
EU Marie Skłodowska-Curie PhD Position in Biomechanics of the buttocks tissues - Project STINTS ("Skin Tissue Integrity under Shear")

- **ORGANISATION/COMPANY**

University Grenoble Alpes / Arts et Metiers ParisTech

- **RESEARCH FIELD**

Biology › Biomechanics

Materials science › mechanical properties and medical imaging

Engineering › Materials engineering

- **RESEARCHER PROFILE**

First Stage Researcher (R1)

- **APPLICATION DEADLINE**

March 4th 2019

- **STARTING DATE**

June 3rd 2019

- **LOCATION**

France › Grenoble (2 years) and Paris (7 months)

- **TYPE OF CONTRACT**

Temporary

- **JOB STATUS**

Full-time

- **HOURS PER WEEK**

37.5

- **EU RESEARCH FRAMEWORK PROGRAMME**

H2020 / Marie Skłodowska-Curie Actions

- **MARIE CURIE GRANT AGREEMENT NUMBER**

811965

Offer Description

Title: *Mixed experimental and numerical approach for the personalized simulation of the poro-elastic response of pelvic soft tissues during the interaction with support surfaces (wheelchair cushions and mattresses).*

Applications are invited for an Early Stage Researcher (ESR) of **EU Marie Skłodowska-Curie Actions (MSCA)** to be hosted in the TIMC-IMAG research Laboratory of **Univ. Grenoble Alpes in France** including a 7-month period spent at the Arts et Metiers ParisTech (Paris). The position is for a fixed-term of 3 years starting in June 2019 and the successful applicant is expected to register for **PhD at the University of Grenoble Alpes**. This is one of the cohort of 13 ESRs of **STINTS** (<http://www.stints.eu>), an EU Innovative Training Network of MSCA participated by 6 leading European universities, 2 global industrial companies and 8 associated industrial partners. The main aim of STINTS is to develop new scientific insight into the complex biomechanical, biophysical and biochemical pathways affecting skin integrity and barrier function, following the exposure of the skin to prolonged pressure and shear forces that ultimately results in damage at the cellular level, e.g. pressure ulcers. This is critical since the prevention and treatment for patients with PUs is costly, with an estimated annual spend of health services across Europe ranging between €1.9–2.9 billion pa., increasing even more with an aging population.

This job opening is for a 3-year research position located mainly at the **University Grenoble Alpes**, France with secondments of a 7 months period spent at Arts et Metiers ParisTech, France, and visits (some weeks) to other organisations in the consortium (Eindhoven University of Technology & Tel Aviv University). It involves a 3-year PhD doctoral program, resulting in a PhD degree awarded by University Grenoble Alpes. The work should lead to the definition of a mixed experimental and numerical approach for the personalized simulation of the poro-elastic response of pelvic soft tissues during the interaction with support surfaces (wheelchair cushions and mattresses).

Job Description:

- perform novel research under the supervision of academic members of staff and an industrial advisor in the biomechanical modeling of the human skin and subdermal soft tissues in the buttock region, and in the interaction of this model with external support surfaces.
- Develop a theoretical model to investigate the temporal evolution of the biomechanical response of soft tissues under a prolonged constant mechanical loading using bi-phasic poro-elasticity
- Adapt an existing disposable system for in-vivo mechanical characterization of soft based on volume measurement developed at TIMC for measuring temporal evolution of volume and pressure during overpressure loading and underpressure loading
- Investigate the possibility of using Ultrasound Shear Wave Elastography and indentation for the personalization of the mechanical behavior of buttock soft tissues
- Thanks to embedded measurements of the pressures at the skin / external support interface, compute subject-specific finite element simulations of soft tissues deformations in order to understand the risks for any deep tissue injury.
- In interaction with one of the industrial partner (www.taxisense.com) contribute to the development of products and care procedures to minimize the occurrence of pressure ulcers.
- participate in the activities of the STINTS programme: attending training workshops, collaborating with network partners, and undertaking periodic secondments at STINTS partner organisations
- produce written outputs as required during their PhD studies and to contribute to engagement and dissemination activities of STINTS
- present regular progress reports as required by the STINTS program of research

University Grenoble Alpes: With around 80 laboratories which host 3700 PhD students, the University Grenoble Alpes (UGA) of Grenoble has developed top level research and is involved in significant collaboration between national research organizations and large instrument organizations situated in the Grenoble area. Grenoble is ranked as the 5th most Inventive city in the world by Forbes (<http://www.forbes.com/pictures/efee45jeje/5-grenoble-france/>) and amongst the top three in Europe by the European iCapital contest (http://europa.eu/rapid/press-release_IP-14-183_en.htm?locale=en). It is at the forefront of pedagogical innovations with MOOCs and shared interdisciplinary modules in critical thinking. Student Life is rated in the top 3 in France.

