directly to the recruiting beneficiary. The official application link will be provided at a later stage.

Doctoral Candidate DC9

Fusion of multispectral imaging with multi-source subsurface NDE imaging

Recruiting organisation	Profilocolore Srl (PCO)
Location	Rome, Italy
PhD-awarding institution	Sapienza University of Rome (SAP)
Contract	36 months (full-time employment contract)
Start date	Expected start: around Oct 2026 (UNVEIL Month 8), flexible
Main supervisor(s)	Ing. Marcello Melis (PCO) & Prof. Michele Scarpiniti (Sapienza University of Rome)
Keywords	Image registration, multimodal fusion, multispectral imaging, THz/UT/thermography, software development

Research project

DC9@Profilocolore will focus on integrating complementary information obtained from various sensors, such as Hypercolorimetric Multispectral Imaging (HMI) and sub-surface NDE techniques, including terahertz imaging (THz), infrared thermography (IRT), and ultrasonic testing (UT). The main tasks will be to: (1) define feature-based image alignment methods for data acquired from different sensors, particularly between HMI and sub-surface techniques; (2) define hardware and software calibration procedures for integrating data from sensors with different sensitivity curves and non-homogeneous sampling; (3) develop post-processing techniques (PCA, ICA, GA) to reduce redundancy in multi-sensor data and extract features characterizing detected anomalies through data merging; (4) compare results obtained from calibrated images and integrated using the proposed techniques; and (5) develop image fusion procedures combining HMI spectral signatures with THz attenuation, and HMI spectral absorbance with IRT data. Secondment periods are planned at CNRS–GeorgiaTech Europe (Metz, France) for training in THz imaging and fusion of HMI with THz data, and at NTNU (Trondheim, Norway) for training in hyperspectral imaging and comparison of spectral processing techniques. Short visits to CNRS-C2RMF (Paris, France) are also expected for fusion with other imaging techniques and material characterization.

Foreseen secondments

- CNRS – International Research Lab Georgia Tech-CNRS (CNRS-GT) (France)
- Norwegian University of Science and Technology (NTNU) (Norway)

Candidate profile

- MSc (or equivalent) in computer science, electrical engineering, physics, mathematics or related field
- Experience or strong interest in image processing, registration, and multimodal data fusion
- Skills: Computer vision, image & signal processing, machine learning, preferred C++, Python; Extra welcome skills: knowledge of GPU development environment, CUDA, OpenCL, Vulkan API (https://www.vulkan.org/)

Link to Company Website

https://www.profilocolore.com/

Contact

Contact both :
marcello.melis@profilocolore.it
michele.scarpiniti@uniroma1.it

MSCA Doctoral Salary (monthly, gross)

The salary consists of three components which are added together:

- **Living Allowance –** Approx. 3 822 € (base 4 010 € × 95,3 % CCC; see European Commission document, page 156)
- **Mobility Allowance –** 710 € (fixed for all doctoral researchers)
- **Family Allowance –** 495 € (if applicable)

Total gross monthly salary:

- With family allowance: 5 027 €
- Without family allowance: 4 532 €

Note: Net salary depends on social contributions and local taxes.

Recruitment procedure

1) Demonstration of Interest (UNVEIL Website)

Candidates must upload the following documents in English:

- Academic certificates and full transcripts
- A detailed CV
- A motivation letter

The CV must include all academic degrees (with dates and institutions) to verify eligibility and must clearly indicate the country of residence and main activity during the 36 months prior to recruitment to ensure compliance with the MSCA mobility rule.

Uploading documents on UNVEIL constitutes a Demonstration of Interest only.

2) Formal Application

Formal applications must be submitted directly to the recruiting beneficiary. The official application link will be provided at a later stage.

Doctoral Candidate DC10

Features extraction from multi-modal multi-dimensional NDE measurements

Recruiting organisation	Newcastle University (NEW)
Location	Newcastle upon Tyne, United Kingdom
PhD-awarding institution	Newcastle University (NEW)
Contract	36 months (full-time employment contract)
Start date	Expected start: around Oct 2026 (UNVEIL Month 8), flexible
Main supervisor(s)	Dr Kabita Adhikari (NEW)
Keywords	Feature extraction, multimodal data fusion, machine learning, NDE, digital twins

Research project

Experts in Heritage Science and Conservation & Restoration work with large, diverse diagnostic datasets, yet integrating this information to create accurate Digital Twins remains a major challenge. This project aims to bridge this gap by fusing and visualising data from advanced NDE techniques to improve feature extraction, diagnostics, and generate precise Digital Twins.

