

JOB OFFER in Louvain-la-Neuve, Belgium: GLITTER project



ORGANISATION/COMPANY:	Université catholique de Louvain
RESEARCH FIELD:	developing an RF electronic system able to synchronize coherently signals received on different Cubesats
RESEARCHER PROFILE:	Doctoral Candidate
LOCATION:	Louvain-la-Neuve, Belgium with secondments at Syntony (Toulouse) and Univ. Luxembourg
APPLICATION DEADLINE:	November 18, 12:00 am, Brussels time
TYPE OF CONTRACT:	Temporary
JOB STATUS:	Full-time
HOURS PER WEEK:	38 hours
EU RESEARCH FRAMEWORK PROGRAMME:	MSCA Doctoral Network GLITTER GnsS-r satelliTe earTh observation GA N° 101120117

GENERAL:

GNSS-R is a technique to carry out Earth observation based on reflections on the ground (or sea, or ice) of signals originating from GNSS (Global Navigation Satellite System) signals. The proposed project consists of educating a new generation of experts, at doctoral level, able to bring a qualitative leap to this technology. The scientific and technological goal consists of developing such systems based on a synchronized constellation of Cubesats. An important advantage of this arrangement is the very low cost of cubesats and the possibility to increase resolution based on beamforming from the satellites. Ground truth, as well as some of the methods, will originate from near-field radar technology. This will require further research on all segments of GNSS-R technology and beyond: launching and adjustment of cubesat formations, RF synchronization, interferometry between moving platforms, calibration of RF front-ends, ground testing making use of drones, cubesat systems, on-board processing, data transfer and analysis, translation into ground truth and into predictions important for climate change studies and for optimal territory management. The project may also benefit to other technologies making use of interferometry, such as radioastronomy and phased array based communications. It is also expected to assist industry segments making use of GNSS signals, such as precision agriculture, forestry and sea and land management.

Training programme for recruited researchers:

GLITTER offers a rich inter-sector training program, with private and academic partners, recognized in all segments of satellite-based Earth observation at microwaves. The program has been designed taking into consideration the “triple i” aspects: international, inter-sectoral, and inter-disciplinary, thanks to the different competences brought by each partner of the network as well as lecturer outside of the consortium with complementary competences.

Each Doctoral Candidate (DC) will benefit from an individual and customized training program, established in the Personal Career Development Plan (PCDP) that offers a combination of research specific and transferable skills. First, the core training, often but not always local, with order of 5 ECTs on specialized topics, close to a given DC personal project, to allow him/her to acquire a deep understanding of her/his subject. Second, the network-wide training will be offered by the consortium during the whole project life cycle through 4 training schools and 3 workshops. The workshops will include practical system-based development.

Job conditions

Each host organisation will appoint the successful applicant under an employment contract with a very competitive salary. The fellow is expected to join their host organizations starting from September 1st, 2024 (estimated time). Additional funding for participation to courses, workshops, conferences, etc. is ensured.

All positions include a doctoral track and the successful applicant will be registered for the PhD program at the host institution. If the doctoral track requires a longer duration than 36 months, the details and financial implications will be provided by the host institution.

EU eligibility criteria for candidates:

The Doctoral Candidate (DC) may be a national of a Member State, of an Associated Country or of any Third Country.

Researchers must be doctoral candidates (no doctoral degree at the date of recruitment)

The DC must not have resided or carried out her/his main activity (work, studies, etc.) in the country of her/his host organization for more than 12 months in the 3 years immediately prior to her/his recruitment. (Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status under the Geneva Convention are not considered)

Candidates profile:

- MSc degree in Electrical/Aerospace/Telecommunications Engineering, or related fields.
- Solid mathematical background, outstanding academic records, and excellent communication skills in oral and written English.
- Knowledge on Radio Frequency circuits, as well as Matlab/Python programming skills.

- Knowledge on Antenna technology and electromagnetics.

