

# Job Description

## MetaWireless Early Stage Researcher

### Institute of Informatics and Telecommunications (IIT) National Centre for Scientific Research “Demokritos” (NCSR), Athens, Greece

The Institute of Informatics and Telecommunications (IIT) of the National Centre for Scientific Research “Demokritos” (NCSR) in Athens, Greece is seeking to appoint one high-calibre Early Stage Researcher (ESR) to join the Marie Skłodowska-Curie Innovative Training Network on ‘**Future Wireless Communications Empowered by Reconfigurable Intelligent Meta-Surfaces**’ (MetaWireless).

<b>Position</b>	Early Stage Researcher  - DEM-1: Large bandwidth and multi-band RIS designs for high frequency bands (RIS = reconfigurable intelligent surfaces)
<b>Location:</b>	Institute of Informatics and Telecommunications (IIT), National Centre for Scientific Research “Demokritos” (NCSR), Patr. Grigoriou E’ & 27 Neapoleos st., 153 41 Agia Paraskevi, Athens, Greece
<b>Working time:</b>	Full Time
<b>Duration:</b>	Fixed-Term for 12 months with extension up to a maximum total duration of 26 months
<b>Living, mobility, family, and research allowances:</b>	In agreement with the MSCA-ITN financial regulations ( <a href="http://ec.europa.eu/research/participants/data/ref/h2020/other/guides_for_applicants/h2020-guide-appl-msca-itn_en.pdf">http://ec.europa.eu/research/participants/data/ref/h2020/other/guides_for_applicants/h2020-guide-appl-msca-itn_en.pdf</a> - Section 5, page 27)

## About MetaWireless

Wireless connectivity has become a pillar of our society. The growth of wireless traffic is relentless, forecast to reach a staggering worldwide aggregate of 5,016 exabytes by 2030, along with bit rates of 1 Tb/s and new services related to sensing, localization, low-latency, and ultra-reliability. While the performance of wireless networks has improved phenomenally over the last decades, progress is by now pushing against fundamental limits and the mechanisms that have sustained these huge improvements are starting to falter. New evolutionary leaps are called for in order to ensure that the aforementioned forecasts can become a reality. To date, every wireless system has abided by the premise that the propagation radio channel is fixed by nature and cannot be tampered with, but only compensated through ever more sophisticated transmission/reception schemes. A potential evolutionary leap for 6G-and-beyond networks is to break free from the postulate that channels are uncontrollable factors. Serving such a vision, MetaWireless pursues the disruptive idea of designing wireless networks by treating the environment itself as a quantity to be controlled and optimized. Precisely, the manipulation of the wireless environment can be made possible by incorporating reconfigurable intelligent surfaces. These are planar structures, made of meta-materials and electromagnetically discontinuous, which do not adhere to conventional reflection and diffraction laws; rather, they can modify in a controllable fashion the phase and wavefront of impinging radio waves. If deployed to coat objects, walls, or building facades, they could allow customizing in real time the electromagnetic response of environments. Making this vision a reality requires the training of a new generation of researchers and a multidisciplinary effort involving wireless communications, physics, electromagnetic theory, and computational learning, which are the ingredients that define the MetaWireless project.

## The Role

The Early Stage Researcher (ESR) will be hosted by the Institute of Informatics and Telecommunications (IIT) which is located in NCSR “Demokritos” campus, Agia Paraskevi, Athens, Greece. The ESR will have the possibility to be enrolled in the PhD programme of University of Piraeus (UNIPI), Piraeus, Greece and write his/her thesis on a topic related to “*Large bandwidth and multi-band RIS designs for high frequency bands*” under the supervision of Dr. Fotis Lazarakis, Research Director at IIT, NCSR and Dr. Angeliki Alexiou, Professor at UNIPI, Department of Digital Systems and head of the Broadband Communication Systems group. The ESR will also benefit of a secondment period at another partner of the MetaWireless project.

Further information about the ESR project can be found in the following table.