The candidate will focus on developing innovative feature extraction (FE), selection (FS), and fusion (FF) methods to process high-dimensional, noisy, and heterogeneous datasets from complementary sensing modalities, including terahertz (THz), pulsed thermography, ultrasound, and multispectral imaging. These methods reduce complex datasets to meaningful, physically interpretable variables, preserving important insights while minimising artefacts such as emissivity and surface variations. The candidate will design adaptable local–global FE algorithms that integrate spatial, temporal, and spectral information to extract, align, and fuse multidimensional NDE measurements. Possible applications include depth alignment for painting stratigraphy, co-registration of subsurface features in 3D artworks, and feature-based multimodal fusion without predefined reference frames. The extracted features will bridge surface and subsurface details, deepening understanding of material properties and artistic techniques. The work will significantly enhance anomaly and defect detection and open new possibilities for monitoring subsurface damage over time. The candidate will also implement and extend unsupervised deep feature-fusion algorithms, including encoder–fusion–decoder architectures previously applied to THz images. The candidate will gain advanced skills in feature extraction, selection, and fusion for high-dimensional, multimodal NDE data, as well as expertise in developing robust computational algorithms for data alignment, fusion, and anomaly detection.

Foreseen secondments

- Profilocolore Srl (PCO) (Italy)
- Fraunhofer IKTS (FRAU-IKTS) (Germany)

Candidate profile

- A strong background in physics, electrical engineering, or applied computer science is recommended.

Link to Research Group

https://www.ncl.ac.uk/engineering/research/electrical-electronic-engineering/intelligent-sensing-communication/sensors/

Contact

kabita.adhikari@newcastle.ac.uk

MSCA Doctoral Salary (monthly, gross)

The salary consists of three components which are added together:

- **Living Allowance –** Approx. 5 683 € (base 4 010 € × 141,7 % CCC; see European Commission document, page 156)
- **Mobility Allowance –** 710 € (fixed for all doctoral researchers)
- **Family Allowance –** 495 € (if applicable)

Total gross monthly salary:

- With family allowance: 6 888 €
- Without family allowance: 6 393 €

Note: Net salary depends on social contributions and local taxes.

Recruitment procedure

1) Demonstration of Interest (UNVEIL Website)

Candidates must upload the following documents in English:

- Academic certificates and full transcripts
- A detailed CV
- A motivation letter

The CV must include all academic degrees (with dates and institutions) to verify eligibility and must clearly indicate the country of residence and main activity during the 36 months prior to recruitment to ensure compliance with the MSCA mobility rule.

Uploading documents on UNVEIL constitutes a Demonstration of Interest only.

2) Formal Application

Formal applications must be submitted directly to the recruiting beneficiary. The official application link will be provided at a later stage.

Doctoral Candidate DC11

User-centred design of digital twins for data integration and interactive visualisation of fused NDE data

Recruiting organisation	RWTH Aachen University (RWTH)
Location	Aachen, Germany
PhD-awarding institution	RWTH Aachen University (RWTH)
Contract	36 months (full-time employment contract)
Start date	Expected start: around Oct 2026 (UNVEIL Month 8), flexible
Main supervisor(s)	Prof. Torsten Kuhlen (RWTH Aachen)
Keywords	Digital twins, visual analytics, interactive visualisation, user-centred design, cultural heritage

Research project

During this project, the DC will create a Digital Twin that integrates and spatially maps multi-source NDE data, which enables visual and interactive analysis tailored specifically to the needs of conservators and restorers. First, general guidelines are developed and necessary methods are identified to create a suitable application design.
This iterative, user-centered development process ensures the practical demands of Con&Res experts.
The candidate will gain broad knowledge in the fields of visual analytics, general and immersive visualization suitable for the visual analysis of historical artifacts.

Foreseen secondments

- CNRS – French Museums Research and Restoration Centre (CNRS-C2RMF) (France)
- Profilocolore Srl (PCO) (Italy)

Candidate profile

- A background in computer graphics, visualization, and computer science alongside excellent software development skills are recommended.

