UNIVERSITÉ CÔTE D'AZUR

univ-cotedazur.fr

POST DOC (H/F)
12 months - Full time 100 %

Description of the employer

Université Côte d'Azur is a major public institution of a scientific, cultural and professional nature, whose fundamental missions are to provide training for students and professionals, top-level research and innovation for the benefit of all. Since 1 January 2020, this experimental public institution has aimed to develop a 21st-century model for French universities, based on new interactions between disciplines (multidisciplinarity and transdisciplinarity), with a desire for a collective dynamic combining Training-Research-Innovation, as well as solid local, national and international partnerships with the public and private sectors.

Université Côte d'Azur has been a winner of the Initiative d'Excellence (IDEX) since 2016, with 'UCA Jedi', the 3IA project (interdisciplinary institute for artificial intelligence) in 2019, and a project for university research schools (EUR). The university is committed to a trajectory of transformation and excellence, which aims to give it the status of a major research-intensive university that is both rooted in its region and internationally oriented. Université Côte d'Azur directly employs more than 3,000 staff and welcomes more than 30,000 students every year.

Université Côte d'Azur is made up of a number of different sites, mainly in Nice, Sophia Antipolis and Cannes, but also widely spread between La Seyne-sur-Mer and Menton. It benefits from a privileged geographical location between the sea and the mountains, offering a pleasant living environment for its staff and students. Its location at the heart of Europe, combined with easy access to Nice Côte d'Azur International Airport, makes it a gateway to the academic and scientific world.

Knowing more on « Travailler à Université Côte d'Azur »

Description of the job

Bone remodelling is a fundamental physiological process that maintains skeletal integrity by balancing bone resorption and formation. This complex mechanism is regulated by mechanical loading, cellular signaling, and microdamage accumulation, all of which influence the structural and functional adaptation of bone. A deeper understanding of these interactions is critical for advancing medical applications such as fracture prevention, prosthetic design, and the treatment of bone-related diseases like osteoporosis.
Bone is a dynamic tissue that undergoes continuous renewal through the coordinated actions of osteoclasts (bone-resorbing cells) and osteoblasts (bone-forming cells). This remodeling process is crucial not only for repairing microdamage caused by mechanical stress but also for adapting the bone structure to changing mechanical demands. When this balance is disrupted, conditions such as osteoporosis and stress fractures can develop, highlighting the importance of accurately modelling these processes.
Mechanical loading plays a key role in regulating bone remodeling. The mechanostat theory suggests that bone adapts its mass and architecture in response to mechanical stimuli, reinforcing regions experiencing high stress while resorbing bone in low-stress areas. However, excessive or repetitive loading can lead to microdamage accumulation, potentially initiating remodeling responses that alter bone strength over time.
The goal of this postdoctoral research is to develop an advanced finite element model of bone remodelling that integrates microdamage effects at the macroscale. The model will build upon previous computational frameworks and will aim to capture:

- The influence of microdamage accumulation on bone adaptation.
- Multi-scale interactions between cellular-level processes and macroscopic mechanical properties.
- The impact of various biological and mechanical parameters on bone remodelling dynamics.

Principal activities

The candidate will be responsible for developing the mathematical model for bone remodelling and will promote the scientific results through scientific publications in high-impact international journals and conferences.
The candidate will work under the supervision of Pr Rachele Allena at the Jean Alexandre Dieudonné Laboratory of the Université Côte d'Azur on the Valrose Campus in Nice (28, Avenue Valrose 06100 Nice, France) and Pr Ivan Giorgio from Università dell'Aquila (Italy).
UniCA offers excellent teaching, cutting-edge fundamental research and the direct transfer of new knowledge to society. More than 30,000 students from over 100 countries find our university a place that encourages independent thinking and an environment that inspires excellence. In 2016, Université Côte d'Azur was awarded the prestigious Initiative d'Excellence (Idex) label. This distinction, awarded by an international jury, places the university in the top 10 of research-intensive universities in France and marks the recognition of a university capable of positioning itself in the global competitive game. As a founding member of the Ulysse European alliance, as the holder of one of the four Interdisciplinary Institutes for Artificial Intelligence (3IA) in France, and with strong partnerships with major national research players, Université Côte d'Azur aims to rank among Europe's top universities and to consolidate its international dimension.

Profile

We are seeking a highly motivated candidate with the following qualifications:

- PhD in Applied Mathematics, Biomechanics, Mechanical Engineering, or a related field.
- Strong background in finite element modelling and computational mechanics.
- Familiarity with bone biology and biomechanics is desirable but not mandatory.
- Ability to work collaboratively in an interdisciplinary research environment.

Job location

Valrose Campus in Nice.
Possible remote work.

Additional information:

Interested candidates should submit the following documents:

- A cover letter detailing research interests and relevant experience.
- A CV, including a list of publications.
- Contact details of two references.

Please send your application to Rachele.allena@univ-cotedazur.fr with the subject line "Postdoc Application – Computational Modelling of Bone Remodelling."
For further inquiries, feel free to contact Rachele Allena at Rachele.allena@univ-cotedazur.fr.

All our positions are open to people with disabilities.

Find out about all our recruitment opportunities on our web portal Travailler à Université Côte d'Azur