

# Job Title: Postdoctoral Researcher IO-PDR-6 & IO-PDR-10

Requisition ID **6541** - Posted - (France, 13067 St Paul Lez Durance Cedex) - **Science and Technology Expertise - New Posting**

The ITER Organization brings together people from all over the world to be part of a thrilling human adventure in southern France—building the ITER Tokamak. We require the best people in every domain.

We offer challenging full-time assignments in a wide range of areas and encourage applications from candidates with all levels of experience, from recent graduates to experienced professionals. Applications from under-represented ITER Members and from female candidates are strongly encouraged as the ITER Organization supports diversity and gender equality in the workplace.

Our working environment is truly multi-cultural, with 29 different nationalities represented among staff. The ITER Organization Code of Conduct gives guidance in matters of professional ethics to all staff and serves as a reference for the public with regards to the standards of conduct that third parties are entitled to expect when dealing with the ITER Organization.

The south of France is blessed with a very privileged living environment and a mild and sunny climate. The ITER Project is based in Saint Paul-lez-Durance, located between the southern Alps and the Mediterranean Sea—an area offering every conceivable sporting, leisure, and cultural opportunity.

To see why ITER is a great place to work, please look at this video

**Application deadline:** 28/08/2022

**Domain:** Engineering Domain

**Department:** Engineering Design Department

**Division:** Port Plugs & Diagnostics Division

**Section:** Ex-Vessel Diagnostics Section

**Group:** Not applicable

**Job Family:** Scientific Coordination

**Job Role:** Post Doc Researcher

**Job Grade:** P1

**Language requirements:** Fluent in English (written & spoken)

**Contract duration:** 2 years

**Two openings**

**Purpose**

As one of the two Postdoctoral Researchers for Neutronics Tasks for the ITER Diagnostics systems, you will either support the development of the neutron calibration technique for ITER Neutron Diagnostics (Position #1 Neutron calibration) or you will support the management of the nuclear dose rate for a larger set of ITER Diagnostics Systems (Position #2\_Dose rate management). For both positions, you will define and execute R&D in support of these objectives, including the involvement of external Research & Development (R&D) entities. You will also support the validation of the performance of the concerned diagnostic systems and their passage through the various developments stages and review gates until commissioning and operation.

## **Background**

*The aim of diagnostics is to provide the measurements necessary to control the plasma and first wall processes in operation to achieve the ITER goals and to gain the knowledge needed for future reactor design. The Port Plugs and Diagnostic Integration Division provides all the Diagnostics for ITER, along*

*with the engineering infrastructures and test systems to support these and guides them through design, manufacturing, installation and commissioning, always keeping efficient operation in view.*

*The two positions on offer are for postdoctoral researchers in the Ex-Vessel Diagnostic Section, coordinated in the Fusion Products Diagnostics cluster. The diagnostics of this cluster are used for measurements of the fusion power, the neutron yield, the spatial and spectral distribution of the neutrons, gammas and other fusion products and the activation level inside the Vacuum Vessel. One particular important aspect for these diagnostics is their calibration (Position #1). This cluster is also where neutronic expertise is concentrated which is needed to determine and improve the dose rate during operation and maintenance for all diagnostics systems (Position #2). This includes studies of diagnostics and associated support structures and of ways to reduce the dose rate through novel shielding measures.*

### **Key Duties, Scope, and Level of Accountability**

- Carries out original research under an agreed program in support of the development of neutronic tasks for ITER diagnostics systems;
- As appropriate, establishes collaborations with researchers working in related areas in the ITER Members;
- Publishes the results of research in appropriate conference proceedings and refereed journals;
- May be requested to be part of any of the project/construction teams and to perform other duties in support of the project;
- May be required to work outside ITER Organization reference working hours, including nights, weekends and public holidays.

#### **Specific duties for position #1 (Neutron calibration):**

- Monte-Carlo neutron transport simulations and analysis to support the planning and optimization of ITER's neutron diagnostics calibration campaign: particularly including configuration of irradiating points;
- Development, improvement and analysis (e.g., Green's function formalism) of synthetic measurement simulations for neutron diagnostics on ITER;
- Work on algorithms/software for tomographic reconstruction for the measurements of neutron emission, alpha source profiles, etc. Includes direct and inverse problem resolution, study of regularization techniques applicability, etc.
- Some supplementary tasks – especially supporting gate reviews of this system.