Link to Research Group

https://www.vr.rwth-aachen.de/

Contact

gerrits@vis.rwth-aachen.de

MSCA Doctoral Salary (monthly, gross)

The salary consists of three components which are added together:

- **Living Allowance –** Approx. 4 058 € (base 4 010 € × 101,2% CCC; see European Commission document, page 156)
- **Mobility Allowance –** 710 € (fixed for all doctoral researchers)
- **Family Allowance –** 495 € (if applicable)

Total gross monthly salary:

- With family allowance: 5 263 €
- Without family allowance: 4 768 €

Note: Net salary depends on social contributions and local taxes.

Recruitment procedure

1) Demonstration of Interest (UNVEIL Website)

Candidates must upload the following documents in English:

- Academic certificates and full transcripts
- A detailed CV
- A motivation letter

The CV must include all academic degrees (with dates and institutions) to verify eligibility and must clearly indicate the country of residence and main activity during the 36 months prior to recruitment to ensure compliance with the MSCA mobility rule.

Uploading documents on UNVEIL constitutes a Demonstration of Interest only.

2) Formal Application

Formal applications must be submitted directly to the recruiting beneficiary. The official application link will be provided at a later stage.

Doctoral Candidate DC12

Augmented reality-based integration of digital twins into museum exhibitions

Recruiting organisation	Trier University (TRI)
Location	Trier, Germany
PhD-awarding institution	Trier University (TRI)
Contract	36 months (full-time employment contract)
Start date	Expected start: around Oct 2026 (UNVEIL Month 8), flexible
Main supervisor(s)	Prof. Benjamin Weyers (TRI)
Keywords	Augmented reality, virtual reality, digital twins, human-computer interaction, museum exhibitions

Research project

The concept of Digital Twins, coined by Grieves in 2002, is successfully used in various contexts such as engineering or scientific work. The goal of a Digital Twin is to create a digital replication of a real, planned, or past physical object or process using computer-based methods. A Digital Twin gives access to objects and processes in an interactive and dynamic way without putting the actual physical object, process or the user at risk. For instance, by using Digital Twins, nuclear power plants can be inspected from within the reactor without getting exposed to radiation or historical artifacts can be made tangible and interactive. Therefore, goal of this doctoral project is to make Digital Twins of historical artifacts accessible to museum visitors using Virtual and Augmented Reality Technologies. At its core of project lies the question how gathered scientific data can be integrated and what type of interaction techniques need to be used for Augmented and Virtual Reality to make Digital Twins of historical artifacts usable and easy to understand. During the project, the candidate will gain deep insight into the development and evaluation of Augmented and Virtual Reality systems as well as brought knowledge

Foreseen secondments

- Twiceout S.r.l. (TWO) (Italy)
- Musée de la Cour d'Or–Metz Métropole (MusMM) (France)
- Universität Leipzig – Museum partner (MusULEI) (Germany)

Candidate profile

- Master's degree in computer science
- Expertise in Human-Computer Interaction and design of interactive software systems.

Link to Research Group

HCI Group @ Trier University

Contact

weyers@uni-trier.de

MSCA Doctoral Salary (monthly, gross)

The salary consists of three components which are added together:

- **Living Allowance –** Approx. 4 058 € (base 4 010 € × 101,2% CCC; see European Commission document, page 156)
- **Mobility Allowance –** 710 € (fixed for all doctoral researchers)
- **Family Allowance –** 495 € (if applicable)

Total gross monthly salary:

- With family allowance: 5 263 €
- Without family allowance: 4 768 €

Note: Net salary depends on social contributions and local taxes.

Recruitment procedure

1) Demonstration of Interest (UNVEIL Website)

Candidates must upload the following documents in English:

- Academic certificates and full transcripts
- A detailed CV
- A motivation letter

The CV must include all academic degrees (with dates and institutions) to verify eligibility and must clearly indicate the country of residence and main activity during the 36 months prior to recruitment to ensure compliance with the MSCA mobility rule.

Uploading documents on UNVEIL constitutes a Demonstration of Interest only.

2) Formal Application

Formal applications must be submitted directly to the recruiting beneficiary. The official application link will be provided at a later stage.

Notes

This document provides a consolidated overview of the UNVEIL Doctoral Candidate positions. Each recruiting organisation will publish an official vacancy and apply its institutional recruitment and employment procedures. In case of discrepancies, the official vacancy and the employment contract prevail.

Foreseen secondments are subject to final agreement, project needs and practical constraints.

Funding acknowledgement

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Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency (REA). Neither the European Union nor REA can be held responsible for them.

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