<b>Position:</b> DEM-1
<b>Title:</b> Large bandwidth and multi-band RIS designs for high frequency bands
<b>Scientific context:</b> Millimeter-wave communications are known to be highly vulnerable to non-line-of-sight propagation. RISs are a promising approach to deal with non-line-of-sight conditions compared with current expensive and power-hungry technologies (e.g. multi-antenna relays). However, current meta-surfaces suffer from narrowband bandwidth operation, which is a barrier for their use at high frequencies. Several techniques have been proposed to counteract this issue, such as coupling multiple resonances together, coupling unit cells with time delay lines or stubs, the variation of substrate thickness, and multi-layered substrates. However, their direct use in high-frequency bands is not straightforward due to the shorter wavelength that affects the sensitivity of the methods. To overcome this gap, this ESR project is focused on designing meta-surfaces with large bandwidth capabilities and that operate at high frequency bands. In addition, designs that incorporate multi-band operation due to the different channelizations of millimeter-wave bands will be investigated. To this end, single-layer designs that use on the same substrate unit cells of different sizes and different types will be investigated. The proposed designs will be optimized and validated by using advanced electromagnetics modeling software tools (CST Microwave Studio and HFSS).
<b>Objectives:</b> To design high-frequency meta-surfaces with increased bandwidth capabilities and able to operate at different bands.
<b>Expected results:</b> Novel high-bandwidth and multi-band meta-surface designs suitable for RIS-based wireless networks.
<b>Acquired knowledge:</b> Gaining knowledge on the design of high-frequency meta-surfaces that are realizable and low complexity.
<b>Planned secondment(s):</b> WUP (Italy) for 6 months.
<b>Ph.D. enrolment:</b> University of Piraeus (Greece).

## Duties and Responsibilities

1. Undertake postgraduate research in support of the agreed doctoral research project.
2. Work closely with the academic supervisors to ensure the compatibility of the individual project with the overall goals of MetaWireless.
3. Present and publish research in both academic and non-academic audiences.
4. Attend and participate to academic and non-academic conferences, events and seminars.
5. Attend and participate to all training events and supervisory meetings.
6. Be seconded to other network partners as necessary to fulfil the grant obligations.
7. Prepare progress reports and similar documents on research for funding bodies, as required.
8. Contribute to the delivery and management of the wider programme, including attending and participating in programme committee meetings.
9. Actively contribute to the public engagement and outreach activities as described in the grant agreement.

As job descriptions cannot be exhaustive, the ESR may be required to undertake other duties, which are broadly in line with the above duties and responsibilities.

## Person Specification

1. An undergraduate degree and a postgraduate Master's degree (or equivalent) in electronic or electrical engineering, electromagnetics, or a physical sciences subject.
2. Excellent mathematical skills and background.
3. Solid background on wireless communications (antennas, propagation and/or advanced transmit/receive techniques).
4. High proficiency in Matlab, Mathematica, Maple, R, or similar programming software.
5. High proficiency in electromagnetic simulation software tools e.g. CST/MWS or ANSYS/HFSS
6. Excellent written and verbal communication, including presentation skills.
7. Highly proficient English language skills.
8. Excellent organisational skills, attention to detail and the ability to meet deadlines.
9. Ability to deal with complex problems, create solutions and make informed decisions.
10. Willingness to work collaboratively in a research environment.
11. A strong commitment to his/her own continuous professional development.
12. Willingness to travel and work across Europe.

## Eligibility Requirements

All candidates must meet the following requirements to be considered for this post:

- a) Early-Stage Researchers (ESRs) shall at the time of recruitment by the host organisation be in the first four years (full-time equivalent research experience) of their research careers and not yet have been awarded a doctoral degree. Full-time equivalent research experience is measured from the date when a researcher obtained the degree which would formally entitle him or her to embark on a doctorate, either in the country in which the degree was obtained or in the country in which the researcher is recruited.
- b) At the time of recruitment by the host organisation, ESRs must not have resided or carried out their main activity (work, studies, etc.) in the country of their host organisation for more than 12 months in the three years immediately prior to the recruitment date. Compulsory national service and/or short stays such as holidays are not taken into account.

