

VACANCY NOTICE FOR A TRAINEESHIP

AREA OF ACTIVITY	THERMO-HYDRAULIC ANALYSIS OF HIGH HEAT FLUX COMPONENTS – FOCUS ON GYROTRON CAVITIES
REFERENCE	F4E/TRA/2016/019
START AND END DATE - DURATION	01/10/2016 – 30/06/2017 – 9 MONTHS
LOCATION	BARCELONA SPAIN
PUBLICATION DATE	02/05/2016
CLOSING DATE FOR APPLICATIONS	31/05/2016 AT 12:00 PM (BARCELONA TIME)

1. DESCRIPTION OF THE DEPARTMENT/PROJECT UNIT

The Neutral Beam and Electron Cyclotron (EC) Power Supplies and Sources (gyrotrons) Project Team prepares and manages the procurement of the Neutral Beam Injectors and the EC Power Supplies and Sources (gyrotrons) to be provided to ITER IO as EU in-kind contributions, and supports the IO in related activities as necessary. The scope includes the preparation and operation of the needed test facilities.

In particular, the Project Team is responsible for the delivery:

- A set of gyrotrons for a cumulative power of 6 MW;
- EC power supplies feeding 16 ITER 1MW Gyrotrons.

Successful delivery of these components will require the development of the following main prototypes and their testing in certain facilities:

- The development of the gyrotrons by means of full scale prototypes and tests performed in EU laboratories at CRPP, Lausanne (CH) and KIT, Karlsruhe (D).

2. DESCRIPTION OF TASKS

A gyrotron is an RF source which converts rotational kinetic energy of electrons streaming axially in a static magnetic field into microwave energy. Energy conversion takes place in a resonator (called cavity) which rests on the peak field of the Superconducting Magnet. The power of the e-beam which has not interacted inside the cavity of the gyrotron is collected into the gyrotron collector where it has to be dissipated.

The cavity is made of a Copper alloy that can withstand very high operating temperatures and thermal cycles without recrystallization. The heat load on the cavity can rise to >2kW/cm², therefore an efficient cooling technique is needed in order to maintain acceptable cavity wall temperature during tube operation. Similar requirements apply to the Gyrotron collector.

To sustain such a high load several design solutions for the cavity and collector cooling layout have been investigated. On this framework, F4E has developed in the past years a 3D CFD model of the Gyrotron Cavity and a 2D model of the Gyrotron Collector.

The trainee will be required to carry out the following tasks:

- F4E Consolidate the 3D CFD thermo-hydraulic model of the Gyrotron cavities
- Supports to the improvement studies of the Gyrotron cavity cooling (mock-ups, verification of models)
- Tuning of 2D thermal cavity model basing on the 3D CFD model and assessment of boundary conditions benchmarking with experiments.
- Benchmarking of the 2D CFD model of the Gyrotron collector and analysis of improvement concepts
- Support to CFD analyses of other ITER systems under F4E responsibilities (Vacuum Vessel, Cryostat)

3. ELIGIBILITY CONDITIONS

- Be a national of one of the Member States of the European Union or of a Third state fully associated with the Euratom fusion programme (Switzerland);
- The candidate must have finished his/her university degree at least 3 years attested by a diploma. The university degree must have been obtained within the last 3 years before the closing date for applications;
- In order for the trainee to fully profit from the traineeship and to be able to follow meetings and perform adequately, candidates must have good knowledge of English, the main working language of F4E.

Applications will not be accepted from candidates who:

- have already benefited from any kind of in-service training within a European institution or body, or
- who have had or have any kind of employment within a European institution or body.

4. QUALIFICATIONS REQUIRED

- University degree in engineering with relevant education in thermo-hydraulic (nuclear engineering, mechanical engineering or equivalent).
- Previous experience with software for analysis and modeling in fluid dynamics - CFD (Computational Fluid Dynamic), would be very advisable, preferably with STARCCM+.

5. WHAT WE OFFER

Trainees are awarded a monthly maintenance allowance. The monthly allowance for 2016 amounts to €1.087,39.

Additionally, trainees may receive a travel allowance, subject to budget availability, to compensate for travel expenses incurred from the place of residence to the seat of F4E and vice versa. Trainees whose place of recruitment is less than 50 km from F4E's offices shall not be entitled to a travel allowance.

Detailed information about the F4E traineeship procedure as well as trainees' rights and duties can be found in the Decision of the Director of 'Fusion for Energy' on the Acceptance of Traineeships published on our website. We strongly recommend applicants to read them carefully. Accommodation costs will be covered by the trainee.

6. SUBMISSION OF APPLICATIONS

The online application process starts upon clicking "**CLICK TO APPLY**" on the traineeships page: <http://www.fusionforenergy.europa.eu/careers/traineeships.aspx>.

Applicants must register their applications online through the F4E traineeship's tool by creating a valid F4E user account and choosing the vacancy notice they wish to apply to.

Please note that the online traineeship application tool is the only acceptable means of sending applications. Applicants are responsible for keeping their e-mail addresses and personal details up to date in their profile in F4E online application tool.

The mandatory fields in the profile marked with an asterisk should be duly filled in. Candidates are requested to submit the following 2 documents:

- A detailed Europass curriculum vitae in **English** (can be obtained at the following address: <http://europass.cedefop.europa.eu/en/documents/curriculum-vitae>)
- A motivation letter of 2 pages maximum in English

Applications must be sent by 31/05/2016 (closing time 12:00 pm Barcelona time).

In case you encounter technical problems when trying to submit your application via the traineeship application tool, please make a screenshot and send it to: traineeships@f4e.europa.eu.

It is the responsibility of the applicant to inform 'Fusion for Energy' about any technical problem without delay within the deadline mentioned above.

Please, do not send any supporting documents (i.e.: copies of your ID-card, educational certificates, etc.) **with your application at this stage if not specified in the Traineeships Notice.**