Commitment to Equality and Diversity:

The GLITTER consortium is committed to promoting equality, diversity, and inclusion in all aspects of the project. We particularly encourage applications from women, underrepresented minorities, and individuals with diverse backgrounds and perspectives, aiming to create an inclusive research environment that reflects the diversity of our society. Our policies ensure equal opportunities for all, regardless of gender, ethnicity, disability, age, sexual orientation, or religion.

Research centres:

- Université catholique de Louvain, Belgium
- Technische Universiteit Delft, The Netherlands
- Université du Luxembourg, Luxembourg
- Institute of Space Sciences (ICE-CSIC), Barcelona, Spain
- Institut Supérieur de l'Aéronautique et de l'Espace, France
- University of Cambridge, UK
- Universitat Politècnica de Catalunya, Spain (Associated Partner)

Companies:

- Syntony, France
- Polychord Ltd., UK
- Hydroscan, Belgium (Associated Partner)

To learn more about each of the nine thesis topics proposed in this project, please click on the following link: https://sites.uclouvain.be/DN_GLITTER/

Consortium-wide individual research projects:

DC1 – Multi-frequency GNSS-R signal processing

DC2 – Investigation of advanced reflectometry instrumental concepts with simulated scattered signals

DC3 – developing an RF electronic system able to synchronize coherently signals received on different Cubesats

DC4 – Calibration of GNSS-R products for soil moisture using drone-borne radar

DC5 – Grazing angle GNSS-R for precise altimetry

DC6 – Calibration and drone-scale experiments

DC7 – Deployment and control of a distributed telescope as a formation of nanosatellites

DC8 – GNSS-R signals acquisition and ranging

DC9 – Cubesat system

DC10 – Space-compliant front-end RF electronics

DC11 – Antenna technology

DC12 – CubeSat advanced Bayesian analysis and optimisation

Description of the project concerned by this offer (DC3)

The GLITTER project is focused on advancing GNSS-reflectometry, among others through the use of a swarm of CubeSats to receive the signals scattered by the Earth in an interferometric way. That is, the signals are received by each CubeSat are coherently combined, as is currently done with radiotelescopes, in order to form a synthetic beam and so to improve the resolution on the ground, typically from 10 km to 1 km. This PhD aims at ensuring a good RF coherency between the different satellites.

The system may make use of the GNSS signals themselves, to localize the CubeSats. The signals from an actual GNSS receiver will be used in order to correlate direct signals and signals scattered by the surface. The downconverted signals will be time-stamped for transmission toward a master satellite. Cooperation with the HARMONY doctoral network is foreseen regarding communications and distributed computing. The research will also include an optimization of the antenna and of the satellite configuration in order to provide a good compromise between directivity and sidelobe level. Collaboration is foreseen with the University of Luxembourg, regarding the control of the CubeSat formations and the exploitation of signals in an interferometric context. For the case of dense microsatellite formations, the analysis will include corrections related to the effects of scattering among satellites, which may distort the synchronization signals, as well as the antenna patterns. A full-wave solver based on the method of moments, as developed by an UCLouvain researcher, will be used to analyze the effects of coupling. In addition, the PhD candidate will do two three-months secondments abroad: SYNTONY company in Toulouse (Dr. Carrie) and UL/GEO (Dr. Tabibi).

Application Process:

The application process will be open until May 18 at noon, Europe Continental Time. The applications received after this date will not be evaluated.

Apply at the following email address: christophe.craeye@uclouvain.be, the email must have a subject line starting with [GLITTER_APPLICATION]

N.B. All the application must be in English. Applications received in another language will not be considered!

Questions regarding the recruitment can be sent to christophe.craeye@uclouvain.be. To be considered, the email must have a subject line starting exactly with [GLITTER_QR]

Please provide the following four items, all in pdf format:

- Your CV (1 to 2 pages in pdf format)
- A list of grades/diplomas, certificates
- A list of referees (three at least)
- A motivation letter

The four documents should be preferably assembled in a *.zip file with a file name that starts with DC3.