#### **Specific duties for position #2 (Dose rate management):**

- Calculation/analysis of the neutron / gamma fluxes and related spectra in the port plug and port cells areas;
- Calculation/analysis of the nuclear heating (neutron and gamma heat loads);
- The Shut Down Dose Rate (SDDR) analysis at the closure flange and port cell areas;
- Calculation/analysis of the alpha, beta and gammas emission spectrum for the various components within the port plug;
- Material sensitivity study to reveal their influence on neutron stopping capability, beta and gamma emission spectra from the material some supplementary tasks – up to Reliability, Availability, Maintainability & Inspectability (RAMI) justifications and any others.
- Some supplementary tasks – especially supporting gate reviews of concerned system.

### **Measure of Effectiveness**

- Contributes effectively to progress in the area of fusion science or technology defined by the agreed research or engineering program;
- Supports team activities efficiently in the relevant area of the ITER Project;
- Produces accurate and innovative studies within the defined timeline, writing reports and giving presentation on these researches or cases.
- Interacts efficiently with all ITER Organization stakeholders, industrial partners and other experts;
- Generates clear publication-quality material for conferences and journals.

## Experience & Profile

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- **Professional Experience:**
  - Minimum 3 years' experience in neutronics, modelling and analysis in line with the specific duties.
- **Education:**
  - PhD or equivalent in Physics or Engineering, or other relevant discipline;
  - The required education degree may be substituted by extensive professional experience involving similar work responsibilities and/or additional training certificates in relevant domains.
- **Language requirements:**
  - Fluent in English (written and spoken).
- **Technical competencies and demonstrated experience in:**
  - Neutron calibration or Calculation/analysis of the neutron / gamma fluxes with tools such as the Monte Carlo N-Transport Code (MCNP);
  - Demonstrating 'out of the box' thinking and ability to adapt easily;
  - Producing clear technical documentation and publishing or presenting technical and/or scientific reports on specific topics;
  - Proficient in MS office software;
  - Using computational methods to perform physics and data analysis (e.g. with FORTRAN, MATLAB, Python etc.) would be an advantage;
  - Problem Solving: Assessing problems, identifying root causes and reaching practical solution.
- **Behavioral competencies:**
  - Collaborate: Ability to conduct dialogues with a wide variety of actors and stakeholders;
  - Communicate: Ability to adjust communication content and style to deliver messages to work effectively in a multi-cultural environment;
  - Drive results: Ability to persist in the face of challenges to meet deadlines with high standards;
  - Manage Complexity: Ability to gather multiple and diverse sources of information to understand problems accurately before moving to proposals;
  - Ethical values to instill trust: Ability to apply high standards of team mindset, trust, excellence, loyalty and integrity and to adapt to cultural diversity.

## Others Necessary qualifications

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- The applicant must have received their PhD since 1 January 2019, or must receive their PhD prior to the deadline for beginning the Fellowship at the ITER Organization.
  - The e-Recruitment system will require you to:
    - 1) Fill-in an online application file;
    - 2) Upload your Curriculum Vitae (including a list of your publications and photocopies of your highest academic qualification) merged in one unique PDF document;
    - 3) Upload a letter of motivation (limited to 1 page) merged with at least two letters of recommendation into one unique PDF document.
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## *The following important information shall apply to all jobs at ITER Organization:*

- Maintains a strong commitment to the implementation and perpetuation of the ITER Safety Program, ITER Values (Trust; Loyalty; Integrity; Excellence; Team mind set; Diversity and Inclusiveness) and Code of Conduct;
- ITER Core technical competencies of 1) Nuclear Safety, environment, radioprotection and pressured equipment 2) Occupational Health, safety & security 3) Quality assurance processes. Knowledge of these competencies may be acquired through on-board training at basic understanding level for all ITER staff members;

- Implements the technical control of the Protection Important Activities, as well as their propagation to the entire supply chain;
- May be requested to work on beryllium-containing components. In this case, you will be required to follow the established ITER Beryllium Management Program for working safely with beryllium. Training and support will be provided by the ITER Organization;
- May be requested to be part of any of the project/construction teams and to perform other duties in support of the project;
- Informs the IO Director-General, Domain Head, or Department/Office Head of any important and urgent issues that cannot be handled by line management and that may jeopardize the achievement of the Project's objectives.