

### 3 Marie Curie Ph.D. Positions at Barcelona

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Three Early Stage Researcher (ESR) / Ph.D positions are offered in the context of the H2020 Innovative Training Network (ITN) project SPOTLIGHT, focused on the design and optimization of a beyond 5G disruptive mobile network architecture that exploits massively distributed MIMO, big data analytics and cloud-empowered network management. More information on the project can be found here: [http://cordis.europa.eu/project/rcn/205539\\_en.html](http://cordis.europa.eu/project/rcn/205539_en.html).

We are looking for highly motivated, enthusiastic junior scientists, with an MSc in electrical engineering or related fields, aiming at significantly improving their career perspectives in both public and private sectors. Excellent research skills and analytical abilities are required, fluency in English (spoken and written), proactive communication skills and problem solving as part of a team, strong record keeping, great work ethic and initiatives are essential characteristics.

These positions are fully funded for 3 years by the European Commission under the H2020 Marie Curie Innovative Training Network Programme. The recruited ESRs will be highly encouraged to enroll to the Ph.D. programme of local universities (UOC, UPC, UB, etc.).

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#### AVAILABLE RESEARCH POSITIONS

In this context, two positions (ESR1, ESR2) are offered by Open University of Catalonia (UOC) and one position (ESR3) by IQUADRAT, S.L., all located in Barcelona, Spain. All positions will be oriented towards future 5G networks and architectures, including concepts such as:

- Network function virtualization and resource slicing
- Software Defined Networking (SDN) principles
- Edge cloud/fog network architectures
- 5G architectures and concepts (C-RAN, F-RAN, etc.)
- mmWave communications

Specific description of the open positions are given below.

- A) **Two positions in Open University of Catalonia-UOC (<http://www.uoc.edu>)**, email to: [ferranadelantado@uoc.edu](mailto:ferranadelantado@uoc.edu)

**ESR1:** This ESR will focus on the design and optimization of efficient algorithms for fronthaul/backhaul networks, in the context of 5G networks with dense heterogeneous deployments (C-RAN, small cells, etc) and novel transmission techniques (mmWave communications, massively distributed MIMO, etc.). Network function virtualization and dynamic resource slicing will play a key role in the allocation and orchestration of the available network resources.

**ESR2:** This ESR will focus on the design of innovative caching techniques, taking into account the principles of information-centric networking. The capabilities of novel 5G underlying architectures will be exploited, including edge/fog cloud computing principles and SDN centralized control.

**Requirements:** ESR1 and ESR2 must have a strong mathematical background, fluency in English (spoken and written) and excellent analytical and writing skills. Experience in optimization, game theory, stochastic modeling and network virtualization will be highly appreciated.

**Mobility requirement:** Within the duration of the project, the ESRs will perform a secondment of up-to 6 months at a SPOTLIGHT industrial partner, in particular, ESR 1 at NESSOS, Athens, Greece (<http://www.nessos.gr/>) and ESR2 at MTN, Nicosia, Cyprus ([www.mtn.com.cy](http://www.mtn.com.cy)).

B) **One position in IQADRAT, S.L** ([www.iquadrat.com](http://www.iquadrat.com)), email to: [ellik@iquadrat.com](mailto:ellik@iquadrat.com)

**ESR3:** This ESR will focus on the implementation of an open-source programmable testbed platform for the evaluation of novel system concepts and architectural components for 5G and beyond communication networks, supporting network function virtualization and SDN.

**Requirements:** ESR3 must have a strong background in network simulation and programming (ns2-3, opnet, matlab, c++, etc.). Previous experience in testbed programming, along with a clear understanding of network virtualization and SDN design principles will be highly appreciated. Basic knowledge of LTE networks and key mathematical tools for network analysis and modeling (probability theory, optimization, etc.) will also be positively evaluated.

**Mobility requirement:** Within the duration of the project, the ESRs will perform a secondment of up-to 6 months at the SPOTLIGHT academic partner University of Athens, Greece.

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## THE SPOTLIGHT PROJECT

Mobile networks are driven to their limits due to the unprecedented growth in the number of connected devices and the volume of data traffic, as well as the stringent demands of emerging applications and services. Despite the continuous advances in transmission and networking technologies, the mobile network ecosystem remains vastly heterogeneous and under-organized, failing to fully exploit and efficiently coordinate the vast amount of available network resources. The SPOTLIGHT project aims to overcome these limitations by proposing a disruptive architecture based on the creation of a flat coalition of massively distributed transceivers utilizing a common pool of energy, radio, computing and storage resources that are optimally handled by a cloud-empowered network core.

Towards that goal, SPOTLIGHT has defined 11 technical challenges, mapped onto 15 individual projects, which will be assigned to 15 recruited ESRs. In addition to the top-notch research activities, the SPOTLIGHT consortium will joint their expertise and infrastructure to establish a high-quality training network to provide the recruited ESRs with the technological and complementary skills, boosting their employability in the context of 5G communications.

The recruited ESRs will work in close collaboration with the academic and industrial partners of the project, spanning across eight European countries:

- National and Kapodistrian University of Athens, Greece
- Iquadrat Informática SL, Spain
- Ericsson AB, Sweden
- Nessos SA, Greece
- NEC Europe LTD, Germany
- EURECOM, France
- University of York, UK
- MTN Cyprus LTD, Cyprus
- Open University of Catalonia, Spain
- Politecnico di Milano, Italy

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**ELIGIBILITY**

- The recruited researchers should be, at the time of selection, in the first four years of their research careers (measured from the date when they obtained the degree which would formally entitle them to embark on a doctorate).
- The applicants should not be in possession of a doctoral degree, but they should have the qualifications to embark on a PhD program.
- The applicants (regardless of their nationalities) must not have resided or carried out their main activities (work, studies, etc.) in Spain for more than 12 months in the last 3 years.

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**FINANCIAL PROVISIONS**

Marie Curie ITNs provide competitive financial support to the ESR including:

- a competitive monthly living and mobility allowance,
- coverage of the expenses related to the participation of the ESR in research and training activities (contribution to research-related costs, meetings, conference attendance, training actions, etc.).

The recruited researchers will have a regular contract with the same rights and obligations as any other staff member of Iquadrat. The ESRs should start within 2 months of the acceptance of the fellowship.

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**APPLICATIONS**

To apply, please provide:

- 1) a cover letter indicating the applied position(s) and justifying your suitability
- 2) a detailed CV and complete transcripts
- 3) the name and address of two referees to support your application.

- Applications for ESR1 and ESR 2 should be sent to [ferranadelantado@uoc.edu](mailto:ferranadelantado@uoc.edu)
- Applications for ESR3 should be sent to [ellik@iquadrat.com](mailto:ellik@iquadrat.com)

All applications will be evaluated by a committee with equality and based strictly on the candidates' skills and eligibility, whereas issues as gender, ethnicity, disability, etc. will be irrelevant to the selection.

**The closing date for applications is March 31, 2017.**

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