



Offre n°2025-08817

PhD Position F/M Artificial intelligence and non-smooth mechanics for bridging scales in natural gravitational hazards

Le descriptif de l'offre ci-dessous est en Anglais

Type de contrat : CDD

Niveau de diplôme exigé : Bac + 5 ou équivalent

Fonction : Doctorant

A propos du centre ou de la direction fonctionnelle

The Inria Grenoble research center groups together almost 600 people in 24 research teams and 7 research support departments.

Staff is present on three campuses in Grenoble, in close collaboration with other research and higher education institutions (University Grenoble Alpes, CNRS, CEA, INRAE, ...), but also with key economic players in the area.

Inria Grenoble is active in the fields of high-performance computing, verification and embedded systems, modeling of the environment at multiple levels, and data science and artificial intelligence. The center is a top-level scientific institute with an extensive network of international collaborations in Europe and the rest of the world.

Contexte et atouts du poste

The successful candidate will conduct interdisciplinary research bridging applied mathematics, mechanics, and granular physics at INRIA-TRIPOP and INRAE-ECRINS. The project addresses challenging problems in Granular Physics and Artificial Intelligence to better understand, model, and predict the dynamics of

natural gravitational hazards, providing extensive opportunities for academic and industrial career development. The appointment is part of a pending research grant.

TRIPOP (Inria Grenoble Rhône-Alpes, Laboratoire Jean Kuntzmann) team specialises in modelling, simulation, control of non-smooth dynamical systems, and data-driven modelling of complex materials.

ECRINS (INRAE, IGE) team specialises in gravity-driven natural hazards, aiming to improve understanding, prediction, and management of landslides, rockfalls, snow avalanches, and debris flows through integrated research approaches.

Supervisory team:

- Vincent Acary (INRIA-TRIPOP) vincent.acary@inria.fr
- Thierry Faug (INRAE-ECRINS) thierry.faug@inrae.fr
- Filippo Masi (INRIA-TRIPOP) filippo.masi@inria.fr
- Franck Bourrier (INRAE-ECRINS, INRIA-TRIPOP) franck.bourrier@inrae.fr

Mission confiée

Climate change intensifies gravitational hazards with increasing threats to safety and infrastructures. Traditional modelling approaches, relying on phenomenological parameterisations of the state space determined through human trial-and-error adjustments, fail to fully capture the complex, non-smooth, and multiscale rheology of granular systems. The project seeks to develop advanced physics- and data-driven models that accurately represent granular flows and their non-smooth dynamics, aided by high-fidelity simulations and available experimental datasets.

For more details, contact: filippo.masi@inria.fr

Principales activités

As a PhD researcher, you will explore and develop Artificial Intelligence methods aimed at robust and high-fidelity modelling of granular systems and flows. You will focus on developing first-principled, data-driven models and advanced numerical simulations to enhance predictive accuracy.

The interdisciplinary research will integrate AI with physics and mechanics to advance scientific understanding of gravitational natural hazards and rheology. Outcomes will contribute to advancements with impact in the scientific community and the industry.

The appointment is for a duration of three years. The successful candidate will join the TRIPOP and ECRINS research groups within Inria and INRAE-IGE. Both groups provide an engaging, collaborative research environment with access to state-of-the-art computing resources, field and laboratory facilities, and numerous

opportunities for professional development.

The position also includes opportunities to engage in academic activities, such as supervising Master's and undergraduate students.

Compétences

Successful candidates should demonstrate strong scientific capabilities and high motivation. Fluency in spoken and written English is mandatory. The candidates will carry out research, develop tools, and write scientific articles in close collaboration with the supervisory team and the members of TRIPOP and ECRINS.

The candidate is expected to have:

- Background in Applied Mathematics or completed related coursework.
- Proficiency in programming (e.g., Python, C++).
- Knowledge of Machine Learning.

Highly appreciated qualifications include:

- Background in dynamics, mechanics, geomechanics, or geophysics.
- Passion for software development in computational mechanics.
- Teamwork and collaboration skills.

Avantages

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking (90 days / year) and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Complementary health insurance under conditions

Rémunération

2 200 euros gross salary /month

Informations générales

- **Thème/Domaine** : Optimisation, apprentissage et méthodes statistiques
- **Ville** : Montbonnot
- **Centre Inria** : [Centre Inria de l'Université Grenoble Alpes](#)
- **Date de prise de fonction souhaitée** : 2025-09-01
- **Durée de contrat** : 3 ans
- **Date limite pour postuler** : 2025-05-18

Contacts

- **Équipe Inria** : [TRIPOP](#)
- **Directeur de thèse** :
Masi Filippo / filippo.masi@inria.fr

A propos d'Inria

Inria est l'institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 215 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3900 scientifiques pour relever les défis du numérique, souvent à l'interface d'autres disciplines. L'institut fait appel à de nombreux talents dans plus d'une quarantaine de métiers différents. 900 personnels d'appui à la recherche et à l'innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 200 start-up. L'institut s'efforce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l'économie.

L'essentiel pour réussir

Highly motivated and suitable candidates should submit their application, containing a CV, a cover letter detailing interests and qualifications related to the position, an academic track record, and contact details of two reference professors. Selection will be based on the quality of the CV and motivation letter.

Attention: Les candidatures doivent être déposées en ligne sur le site Inria. Le traitement des candidatures adressées par d'autres canaux n'est pas garanti.

Consignes pour postuler

Applications must be submitted online on the Inria website.

Processing of applications sent by other channels is not guaranteed.

Sécurité défense :

Ce poste est susceptible d'être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L'autorisation d'accès à une zone est délivrée par le chef d'établissement, après avis ministériel favorable, tel que défini dans l'arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l'annulation du recrutement.

Politique de recrutement :

Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.