

Job Title: Internal Research Fellow (PostDoc) in Space Debris Environment and Monitoring

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EUROPEAN SPACE AGENCY

Research Fellowship Opportunity in the Directorate of Operations.

ESA is an equal opportunity employer, committed to achieving diversity within the workforce and creating an inclusive working environment. Applications from women are encouraged.

Post

Internal Research Fellow (PostDoc) in Space Debris Environment and Monitoring

This post is classified F2.

Location

ESOC, Darmstadt, Germany

Our team and mission

The Internal Research Fellow will be based in the Space Debris Office, a self-standing entity within the Space Safety Programme Office of ESA's Directorate of Operations. It constitutes the focal point for all ESA space debris activities. The Space Debris Office is coordinating the Agency's space debris and meteoroid research activities and is responsible for all space debris operational and analysis services in support of ESA missions and of ESA cooperation at inter-agency level. The work of the Space Debris Office is based on a large set of operational and scientific analysis software that are developed, maintained and operated under its control.

The related activities of the Office cover:

- Characterisation of the space debris environment and its evolution
- Ground- and space-based measurements of the environment
- Impact risk analysis
- Space debris mitigation
- Collision risk prediction and operational collision avoidance manoeuvre planning
- Re-entry forecasts and re-entry risk predictions
- Maintenance of a database on more than 40,000 objects in space

The office's experts are also responsible for leading all space debris monitoring activities in support of ESA's current SSA program and the Space Debris pillar of ESA's proposed Space Safety Programme. The main activities comprise the advancement of sensor technology, such as, e.g., in the area of laser ranging and space-based optical observation concepts, observation data and catalogue processing and correlation through establishing a community approach, and development of an Expert Centre technology. Space debris experts also support ESA's Cleanspace initiative in the area of mitigation on-board technology and remediation (active removal of space debris objects).

Interested candidates are encouraged to visit the ESA websites: www.esa.int, www.esa.int/spacedebris, www.esa.int/spacesafety

Field(s) of activities/research

The successful applicant shall become active in state of the art research projects on space debris monitoring and analysing the consequences thereof and mitigation activities on the state of the environment. This aligns with ESA's continuous endeavours to develop and test technologies and to increase the capabilities of ground and in-orbit based sensors when it comes to the detection and tracking of space debris, and the establishment of products and software tools based thereon which allow operators to identify and mitigate the risk to their spacecraft.

On one hand the focus of the activity shall be on the exploitation of available space surveillance data for the purpose of understanding the state of object in the environment, e.g. the consistent monitoring of attitude motions and remote characterisation of object properties from observations and modelling. Such undertakings require a proven understanding of classical and orbital mechanics, orbit determination, space weather effects, and modern statistical methods for uncertainty quantification.

On the other hand, the observed creation of various complementary and overlapping data sets on object coming from space surveillance activities leads to new questions addressing data fusion and automated knowledge discovery across the data sets and the development of related applications thereon. Potential applications include the stochastic lifetime prediction of nuclear power sources spanning decades of remaining lifetime in orbit, object size identification based on fused data sets for use in collision avoidance procedures and in the verification and validations of ESA's statistical MASTER software, and finally in applying pattern recognition techniques on catalogue data to identify operational trends and global mitigation practices. This requires a good and demonstrated understanding of the current needs in space debris research, good programming and writing skills, and some background in mathematical modelling or machine learning.

The proposed field of research will inherently be multidisciplinary and include component which are both theoretical and application driven.

Technical competencies

Knowledge relevant to the field of research

Research/publication record

Ability to conduct research autonomously

Breadth of exposure coming from past and/or current research/activities

General interest in space and space research

Ability to gather and share relevant information

Behavioural competencies

Innovation & Creativity

Continuous Learning

Communication

Relationship Management

Self Motivation

Problem Solving

Cross-Cultural Sensitivity

Education

Applicants should have recently completed, or be close to completion of a PhD in a related technical or scientific discipline. Preference will be given to applications submitted by candidates within five years of receiving their PhD.

Additional requirements

Knowledge of orbital mechanics and mathematics in general, be familiar with UNIX/LINUX operating environments, and with scientific programming (e.g. programming in FORTRAN or Python). Experience with software engineering is considered an asset.

The working languages of the Agency are English and French. A good knowledge of one of these is required. Knowledge of another Member State language would be an asset.

Other information

For behavioural competencies expected from ESA staff in general, please refer to the [ESA Competency Framework](#).

The Agency may require applicants to undergo selection tests.

The closing date for applications is 8 September 2019.

In addition to your CV and your motivation letter, please add your proposal of no more than 5 pages outlining your proposed research in the "additional documents" field of the "application information" section. Candidates are asked to arrange for 3 reference letters, to be sent by the referees themselves, before the closing date to temp.htr@esa.int. Please ensure your name is mentioned in the subject of the e-mail.

If you require support with your application due to a disability, please email contact.human.resources@esa.int.

Please note that applications are only considered from nationals of one of the following States: Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and the United Kingdom. Nationals from Slovenia, as an Associate Member, or Canada as a Cooperating State, can apply as well as those from Bulgaria, Cyprus, Latvia, Lithuania and Slovakia as European Cooperating States (ECS).

Priority will first be given to candidates from under-represented Member States.

In accordance with the European Space Agency's security procedures and as part of the selection process, successful candidates will be required to undergo basic screening before appointment