



FICHE DESCRIPTIVE DE POSTE CDI / CDD

Artitrage Plan Emploi du
 Fiche établie le
 Priorité

Etablissement	Pôle/Direction	Département	Service	Labo
Cadarache	DRF	IRFM	SPPF	GC3I

Nom/prénom du demandeur Téléphone Mail

LIBELLE DU POSTE **N° POEM**

Type d'annonce	<input type="text" value="Recrutement"/>	Segment	<input type="text"/>
Type de contrat	<input type="text" value="CDD ATA"/>	Domaine	<input type="text" value="Mathématiques, information scientifique, logiciel"/>
Si CDD durée	<input type="text" value="18"/>	Projet	<input type="text"/>
Statut du poste	<input type="text" value="Cadre"/>	EOTP/Centre de coûts	<input type="text"/>
Motif	<input type="text" value="Création de poste"/>	Code d'exposition	<input type="text"/>
Nom du salarié remplacé	<input type="text"/>	Métier	<input type="text"/>
Disponibilité du poste	<input type="text" value="01/07/2024"/>	Emploi	<input type="text"/>

DESCRIPTION DU DEPARTEMENT 600 caractères max

The Institut de Recherche sur la Fusion par Confinement Magnétique (IRFM) is part of the Fundamental Research Department (DRF) of the CEA. For over 50 years, its role has been to conduct research on a new energy source: magnetic confinement fusion, in collaboration with the European Fusion program. The activities of the IRFM are structured around three axes of research and development:

- Contributing to the realization of the ITER project and those of the Expanded Approach (mainly the JT-60SA tokamak),
- Preparing the scientific operation of ITER.

DESCRIPTION DE L'UNITE SERVICE/LABO 1500 caractères max

The activities of the GC3I are organized into three main themes:

- Administration of local IT infrastructure (network, service servers, computing servers, and databases),
- Management and monitoring of IT projects (application and system development),
- HPC/AI (exascale code optimization, development of AI models dedicated to fusion).

The group consists of about ten people who collaborate on these closely related themes. The HPC activities of the group are mainly focused on providing high-level support to first-principles code developers (Gysela, JOREK, Soledge3X) regarding development, code porting to new architectures, and code optimization, with the aim of efficiently performing simulations on exascale supercomputers.

DESCRIPTION DU POSTE 2500 caractères max

Précisez les compétences techniques essentielles

You will be in charge of redesigning the parallelisation of a code [Fubiani G 2017 New J. Phys. 19 015002] which simulates the main physical mechanisms of low temperature magnetized plasmas dedicated to negative ion sources of neutral beam heating systems of fusion reactors. The objective of this numerical model is to obtain a qualitative and quantitative understanding of plasma transport and plasma chemistry (hydrogen or deuterium) in the magnetic confinement of the source, the conversion of the plasma dominated by the positive ions into an electronegative plasma leading to the production of negative ions (H- or D-), the in-depth study of the plasma-beam interface (magnetic plasma sheath) which requires a high grid resolution, primary cause of ionic optical aberrations downstream in the acceleration channel

The code is based on the PIC approach, combining a particle representation of the plasma and a 3D Poisson solver in Cartesian geometry. It is written in Fortran 90 and currently only parallelised in OpenMP. An iterative method simulates the electric potential and densities of each species composing the plasma (electrons and ions) for each time step increment. These simulations require the use of supercomputers and it is therefore essential to upgrade the parallelisation of the code so that it can run on massively parallel scalar and/or accelerated architectures.

The actions associated with this position over the duration of the position are:

- establishing the MPI+OpenMP parallelization strategy,
- validation of the results,
- study of the code performance on massively parallel architectures (strong scaling, weak scaling, ...),
- optimisation the code for efficient use of supercomputers,
- development of post-processing and monitoring tools,
- extension the code to GPU using OpenMP offloading (OpenMP target).

You have a degree equivalent to at least a Master's degree or equivalent (BAC+5) in scientific computing and some experience in development for a parallel simulation code. You have skills and experience with Fortran and Python as well as parallelisation using MPI and OpenMP. Knowledge of GPU programming and/or plasma physics is a plus.

CONTEXTE (Motifs et enjeux du poste)

500 caractères max

Interlocuteurs en interface - Points de force et de faiblesse de l'équipe en place - Difficultés du poste - Points valorisants du poste

You will work in an international research environment in close collaboration with experts in the fields of fusion plasma physics, high-performance computing, and artificial intelligence. You will be required to present your work within the institute and potentially at conferences in your field of expertise.

You will benefit from 100 days of compensated telecommuting per year.

PROFIL DU CANDIDAT

Formation initiale	<input type="text" value="Bac+5"/>
Diplôme requis	<input type="text" value="Master 2"/>
Spécialité du diplôme	<input type="text" value="Calcul scientifique/ Mathématiques appliquées"/>
Expérience	<input type="text" value="1 à 2 ans"/>
Compétences techniques et/ou spécifiques	<input type="text" value="Fortran, python, shell, MPI, OpenMP, OpenACC"/>
Outils utilisés	<input type="text" value="Systèmes UNIX"/>
Langue	<input type="text" value="Anglais"/>
Niveau de langue requis	<input type="text" value="Courant"/>

ELEMENTS SPECIFIQUES DU POSTE

Travail en poste	<input type="text" value="oui"/>	si oui, précisez quel type de poste	<input type="text"/>
Astreintes	<input type="text" value="non"/>		
Permanences	<input type="text" value="non"/>		
Primes de sujétion	<input type="text" value="non"/>		
NIG	<input type="text" value="non"/>		

QUALITES COMPORTEMENTALES REQUISES

Qualités	Définition
Autonomie	Capacité à prendre en charge et à assurer seul la réalisation des actions définies dans la fonction occupée.
Adaptabilité (capacité d'adaptation)	#N/A

Esprit d'analyse (Curiosité,Ouverture, Esprit critique,Capacité d'anticipation)	Capacité à comprendre les éléments d'une situation et à émettre des points de vue constructifs et pertinents pour améliorer le fonctionnement.
Esprit d'équipe	Capacité à travailler en équipe en privilégiant l'intérêt collectif.
Réactivité	Capacité à répondre rapidement et efficacement face à des situations imprévues. Capacité à respecter les délais impartis au quotidien.