## How to Apply

Applications must be submitted, to the attention of Dr. Fotis Lazarakis, according to the following procedure:

- 1) Registration and submission of the application material to the MetaWireless recruitment website (<https://h2020-msca-itn-metawireless.cnit.it/jobs/>).
- 2) Submission of the application material to NCSR "Demokritos" by sending email to [dd.protokol@admin.demokritos.gr](mailto:dd.protokol@admin.demokritos.gr) and cc to [flaz@iit.demokritos](mailto:flaz@iit.demokritos) with Subject "015/2023-111 (E-12440)".

Informal enquires for further information about the position can be sent to Dr. Fotis Lazarakis ([flaz@iit.demokritos.gr](mailto:flaz@iit.demokritos.gr)).

Note 1: Registrations and submissions need to be done to **both the MetaWireless website and NCSR "Demokritos"**.

Note 2: By registering as described above, the applicants agree that all members of the MetaWireless project can access their personal data and application material.

Each application must include the following material:

- a) A cover letter explaining the motivation for applying for the post.
- b) A curriculum vitae setting out the educational qualifications as well as any additional scientific achievements and publications.
- c) Evidence of English proficiency.
- d) Copy of Bachelor's and Master's certificates.
- e) Copy of Bachelor's and Master's transcripts.
- f) Any additional material useful for the assessment of the candidate (e.g., recommendation letters, research project/statement in agreement with the requirements specified in previous text).

## Selection Process

The selection and recruitment processes of the ESRs will be in accordance with the European Charter and Code of Conduct for the Recruitment of Researchers. The recruitment process will be open, transparent, impartial, equitable, and merit-based. There will be no overt/covert discrimination based on race, gender, sexual orientation, religion or belief, disability or age. To this end, the following selection criteria for the recruitment of the ESRs will be considered:

- 1) Curriculum vitae
- 2) Academic performance (diplomas, university transcripts, etc.)
- 3) Research and industrial experience
- 4) Awards and fellowships
- 5) Publications and patents
- 6) Research, leadership, and creativity potential
- 7) English knowledge
- 8) Other relevant items based on the specific candidate

The recruitment process will adhere to the guidelines described in the Grant Agreement of the MetaWireless project. At the network's level, the recruitment will be coordinated by the Recruitment Committee of the project in order to guarantee gender- and sector-balance. At NCSR D's level, the recruitment will be coordinated by the host Institute (Institute of Informatics and Telecommunications - IIT). More precisely, the recruitment and selection of the ESR will be executed by a Committee that will consist of the Scientist-in-Charge of the MetaWireless project for the NCSR D (Dr. Fotis Lazarakis), the Director of IIT and another research scientist of the NCSR D. The entire process will be overseen and approved by the Director & Chairman of the Board of NCSR D and the Department of Research Special Accounts.

The application deadline for both posts is on **2 April 2023**. Each application will be acknowledged electronically (e.g., by return email) and a unique ID number will be assigned to it. The applications will be analysed after the application deadline, and the shortlisted candidates will be invited to a teleconference interview. The selected candidates are expected to be recruited during the period **1 May 2023 – 1 July 2023**. At the end of the selection process, all the applicants will be informed of the outcome of their application by return email.

## Further Information

For more information about the post DEM-1, please contact Dr. Fotis Lazarakis ([flaz@iit.demokritos.gr](mailto:flaz@iit.demokritos.gr)).

## Disclaimer

By applying for this position, the applicants give their consent to circulate their application and personal data within the members of the consortium.

By applying for this position, the applicants declare to fulfil the eligibility requirements defined by the MSCA.

By applying for this position, the applicants agree that they will comply with the secondment plan.

By applying for this position, the applicants agree that they will comply with the planned Ph.D. enrolment.