Post-Doctoral Position
«Develop and use the new "radioSphere" technique for fast 3D positioning of spherical particles with x-ray radiography»

Project summary

Recent work from Andò, Marks and Roux (https://doi.org/10.1088/1361-6501/abfbfe) presents a novel method for 3D positioning of solid spherical particles with a divergent x-ray beam, with a very simple validation experiment. The software developed is already online.

This post-doc has two equally important aspects:

1. Development of the current scientific software technique, by creating stringent tests within a Continuous Integration (CI) framework, making the analysis much more robust and automatic, and developing new ideas, such as attenuation self-calibration, handling of multiple sources and detectors, different-sized spheres and even non-spherical particles. The aim at the end of the post-doc is that this software is usable by other research groups in the tec21 perimeter as well as around the world.

2. Experimental work: A number of simple particle tracking "demonstrator" experiments will be developed with the co-PIs of this project, which are of scientific value to the different groups, but also key to putting the technique through its paces. The projects are as follows:

- Fluidisation of granular bed with different injection rates (with N. Machicoane in LEGI, Grenoble, challenge: water-filled pores)
- Particle kinematics in a dense suspension (with H. Bodiguel in LRP, Grenoble, challenge: small particle size)
- Particle collisions in dense granular flow around an obstacle (with T. Faug in INRAE, Grenoble, challenge: acquisition speed)
- Kinematic fluctuations during lid-driven shear (with G. Viggiani 3SR, Grenoble and B. Marks USYD, Sydney, challenge: number of particles)

The development of a high-speed x-ray detector is also a possibility, for which internal 3SR funding can be used. Within the limits of travel restrictions, a visit to B. Marks in the University of Sydney is envisioned, to test the technique and some demonstrators on the 3-source 3-detector x-ray system available there.

Location and practical aspects

The successful applicant will be hosted by Laboratoire 3SR in Grenoble, a solid mechanics lab in the tec21 network. They will work under the supervision of Edward Andò from Laboratoire 3SR to develop this imaging technique, and will closely collaborate with the co-PIs mentioned above for the demonstrator experiments.

The gross salary will be 2656 euros/months, equivalent to a net salary of about 2134 euros/month.

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Qualifications of the applicant

Applicants are required to have a strong background (as supported by publications in relevant journals) in:

- experimental mechanics
- x-ray imaging
- scientific software development in python and C++

All research work will be in English, and a good written and spoken level is required.

The project has a number of actors, and so candidates with good communication and organisational skills will thrive in this environment.

Applications

Interested candidates should send their CV and cover letter (in PDF form) to:

edward.ando@3sr-grenoble.fr

Receipt of applications will acknowledged.

Deadline for the application: **Midnight, Paris time, on the 11th of June 2021**