

## POST-DOCTORAL POSITION (26 months)

### Muscle-tendon biomechanics and muscle coordination to optimize sprint running performance

LAB MOVEMENT, INTERACTIONS, PERFORMANCE  
(EA 4334, UNIVERSITE DE NANTES, FRANCE)

#### ➤ [Context](#)

The post-doctoral position will be a 1-year contract (renewable for 14 months). The scientific work will mainly take place at the University of Nantes, in collaboration with the French Institute for Sports (INSEP) located in Paris. The candidate will also have funded missions to the different training locations of the elite track and field, rugby, and ice sports athletes involved in the project.

Université de Nantes comprises approximately 38,000 students (10% are foreign students) enrolled each year, with one doctoral college composed of 8 post-graduate schools and 3,200 research staff working in 54 accredited units. Research is a major growth sector. As an innovative force, the University has research agreements with industry and shares its discoveries with society at large. Université de Nantes is a multidisciplinary university and offers programs in most fields of knowledge and academic paths giving access to the majority of degrees in higher education, in short or long programs (Life sciences, Health and Medical Technology). The Lab “Movement, Interactions, Performance”, headed by Prof François HUG, is based in the sport sciences faculty. It aims to better understand human motion from muscle force production to coordination between muscles.

#### ➤ [The global project: FULGUR](#)

This postdoctoral position is part of the FULGUR project led by Gaël GUILHEM (Laboratory Sport Expertise and Performance, INSEP), supported by the national research agency program “Programme Prioritaire de Recherche Très Haute Performance Sportive” (Grant for research applied to very high performance in sports), within the framework of the Olympic/Paralympic Games that will take place in Paris in 2024. It is anticipated that the results of the project will have direct applications for performance optimization in 2024.

FULGUR is a multi-disciplinary program on high performance in explosive sports that include 9 research centers, 3 sports federations (Athletics, ice sports of bobsleigh and rugby) and 2 companies, with three main objectives:

- Describe the running sprint and main training exercises mechanics of elite athletes in the three sports (segments and centre of mass), in order to better quantify the training load (WP 1)
- Determine the individual musculoskeletal profile of athletes in order to propose individualized training program (WP 2)
- Evaluate the injury risk and propose some prevention solutions based on mechanical analyses. This will be possible using a multi-factorial approach (physiological, biomechanical and psychological approach) (WP 3).

A research engineer will be recruited for the coordination of the project and the transfer for the athletes and coach.

#### ➤ [Work Package 2 \(WP2\) of the FULGUR project](#)

The WP2 is led by Antoine NORDEZ (Full Professor at the Université de Nantes, France) and Giuseppe RABITA (Researcher at the INSEP, Paris). The post-doctoral researcher will be based in Nantes and supervised by Antoine NORDEZ. Another post-doctoral fellow will be recruited latter in the WP 2 at the INSEP (Paris, France). WP2 aims to determine the neuromusculo-skeletal profile of top-level athletes in order to design tailor-made training programs to improve their sprint performance, with 3 sub-objectives:

- To investigate the relationships between muscle-tendon properties / musculo-articular geometry and determinants of sprint propulsion performance (e.g., sprint acceleration, effectiveness of the force application)
- To investigate the relationships between muscle coordination and determinants of sprint propulsion performance
- To determine the effects of a tailored-training program on muscle and sprint performance

All these objectives will concern running sprint capability in track and field, rugby, and ice sports (mainly bobsleigh) French top-level athletes. The scientific team involved in the WP 2 is composed of: Sylvain DOREL (Univ Nantes), Gaël GUILHEM (INSEP), François HUG (Univ Nantes), Lilian LACOURPAILLE (Univ Nantes), Antoine NORDEZ (Univ Nantes) and Giuseppe RABITA (INSEP).

➤ Primary responsibilities

- Contribute to develop research protocols and draft applications to the ethical committee
- Contribute to, and lead data collection / data analysis
- Contribute to research outputs through peer-reviewed publications and conference materials
- Contribute to supervision of undergraduate and graduate students
- Develop lasting and sustainable relationships with sport federation staff members and athletes, which is key to the FULGUR project
- Create tools for transfer of practical knowledge to coaches (e.g., graphical interfaces providing visual feedback of running biomechanics, reports for evaluations...)
- Interact effectively with the research engineer for an efficient coordination of the project (schedules, feeding of living databases, ethics committee, meetings with staffs)

Depending on the skills of the recruited post-doc, the topic of the experiments can be either on musculo-skeletal modeling, muscle-tendon morphology/biomechanics and/or muscle coordination in relation with sprint performance.

➤ Selection criteria

- A PhD in biomechanics, sport sciences, human movement sciences, physiotherapy with a track record in the field of biomechanics and human performance as evidenced by publications in peer-reviewed journals
- High expertise in the non-invasive exploration of human movement applied to sport performance (e.g., ergometers, motion analysis, ultrasound, MRI, EMG...), especially applied to running/sprinting
- High-level skills in data processing and programming (e.g., Matlab)
- Ability and willingness to interact with sport federation staff members and athletes
- Excellent oral and written English language skills, skills in French would be an added-value but are not mandatory

➤ Position start May/June 2020

➤ Net salary ~2200€ / month (i.e., ~ the starting salary of an associate professor in France)

➤ Contact

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*Send applications with a motivation letter and a full CV to [antoine.nordez@univ-nantes.fr](mailto:antoine.nordez@univ-nantes.fr)*

*Application deadline : 15<sup>th</sup> of March 2020. Considering the close starting date, it is recommended to apply as soon as possible*