Research Fellowship in Optoelectronics

Directorate of Technical and Quality Management

ESTEC, Noordwijk, The Netherlands

ESA/RF-ESTEC(2015)017

Overview of the Division's mission

Mechatronics is the fusion of mechanical, electrical, optical and optoelectronic/electro-optic, material and bio-technology systems. It contributes to the development of advanced robotics, of instrumentation for physical or life sciences, of optical instruments for remote sensing, of devices which transmit and detect light for communication or processing, as well as for the development of life support systems.
The design and verification of optical systems is another core activity, ranging from full-sized telescopes to fibre optics and photonics devices, from laser communications to LIDAR atmosphere-sampling sensors and space interferometers. This work extends into advanced optoelectronic systems such as superconducting magnetic field detection devices, advanced detectors operating across a broad spectral range from X-rays and gamma rays into the infrared to the application of advanced quantum states for secure communications.
Advanced and highly coherent lasers and LIDARS and other optoelectronic devices such as detectors and spectrometers are developed. Techniques to generate large numbers of cold atoms using simplified experimental methods have also been developed in the recent past adding to the range of techniques needed to be qualified for later space implementation. The applications are principally in the domain of laser cooled atom sensors including Cold Atom Interferometry (CAI), Optical Atomic Frequency Standards (OAFS) as well as the transfer of ultra-stable frequencies in fibre networks and eventually in free space.

Overview of the field of research proposed

The proposed field of research will cover technologies and the application of cold atom physics (CAP) for future project domains of ESA, which include Cold Atom Interferometry (CAI) and Optical Atomic Frequency Standards (OAFS). The technical application directorates in ESA are Earth Science (D-EOP), Fundamental Physics (D-SRE) and Science implementation (D-HSO).
The technical approaches and associated technologies for future missions in CAI and OAFS are currently focusing on laser cooled Rubidium (Rb) for Gradient Gradiometry (D-EOP) but the alternatives still being examined are Cesium (Cs), Potassium (K) and Strontium (Sr). The technical approaches for OAFS for ultra-stable optical frequency references are converging on the neutral Strontium confined in a laser generated optical lattice (Neutral Lattice), a technology with extremely high stability requirements. Significantly the Strontium based developments, world-wide, have the largest number of metrology and university laboratories contributing to its ongoing development and refinement.

In the selection for a specific atomic species many system studies have been conducted by ESA and some are still in progress. These studies and the associated technical development activities are the means for the Agency to best define the needs for its future missions across the application domains.

The current development basis in the applications for CAI and OAFS is the implementation of a laser cooled neutral atom for both systems.

The selection of an ESA Research Fellow (RF) is therefore proposed to work specifically on the development of a neutral atomic Strontium system for Science applications (Fundamental Physics) with support to other neutral atom system studies in the Agency.

Who can apply

The programme is open to suitably qualified women and men. Preference will be given to applications submitted by candidates within five years of receiving their PhD.

The Research Fellow Programme is open to nationals of the following states: Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and the UK, or Canada as a Cooperating State, Bulgaria, Estonia, Hungary, Latvia, Slovakia and Slovenia as European Cooperating States (ECS).

Required qualifications

Applicants must have recently completed their PhD studies in Experimental Physics with a particular emphasis in the application of Cold Atom Physics (CAP).

Applicants should have good analytical and communication skills and should be able to work in a multi-cultural environment in an autonomous manner.

Applicants must be fluent in English and/or French, the working languages of the Agency. A good proficiency in English is required.

How to Apply

Please fill in the online application form attaching to it, **in one document only,** your CV, your motivation letter and your research proposal.

Candidates must also arrange for up to **three letters of reference** to be sent by e-mail, before the deadline, to **temp.htr@esa.int**. The letters must be sent by the referees themselves. The candidate's name must be mentioned in the subject of the email.

Applications satisfying the general conditions for eligibility, to be submitted **by 6 May 2015**, will be evaluated and successful applicants will be invited for an interview.

Interested candidates are highly encouraged to visit the ESA website: www.esa.int.