Recruitment for the position of Assistant-Professor (*Maître-Assistant*) in

Physics of Dispersed Media

in the SPIN Centre for Chemical Engineering

The École Nationale Supérieure des Mines de Saint-Etienne (EMSE), École de l'Institut Mines Télécom, under the supervision of the Ministry of the Economy, Industry and Digital Technology, is assigned missions of education, research and innovation, transfer to industry and scientific, technical and industrial culture. The EMSE consists of 1,800 engineering and research students, 420 staff members, a consolidated budget of €50M, three sites on the Saint-Etienne campus (Loire Department), a campus in Gardanne (Bouches-du-Rhône Department), five educational training and research centres, seven research laboratories, a scientific, technical and industrial cultural centre (La Rotonde) and development projects in France and abroad.

The SPIN Center (« Sciences of Natural and Industrial Processes ») is a teaching and research centre recognized for its expertise in Chemical Engineering applied to dispersed media (grains, particles, powders, porous media, soils …). It belongs to the joint research unit UMR 5307 of CNRS. It uses its scientific knowledge and top-notch equipment to bring innovation to industrial companies facing the challenges of energy optimization and high performance materials design. The SPIN Centre is organized in three departments and six research themes: powder technology, geometry and physico-chemistry of granular materials, complex hydro-systems and geo-processes, industrial crystallization, reactivity of solids and their transformation as well as electrical properties of solids interacting with a gas.

The PMMG department («Handling processes for granular matter»), where the successful candidate will work, is a team of around 10 researchers that are developing original characterization techniques, theoretical models and numerical methods in order to predict the behaviour of granular materials in unit operations (grinding, compression, transport, agglomeration, mixing, separation, thermo-chemical transformation, …). Most of our research projects are conducted in partnership with top high-tech companies such as Michelin, Lafarge, Framatome, Orano, CEA, Saint-Gobain, Total, Solvay, Imerys, Blue Star Silicones …

We aim to strengthen our competencies in modelling the physical phenomena driving the behaviour of dispersed media. For almost a decade, the PMMG department has positioned itself as a major player in using numerical simulations to address the industry needs to better control granular unit operations. Numerous high fidelity methods are routinely used (DEM, SPH, LBM …). However, in spite of the increasing computing power, the modelled systems are still of modest size (a few million particles for a few seconds or minutes). The challenge we would like to tackle is the development of new and efficient models that can ultimately simulate industrial-scale systems in or near real time. These digital twins will help industrial companies to better design their processes and high performance materials (Digital design).

To contribute to the realization of that goal, we are looking for a talented young researcher. We offer a diverse, multidisciplinary and stimulating working environment, fostering professional and personal growth.

1) Missions

Teaching activities

The candidate will give lectures and tutorials and will monitor students in various projects and internships of the Engineering and MSc courses. The successful candidate will cover a wide spectrum in the following disciplines: Chemical Engineering (heat transfers, unit operations, fluid mechanics …) and Physics of Dispersed Media (solid state physics, statistical physics, multiphase flows, suspension rheology, geometrical characterization …).

The successful candidate may also teach within other education programmes: MSc Masters, Doctoral courses, continuing education and students with employee status. The recruited person will participate in the teams designing new pedagogies, especially those with a numerical approach. The successful candidate shall be able to deliver his/her teaching (possibly MOOCs) in English. A minimum annual teaching volume must be completed. It includes lectures, preparation, student tutoring and module management.

Research activities

The successful candidate will integrate the PMMG department of the SPIN Centre. He/She will carry out research in the field of the Chemical Engineering applied to the processes involving dispersed media (solid particles in gas or liquid, emulsions, sprays …). His/Her main objective will be to strengthen the group capacities by developing models able to simulate unit operations on an industrial scale. A special emphasis will be given to processes with strong couplings (mechanical, thermal, chemical …) and those often encountered in industry (e.g.: rotating ovens, fluidized beds …) for diverse applications (e.g.: oxidation, hydration, gasification …). He/She will test his/her models against experimental data and/or high precision numerical simulations.

The missions assigned to the successful candidate are:

- To conduct research activities in coherence with the projects of the SPIN Centre
- To co-supervise PhD students and research projects, promote his/her results (publications, patents,…)
- To participate in setting up and managing collaborative projects, with academic or industrial partners, both French and international
- To participate in raising funds and applying for grants from public institutions or private partners
- To be ready to defend his/her *Habilitation* 5 to 7 years after recruitment

These missions will be carried out on the Campus of Saint-Etienne, in the SPIN Center, in the frame of the Georges Friedel Laboratory UMR CNRS 5307.

2) Candidate profile and evaluation criteria

The candidate should hold a PhD, typically in physics or chemical engineering (sections 28, 60 or 62 of the National Council of Universities CNU).

The candidate should have an in-depth knowledge in one or more of the fields listed below and explain how he/she will articulate them to meet his/her research objectives:

- statistical physics (at equilibrium and out of equilibrium)
- physics of soft matter and complex systems
- fluid mechanics, especially multi-phase flows
- chemical engineering, especially applied to granular matter
- population balances
- model reduction (RB, POD, PGD, …)
- artificial intelligence (machine learning)
- high performance computing (GPU or CPU)

The main evaluation criteria are as follows:

- significant teaching experience in the fields cited above at graduate or postgraduate level, as well as an interest for new pedagogical approaches
- scientific production: quality and number of articles in leading peer-reviewed journals
- ability to defend a *Habilitation* within 5 to 7 years
- ability to develop his/her activities in coherence with the projects of the SPIN Centre
- English language mastery
- significant experience abroad

Furthermore, the jury will evaluate the candidate's potential to:

- conduct his/her research in partnership with private companies and other public institutions
- initiate and animate full exchange programmes with other universities (teaching and research)

Command of the English language is essential. Given the School's international development projects, significant international experience is strongly recommended. Failing this, an international mobility with a foreign partner institution should be envisaged during the three years following recruitment.

3) Recruitment conditions

By application of the specific status of teaching staff of the Mines Telecom Institute (modified decree n° 2007-468 of the 28th March 2007), candidates should hold a doctorate diploma or a similar recognized qualification level, equivalent to the required national diplomas.

In addition, candidates should have European Union citizen status as of the day of the application submission (law 83-634 of the 13th July 1983 referring to the rights and obligations of public employees; Art. 5 and 5 bis).

Required date for taking up the position: October 1st, 2019

4) Application procedure

The application file must include:

- an application cover letter,
- a CV showing teaching activities, research activities and, when applicable, relationships with businesses and industrial organizations (maximum 10 pages),
- letters of reference, at the candidate's discretion,
- copy of the Doctorate diploma (or PhD)
- copy of an identity document

These documents shall be addressed for the attention of the Director of the École Nationale Supérieure des Mines de Saint-Etienne no later than April 30th, 2019 (as per postmark) and sent to:

École nationale supérieure des Mines de Saint-Étienne
For the attention of Madame Elodie EXBRAYAT

Department of Personnel and Human Resources
158, Cours Fauriel

42023 Saint-Étienne cedex 2
France

Candidates selected for an interview will be informed rapidly. Part of the interview will be held in English. Cover letters, CVs and application files written in English will be accepted, but applicants will have to demonstrate in their application file their ability to efficiently communicate in French with students, fellow faculty members and the school administration. For those invited to be interviewed, the same will be expected in oral form and tested by the selection committee.

5) For more information …

Please visit the following websites:

- SPIN Centre: www.mines-stetienne.fr/spin
- Mines Saint-Etienne: www.mines-stetienne.fr

For any information on the position, please contact:

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