

## PhD offer in the GENIUS MSCA Doctoral Network 101072560 Wide-angle glide-symmetric absorbers for aircraft communications

**Keyword:** electromagnetics, absorbers, metasurfaces, glide-symmetry, antennas, periodic problems

### Offer Description

A 3-year PhD position is available in the framework of the MSCA Doctoral Network GENIUS “Glide-symmetric mEtamaterials for iNnovative radio-frequency commUnication and Sensing”, funded by the European Union’s Horizon Europe Programme and by the UK Research and Innovation.

The doctoral candidate will conduct original research in the use of metamaterials characterized by glide symmetry to develop novel absorbers for aircraft communications.

The research project will be done at Sorbonne University (SU), Paris, France, and at Thales Research & Technology (THALES), Palaiseau, France. The candidate will be enrolled in a PhD programme at SU.

The candidate will develop original models for [glide symmetric](#) (GS) absorbers, being reliable over a large bandwidth and a large range of incident angles, possibly by means of circuit-based approaches. The model will allow for the fast simulation and optimization of this class of metasurfaces. She/he will study the absorbing performance with respect to relevant parameters of the incident radiation, and eventually the impact on antenna systems in typical use-case scenarios. Different prototypes will be designed, according to the required response to maximize (bandwidth, angular response, etc.). She/he will be in charge of the fabrication (additive manufacturing, machining, PCB, etc.) and measurement of the designed prototypes.

### The GENIUS programme

Higher data rates, shared platforms among users and the development of autonomous vehicles are stimulating a revolution in technologies for communications and sensing. New antennas and components are required at millimeter waves, being wide-bandwidth, light-weight, low-cost. Unfortunately existing technologies are currently very bulky, lossy, heavy, and expensive.

It has recently been discovered that electromagnetic waves propagating across metamaterials which exhibit glide symmetry possess marvelous properties (ultra-wide band propagation, strong isolation and high absorption features) capable to address the open challenges of modern RF systems. The GENIUS programme aims at providing doctoral candidates with excellent, multi-disciplinary scientific training ranging from metamaterial theory to advanced modelling methods and design of devices. We aim at helping the researchers to develop a critical thinking in a very wide range of sectors of innovation requiring mastering of novel radio-frequency systems and embedded electronics.

### Benefits:

The candidate will benefit of a salary approximately € 32,000 to € 55,000 per annum (depending on family status). She/he will conduct research in recognized international teams, will attend all the common training events of the Network (PhD schools, workshops, convened sessions at international conferences) and will be in contact with the other five doctoral candidates of the network working on similar topics at SU, THALES, KTH and with the other GENIUS partners.

Transferable-skill training will be provided both at SU and THALES as part of the doctoral programme. No knowledge of French is required, and French classes will be available at SU if the candidate is interested.



## Requirements

- The applicant should have good knowledge of programming languages such as Python, C and Matlab.
- The applicant should have basic knowledge of commercial electromagnetic (EM) simulation software; knowledge of numerical methods for EM will be a plus.
- The applicant should have a very good knowledge of English (both written and oral).
- The applicant should be highly motivated, autonomous, and willing to collaborate with both academic and industrial partners.

## Skills/Qualifications:

The applicant should have completed a Master program in Engineering or Physics with a good background in electromagnetic devices and electromagnetic theory at the date of the recruitment.

## Eligibility criteria:

In order to comply with the MSCA DN eligibility rules, the applicant:

- must not be already in possession of a doctoral degree at the date of the recruitment;
- must undertake transnational mobility: must not have resided or carried out their main activity (work, studies, etc.) in France for more than 12 months in the 36 months immediately before their recruitment date. Short stays such as holidays are not taken into account.

## Selection process:

Sorbonne University is engaged to assure an Open, Transparent and Merit-based Recruitment (OTM-R) of researchers. The composition of the selection committee will respect the rules of parity both in gender and in academic/industrial participation. Rejected applications will receive constructive feedbacks, and the recruited candidate will have the possibility to be accompanied in their administrative procedures to enroll in the PhD programme and move to Paris.

## Place and research environment of the PhD program

*Sorbonne University (Paris, France)*

Sorbonne University, Campus Pierre et Marie Curie, is located in the heart of Paris. The "Wave and Propagation group" of the GeePs laboratory is a research group active on the modeling, design, fabrication and measurement of artificial materials for extreme wave manipulations with applications to space and terrestrial communications, smart devices, radar and imaging.

*Thales RT (Palaiseau, France)*

Thales Research & Technology France, located in Palaiseau, is the French research center of Thales Group. It counts more than 300 researchers, PhD candidates and other scientists from sponsored organisms. The research study will be conducted within the Laboratory "Energy and Radiation: Modelling, Materials and Synthesis" in the Research Group "Technology and Materials".

**Duration:** 3 years. **Starting date:** anytime in 2024

## Supervisors:

Guido VALERIO at SU (thesis director)

Erika VANDELLE at THALES

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