TIMC-IMAG laboratory (CAMI team: Computer Assisted Medical Intervention) is a 280 people Joint Research Unit (UGA and CNRS) on the Grenoble University Hospital site. The CAMI team includes researchers and students from diverse backgrounds (applied mathematics, computer science, biomechanics, robotics, instrumentation, and medicine). Its ultimate objective is clinical: assist the physician or surgeon in the successful execution of diagnostic or therapeutic interventions by minimizing invasiveness whilst improving accuracy. This objective results in interdisciplinary research, technological development, clinical evaluation and industrial dissemination. Sensitive early on to industrial transfer, the CAMI team has also been motor in the creation of 15 start-up companies in the field. Hundreds of thousands of patients have benefited from technologies developed by this team.

Founded in 1780, **Arts et Métiers ParisTech** is one of France's oldest and best engineering schools specializing in mechanical, industrial and energy engineering. Arts et Métiers is a founding member of the French Alliance for Industry of the Future and a key player in accompanying French and European industry through its high level academic programs and its cutting edge research activities in the major fields of Industry 4.0, mainly corobotics, advanced manufacturing systems, production systems, virtual & augmented reality. In 2018, 17 French Institutes appear in the [Global University Employability Ranking](#), of which Arts et Métiers is ranked 5th for all French Universities and 6th for French Engineering Institutes. The **Institut de Biomecanique Humaine Georges Charpak** (IBHGC) of the Ecole Nationale Supérieure des Arts et Metiers (ENSAM) is a research organization located in Paris in which researchers with various scientific profiles such as mechanical engineering, orthopaedic surgeons, imaging specialists, functional rehabilitation physicians are involved. This plurality of skills enables the Institute to conduct relevant and recognized research in the fields of biomechanics, health, safety, sport and disability. The scientific approach, centered on musculoskeletal modelling, gives the institute an original and strong historical positioning at the national level. The IBHGC possesses a first-class technology platform of 1,000 m², favouring the deployment of research, teaching and development activities through a strong industrial partnership. The Institute recently proposed a new methodology for the fast geometric and mechanical modelling and showcased the feasibility of 2D B-mode US imaging for the quantification of internal soft-tissue finite strains of buttock tissues in two perpendicular planes during realistic sitting.

Skills/Qualifications

Personal requirements:

- Master's degree in Mechanical Engineering, Bioengineering, Computer Science or Materials Science or a closely related discipline
- Ability to work in a laboratory environment, interest for experimental research with the determination to understand the underlying physical fundamentals
- Excellent analysis skills and an analytical mind-set, as well as excellent oral and written communication skills
- Ability to work independently and as a member of a research team
- Ability to engage with interdisciplinary studies and technological areas
- Entry requirements include **English language requirements** being IELTS Academic 6.5 overall with 6.0 in each band or equivalent.

Benefits

All benefits of Marie Skłodowska-Curie Early Stage Researchers will apply, including generous salary, mobility allowance and family allowance.

The 13 ESRs in the STINTS project will attend training courses in the various scientific aspects of the project and also professional skills. Effective collaboration between the ESRs will be critical to the success of the project.

Eligibility criteria

Eligibility: Applicants must satisfy the eligibility requirements for an ESR under the Horizon 2020 ITN Programme; in particular, they should be eligible to be appointed as an ESR in France by satisfying the following criteria:

- to have less than four years research experience after Undergraduate/Masters graduation (this is cumulative research experience and does not include management/industrial or other work experience)
- to not hold a PhD degree (PhD candidates under 4 years of registration and before completion may apply)
- to have resided or carried out their main activity in France for less than 12 months (cumulative) in the three years prior to their recruitment.

Selection process

The following application documents are required:

- Cover letter
- Curriculum vitae and a list of publications
- Academic transcripts, Duplicate of the Master's diploma
- The names, complete contact information and recommendation letter of two referees

The documents should be sent to Professor Payan (Yohan.Payan@univ-grenoble-alpes.fr), Dr Connesson (nathanael.connesson@univ-grenoble-alpes.fr) and Dr Rohan (Pierre-Yves.Rohan@ensam.eu)

Additional comments

Candidates from minorities underrepresented in science are strongly encouraged.

Research Fields: Biomechanics / Materials engineering / Engineering

Career Stage: Early Stage Researcher or 0-4 yrs. (Post graduate)

Contact for additional details: Informal enquiries are encouraged and should be directed to:

Professor Yohan Payan (Yohan.Payan@univ-grenoble-alpes.fr) - <https://www-timc.imag.fr/en/yohan-payan>

Dr Nathanael Connesson (nathanael.connesson@univ-grenoble-alpes.fr) - <https://www-timc.imag.fr/nathanael-connesson>

Dr Pierre-Yves Rohan (Pierre-Yves.Rohan@ensam.eu) - <https://sites.google.com/site/cpyrohan/research>

Dr. Marek Bucki (marek.bucki@taxisense.com) - <http://www.taxisense.com>

Work location:

University Grenoble Alpes - TIMC-IMAG Laboratory
Pavillon Taillefer – Faculty of Medicine
38700 La Tronche - France

Arts et Metiers ParisTech (7 months)
Institut de Biomécanique Humaine Georges Charpak
151 bd de l'Hôpital 75013 Paris - France